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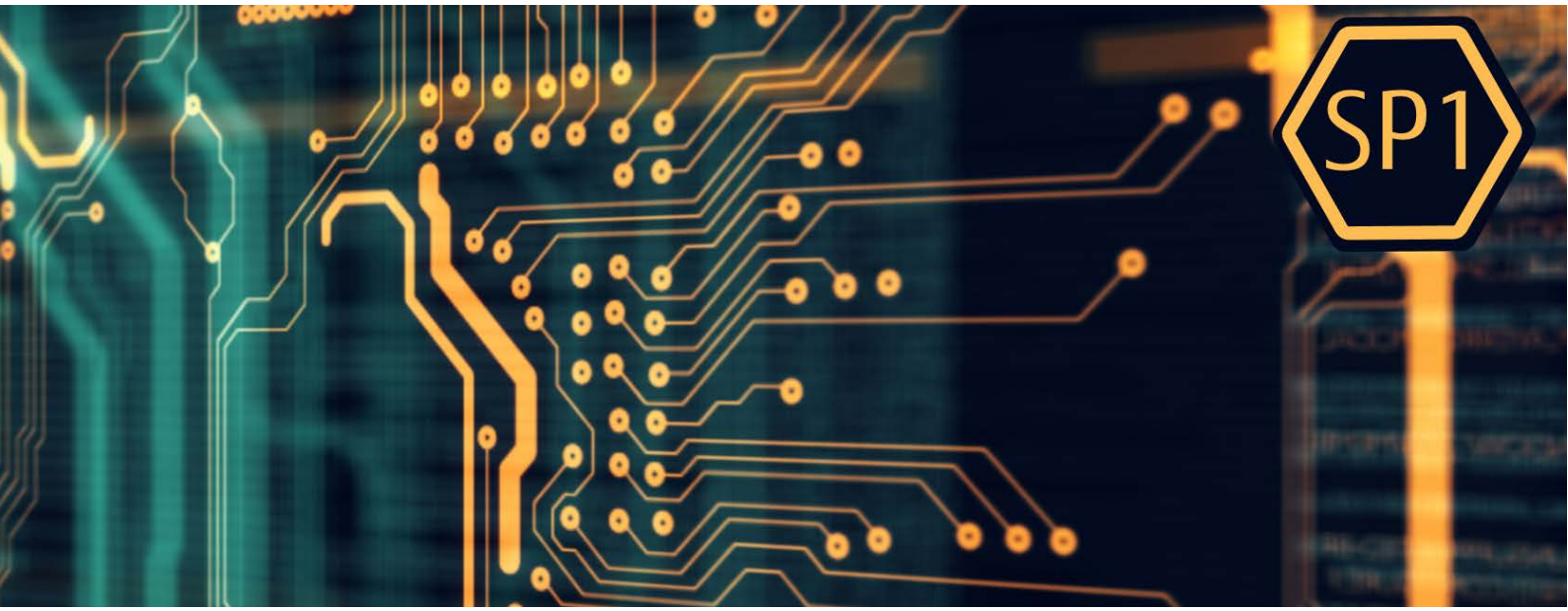

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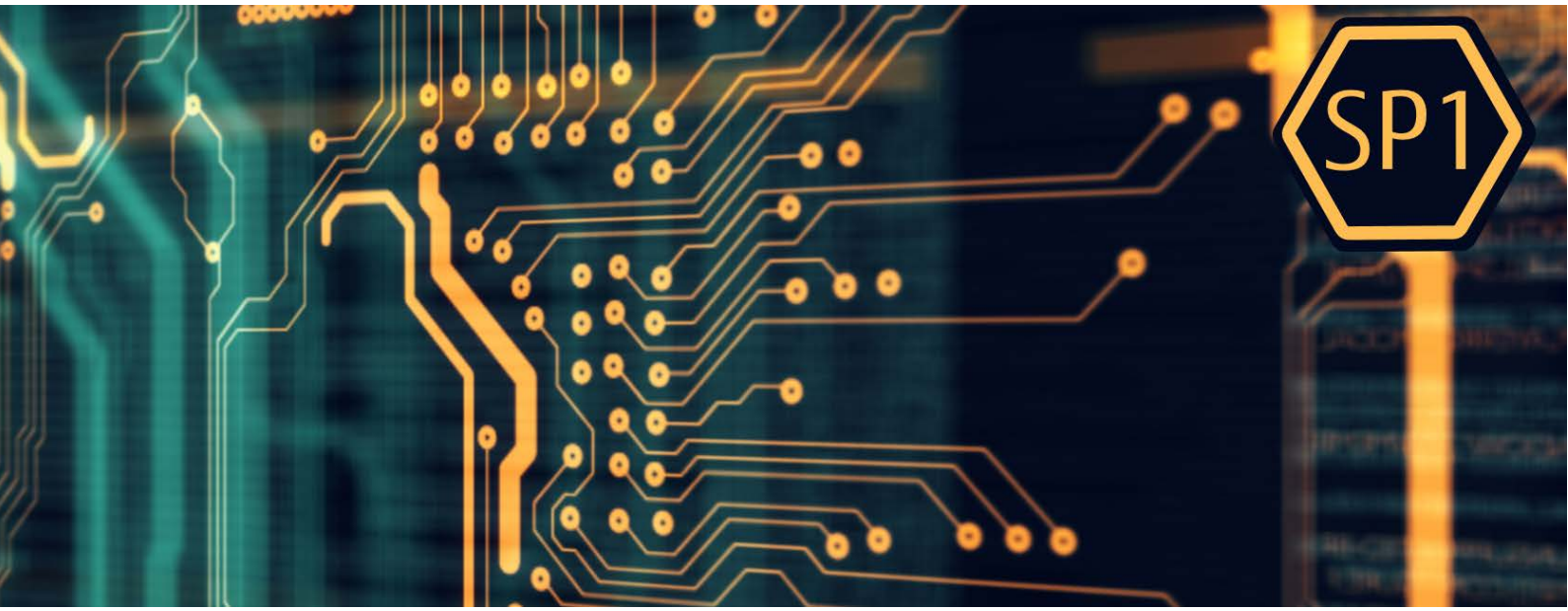

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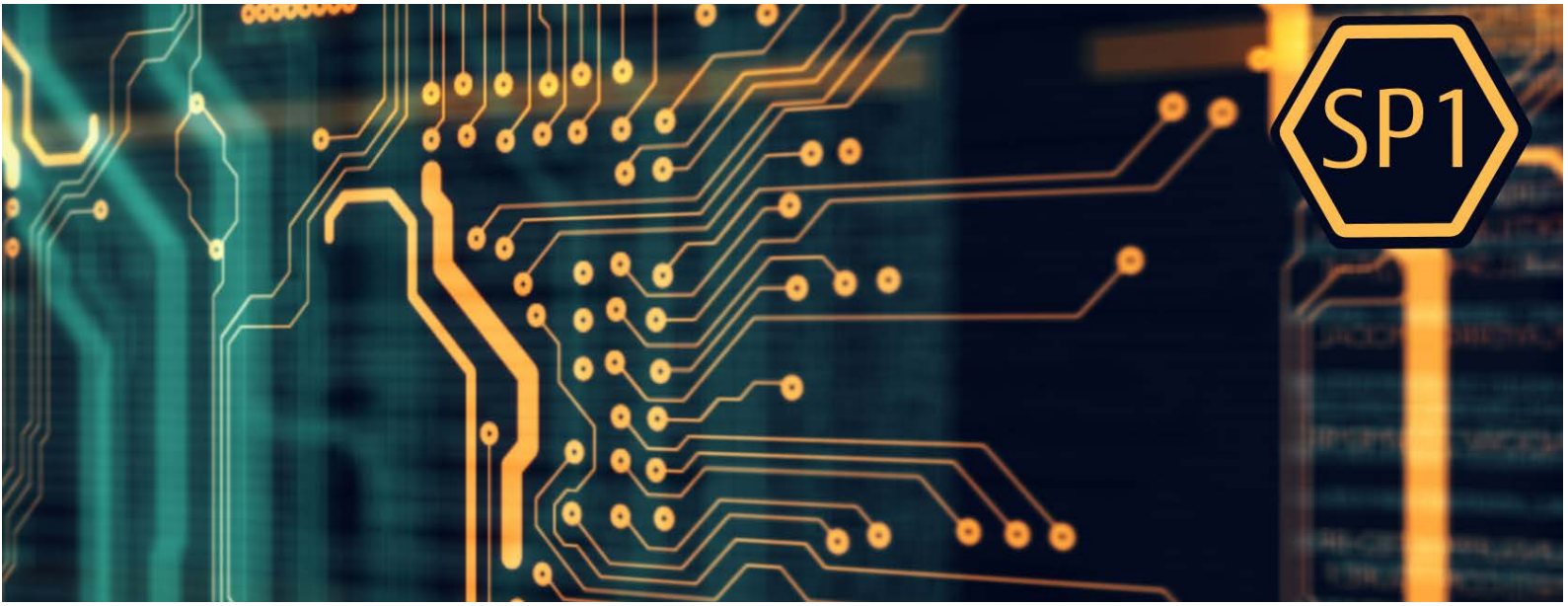

Documentation Roadmap

Windows/Linux

J2UL-2670-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document is intended for users of "FUJITSU Software Enterprise Postgres" (hereafter referred to as "FUJITSU Enterprise Postgres"), and explains how to read the manuals.

Structure of this document

The structure and content of this manual is shown below.

Chapter 1 How to Read the Manuals

This section explains the notational conventions in FUJITSU Enterprise Postgres manuals.

Chapter 2 Trademarks

This section explains the trademarks.

Export restrictions

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Issue date and version

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Chapter 1 How to Read the Manuals

The FUJITSU Enterprise Postgres manuals use certain notational conventions and rules. Pay attention to these conventions and rules when reading the FUJITSU Enterprise Postgres manuals.

1.1 Intended Products

The manuals apply to the following products:

- FUJITSU Enterprise Postgres Advanced Edition
- FUJITSU Enterprise Postgres Standard Edition

1.2 Abbreviations of Manual Titles

The following tables list abbreviations of the titles of manuals for FUJITSU Enterprise Postgres as they appear in the manuals.

Formal manual title	Abbreviation in FUJITSU Enterprise Postgres manuals
FUJITSU Enterprise Postgres Release Notes	Release Notes
FUJITSU Enterprise Postgres General Description	General Description
FUJITSU Enterprise Postgres Installation and Setup Guide for Server	Installation and Setup Guide for Server
FUJITSU Enterprise Postgres Installation and Setup Guide for Client	Installation and Setup Guide for Client
FUJITSU Enterprise Postgres Installation and Setup Guide for Server Assistant	Installation and Setup Guide for Server Assistant
FUJITSU Enterprise Postgres Operation Guide	Operation Guide
FUJITSU Enterprise Postgres Cluster Operation Guide (Database Multiplexing)	Cluster Operation Guide (Database Multiplexing)
FUJITSU Enterprise Postgres Cluster Operation Guide (PRIMECLUSTER)	Cluster Operation Guide (PRIMECLUSTER)
FUJITSU Enterprise Postgres Security Operation Guide	Security Operation Guide
FUJITSU Enterprise Postgres Application Development Guide	Application Development Guide
FUJITSU Enterprise Postgres Connection Manager User's Guide	Connection Manager User's Guide
FUJITSU Enterprise Postgres Reference	Reference
FUJITSU Enterprise Postgres Java API Reference	Java API Reference
FUJITSU Enterprise Postgres Npgsql API Reference	Npgsql API Reference
FUJITSU Enterprise Postgres Glossary	Glossary
FUJITSU Enterprise Postgres Messages	Messages
PostgreSQL 13.3 Documentation	PostgreSQL Documentation

1.3 System of Manuals and How to Use the Manuals

This section describes the system of manuals for FUJITSU Enterprise Postgres.

1.3.1 System of Manuals

FUJITSU Enterprise Postgres manuals

The table below shows the manuals on FUJITSU Enterprise Postgres.

Use/Purpose	Manual title	Content	When to read
Deciding whether to upgrade the product.	Release Notes	Overview of upgraded features and incompatibility information.	When learning about features upgraded from earlier versions and incompatibility information.
Acquiring an overview of the product and the basic information required for work and operation.	General Description	Description of all available functions associated with each intended purpose or use, and screenshots of operations.	When learning basic information and restrictions that system engineers and operators must know to actually operate the product.
Installing and setting up FUJITSU Enterprise Postgres correctly to enable its use.	Installation and Setup Guide for Server	Procedure for installing and setting up FUJITSU Enterprise Postgres.	When installing and setting up FUJITSU Enterprise Postgres.
Installing the FUJITSU Enterprise Postgres client function correctly to enable its use.	Installation and Setup Guide for Client	Installing the FUJITSU Enterprise Postgres client function.	When installing the FUJITSU Enterprise Postgres client function.
Installing and setting up the FUJITSU Enterprise Postgres Server Assistant.	Installation and Setup Guide for Server Assistant	Procedure for installing and setting up the FUJITSU Enterprise Postgres Server Assistant.	When installing and setting up the FUJITSU Enterprise Postgres Server Assistant.
Operating and managing FUJITSU Enterprise Postgres.	Operation Guide	Description of the tasks required in FUJITSU Enterprise Postgres management and operation.	When learning how to operate and manage the databases.
Performing switchover using database multiplexing mode.	Cluster Operation Guide (Database Multiplexing)	Description of the tasks required for database multiplexing operation.	When using database multiplexing mode to create operating environment for switchover and perform it.
Performing failover using PRIMECLUSTER.	Cluster Operation Guide (PRIMECLUSTER)	Description of how to set up failover and perform operations using PRIMECLUSTER.	When performing failover using PRIMECLUSTER.
Performing security operation.	Security Operation Guide	Description of the tasks required for security operations.	When using security features and performing security operation in FUJITSU Enterprise Postgres.
Applications using the interface provided by FUJITSU Enterprise Postgres.	Application Development Guide	Procedure for creating an application using embedded SQL, JDBC driver, ODBC	When developing an application using the interface provided by FUJITSU Enterprise Postgres.

Use/Purpose	Manual title	Content	When to read
		driver, and .NET Data Provider.	
Performing high availability system using the Connection Manager feature.	Connection Manager User's Guide	Description of the features, setup, and usage of Connection Manager.	When using Connection Manager features by FUJITSU Enterprise Postgres.
Usage of FUJITSU Enterprise Postgres commands.	Reference	Description of the FUJITSU Enterprise Postgres commands expanded on from PostgreSQL.	When learning FUJITSU Enterprise Postgres command functions, options, and examples of use.
Learning the syntax of the JDBC API.	Java API Reference	Description of the syntax of the JDBC API.	When learning the syntax of the JDBC API.
Learning the syntax of the Npgsql API.	Npgsql API Reference	Description of the syntax of the Npgsql API.	When learning the syntax of the Npgsql API.
Learning the meaning of the terms of FUJITSU Enterprise Postgres.	Glossary	Description of the terms used in the FUJITSU Enterprise Postgres manuals.	When checking the meaning of terms used in the FUJITSU Enterprise Postgres manuals.
Referring to messages from FUJITSU Enterprise Postgres and taking measures for them.	Messages	Description of each message and description of any measures to be taken for it.	When finding out the specific measures for dealing with messages from FUJITSU Enterprise Postgres.

PostgreSQL manual

The table below shows the manual on PostgreSQL-compatible features.

Use/Purpose	Manual title	Content	When to read
Learning about PostgreSQL features.	PostgreSQL Documentation	Official PostgreSQL documentation. Explains all features officially supported by the relevant version of PostgreSQL.	When learning how to use PostgreSQL.

1.3.2 Documentation Road Map

This section provides a documentation roadmap, broken down by user role.

Database administrator

The database administrator is a user who performs FUJITSU Enterprise Postgres installation and setup, and who operates and monitors the database.

Refer to the manuals in the table below, according to purpose:

	Purpose	Manual name
Required reading	To learn about upgraded features and incompatibility information	Release Notes
	To read an overview of the software	General Description
	To perform installation and setup	Installation and Setup Guide for Server
		Cluster Operation Guide (Database Multiplexing)
		Cluster Operation Guide (PRIMECLUSTER)
		Connection Manager User's Guide
	To install the Server Assistant	Installation and Setup Guide for Server Assistant
	To operate and monitor	Operation Guide
		Security Operation Guide
		Cluster Operation Guide (Database Multiplexing)
		Cluster Operation Guide (PRIMECLUSTER)
		Reference
	Using Connection Manager features	Connection Manager User's Guide
	Reference	Messages
		Glossary
Refer to as required	To learn about PostgreSQL features	PostgreSQL Documentation

Application developer

The application developer is a user who defines the database and develops applications.

Refer to the manuals in the table below, according to purpose:

	Purpose	Manual name
Required reading	To learn about upgraded features and incompatibility information	Release Notes
	To read an overview of the software	General Description
	To perform installation and setup	Installation and Setup Guide for Client
	To define a database	Operation Guide
	To develop applications	Application Development Guide
		Java API Reference

	Purpose	Manual name
		Npgsql API Reference
	Using Connection Manager features	Connection Manager User's Guide
	Reference	Messages
		Glossary
Refer to as required	To learn about PostgreSQL features	PostgreSQL Documentation

1.4 Notational Conventions in the Manuals

Manual titles and product names in the manual are abbreviated.

This section explains the notational conventions for abbreviations and platform-specific information in the manuals.

1.4.1 Platform-specific Information

Even manuals whose title has a platform name contains content common to all the platforms supported by FUJITSU Enterprise Postgres. In such cases, the platform-specific information is marked as shown below. Refer to only the necessary information.

Linux

Indicates content concerning Linux.

Windows(R)

Indicates content concerning Windows(R).

1.4.2 Abbreviation of Product Names

The following table lists abbreviations of the names of products related to FUJITSU Enterprise Postgres as they appear in the manuals.

Formal name	Abbreviation
Oracle Solaris 10 and Oracle Solaris 11	Solaris
Red Hat(R) Enterprise Linux(R) 7 Red Hat(R) Enterprise Linux(R) 8 and SUSE Linux Enterprise Server 12	Linux
Red Hat(R) Enterprise Linux(R) 7	RHEL7
Red Hat(R) Enterprise Linux(R) 8	RHEL8
SUSE Linux Enterprise Server 12	SLES 12
Windows(R) 8.1, Windows(R) 8.1 Pro and Windows(R) 8.1 Enterprise	Windows(R) 8.1
Windows(R) 10 Home, Windows(R) 10 Education, Windows(R) 10 Pro and Windows(R) 10 Enterprise	Windows(R) 10

Formal name	Abbreviation
Microsoft(R) Windows Server(R) 2016 Datacenter, Microsoft(R) Windows Server(R) 2016 Standard and Microsoft(R) Windows Server(R) 2016 Essentials	Windows Server(R) 2016
Microsoft(R) Windows Server(R) 2019 Datacenter, Microsoft(R) Windows Server(R) 2019 Standard and Microsoft(R) Windows Server(R) 2019 Essentials	Windows Server(R) 2019
Windows(R) 8.1, Windows(R) 8.1 Pro, Windows(R) 8.1 Enterprise, Windows(R) 10 Home, Windows(R) 10 Education, Windows(R) 10 Pro, Windows(R) 10 Enterprise, Microsoft(R) Windows Server(R) 2016 Datacenter, Microsoft(R) Windows Server(R) 2016 Standard and Microsoft(R) Windows Server(R) 2016 Essentials Microsoft(R) Windows Server(R) 2019 Datacenter, Microsoft(R) Windows Server(R) 2019 Standard and Microsoft(R) Windows Server(R) 2019 Essentials	Windows(R)
Internet Explorer(R) 11	Internet Explorer
Microsoft(R) Edge	Edge
Java Naming and Directory Interface	JNDI
Java(TM) 2 SDK, Standard Edition, Java(TM) 2 Platform, Enterprise Edition, Java(TM) Platform, Standard Edition and Java(TM) Development Kit	JDK
Java(TM) 2 Runtime Environment, Standard Edition and Java(TM) Runtime Environment	JRE
Microsoft(R) Visual Basic(R) for Applications	VBA
Microsoft(R) Visual Basic	Visual Basic
Microsoft(R) Visual Basic.NET	Visual Basic.NET
Microsoft(R) Visual Studio	Visual Studio
Microsoft(R) Visual Studio.NET	Visual Studio.NET
Microsoft .NET Framework	.NET Framework or.NET
Interstage Application Server Enterprise Edition, Interstage Application Server Standard-J Edition and Interstage Web Server	Interstage Application Server
FUJITSU Enterprise Postgres Advanced Edition (64bit)	AE or FUJITSU Enterprise Postgres Advanced Edition
FUJITSU Enterprise Postgres Standard Edition (64bit)	SE or FUJITSU Enterprise Postgres Standard Edition

Remarks: The symbols (R) and (TM) may be omitted in this manual.

1.4.3 FUJITSU Enterprise Postgres Conventions

The naming conventions for the FUJITSU Enterprise Postgres product names and functions used in the FUJITSU Enterprise Postgres manuals are shown below.

1.4.3.1 Server

The names used in the manuals in explanations regarding FUJITSU Enterprise Postgres functions are shown below.

Product name	Name used in manuals
FUJITSU Enterprise Postgres Advanced Edition (64bit) and FUJITSU Enterprise Postgres Standard Edition (64bit)	64-bit product

1.4.3.2 Client

The names used in the manuals in explanations regarding FUJITSU Enterprise Postgres client functions are shown below.

Product name	Name used in manuals
FUJITSU Enterprise Postgres Client (64bit)	64-bit product
FUJITSU Enterprise Postgres Client (32bit)	32-bit product

1.4.4 Symbol Convention

The symbols shown below are used in the manuals.

Symbol	Meaning
[ ]	These symbols indicate characters displayed in a window or dialog box or keyboard keys. Examples: [Setting] dialogue box, [File] menu, [Item name], [OK] button, [Enter] key.

1.5 Notes about Manuals

This section contains notes about the FUJITSU Enterprise Postgres operating environments and manuals.

- Images in figures

  The FUJITSU Enterprise Postgres manuals contain figures showing printouts for FUJITSU Enterprise Postgres to provide the reader an idea of what the printouts look like, but since the figures are only examples, they are incomplete.

- Explanatory examples

  Most of the examples of databases in the FUJITSU Enterprise Postgres manuals are modeled after inventory control databases of retail stores. The design and contents of the databases in the examples are fictitious and do not represent any real database.

- UNIX release version number

  This system conforms to UNIX System V Rel4.2MP.

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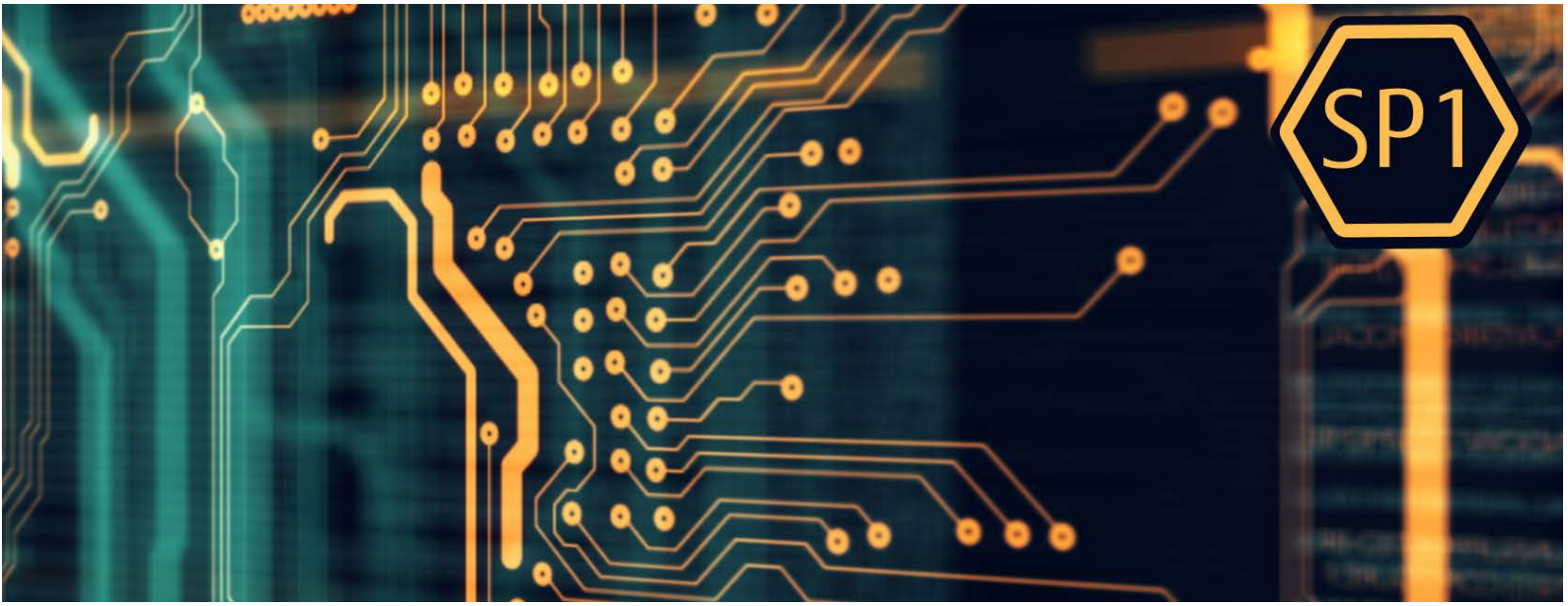

Glossary

Windows/Linux

J2UL-2686-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document explains FUJITSU Enterprise Postgres terminology.

Intended readers

This document is aimed at all users of FUJITSU Enterprise Postgres.

Export restrictions

Exportation/release of this document may require necessary procedures in accordance with the regulations of your resident country and/or US export control laws.

Issue date and version

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Edition 2.0: August 2021
Edition 1.0: April 2021
```

Copyright

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Glossary

Arbitration command

A user exit (user command) called when an abnormality is detected using operating system/server heartbeat monitoring in database multiplexing mode.

Arbitration server

A dedicated server on which the Server Assistant program is installed.

Archive log

Contains the history of updates made to the database, and is used during recovery.

Backup data storage destination

The directory that stores the backup data.

Client command

A command that is executed from the client machine and used. Also known as a client application.

Connection Manager

The replication operation to continue without knowing where the application is connected.

The Connection Manager feature improves the availability.

Data storage destination

The directory that stores the database clusters.

Database cluster

The database storage area on the database storage disk. Database clusters are a collection of databases managed by an instance.

Data masking

A feature that can change the returned data for queries generated by applications, to prevent exposing actual data.

Database multiplexing

Mechanism in which a database is made redundant on multiple servers, by transferring transaction logs (WAL) via the network to enable application jobs to be continued.

Database superuser

A user defined in the database with access privileges for all database objects.

Encoding

Indicates the character set.

Fencing

A process that isolates a database server with an unstable status from the cluster system in database multiplexing mode. This process is implemented as a fencing command.

Fencing command

A user exit (user command) that implements fencing in database multiplexing mode.

Global Meta Cache

The Global Meta Cache feature cache the informations about system catalogs information (catalog meta cache) in shared memory. The catalog meta cache on shared memory is called the Global Meta Cache (GMC).

Instance

A series of server processes for managing database clusters.

Instance administrator

The OS user account that owns the database cluster files and operates the database server processes.

Instance name

Indicates the instance name.

Local Meta Cache Limit

The ability to limit the size by removing the Local Meta Cache that has not been accessed for a long time.

Local Meta Cache is a meta cache (system catalog and table definition information) held in local memory.

Masking policy

A method of changing data under specific conditions when it is returned for a query from an application. You can configure masking target, masking type, masking condition and masking format.

Mirrored transaction log

The log that mirrors the transaction log at the backup data storage destination.

Mirroring Controller arbitration process

A process that performs arbitration and fencing on the arbitration server.

Mirroring Controller monitoring process

A process that performs heartbeat monitoring of the Mirroring Controller process. If the Mirroring Controller process returns no response or is down, the Mirroring Controller monitoring process is restarted automatically.

Mirroring Controller process

A process that performs operating system/server and process heartbeat monitoring and disk abnormality monitoring between database servers. Additionally, the process issues arbitration requests to the arbitration server and executes arbitration commands.

Pgpool-II connection pooling

The connection pooling feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

This feature maintains the connection established with the database server and reuses that connection each time a new connection with the same properties (user name, database, and protocol version) arrives. By reducing the connection overhead for the database server, throughput of the whole system is improved.

Pgpool-II failover

The automatic failover feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

If any of the database servers crashes or can no longer be reached, this feature disconnects the server and continues operation on the remaining servers. The streaming replication feature of PostgreSQL is combined with Pgpool-II to achieve a high-availability system.

Pgpool-II load balancing

The load balancing feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

This feature distributes reference queries to multiple database servers, improving throughput of the whole system. The database multiplexing feature or PostgreSQL streaming replication feature is combined with Pgpool-II to reduce the load on the database server.

Pgpool-II server

A server for using the failover, connection pooling, and load balancing features of Pgpool-II. It is a dedicated server that has a server program installed for using these features.

Primary server

The server that processes the main database jobs during multiplexed database operation.

Server Assistant

A feature that objectively determines the status of database servers as a third party, and if necessary, isolates affected databases if the database servers are unable to accurately ascertain their mutual statuses in database multiplexing mode, such as due to a network error between database servers, or server instability.

Server Assistant program

A program to be installed on the arbitration server.

Server command

A command used on the database server. Also known as a server application.

Standby server

A server that generates a replicated database synchronized with the primary server, and that can run as an alternative server in case the primary server fails during multiplexed database operation.

State transition command

A user exit (user command) called when Mirroring Controller performs a state transition of a database server in database multiplexing mode. State transition commands include the post-switch command, pre-detach command, and post-attach command.

Transaction log

Contains the history of updates made to the database by transactions. Also known as the WAL (Write-Ahead Log).

Transaction log storage destination

The directory that stores the transaction log.

VCI (Vertical Clustered Index)

An index with columnar data structure suitable for aggregation.

WAL (Write-Ahead Log)

Has the same meaning as 'transaction log'.

WebAdmin program

A GUI-based program installed on a database server or a dedicated WebAdmin server, used to manage database instances.

WebAdmin server

By using the WebAdmin program on a different server to the database server, instances on multiple database servers can be managed from a dedicated WebAdmin server on which the WebAdmin program is installed.

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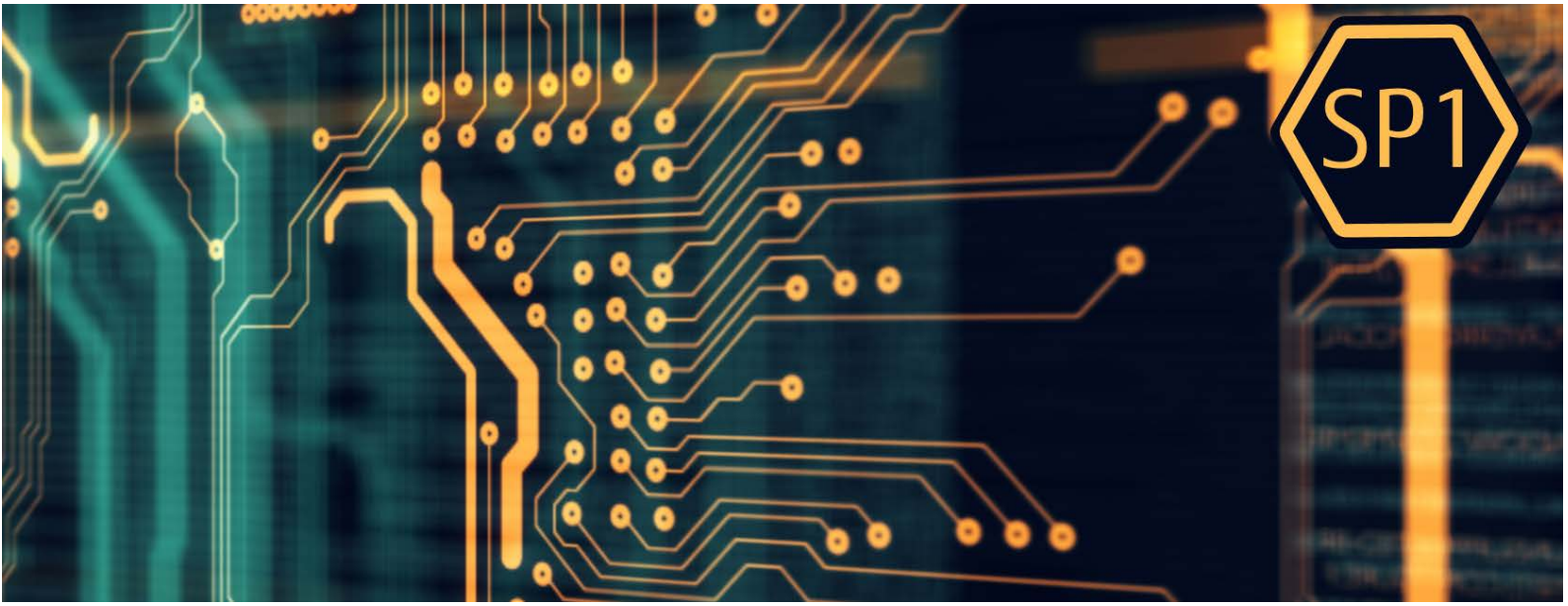

General Description

Windows/Linux

J2UL-2673-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document explains the FUJITSU Enterprise Postgres concepts to those who are to operate databases using it.

This document explains the features of FUJITSU Enterprise Postgres.

Intended readers

This document is intended for people who are:

- Considering installing FUJITSU Enterprise Postgres
- Using FUJITSU Enterprise Postgres for the first time
- Wanting to learn about the concept of FUJITSU Enterprise Postgres
- Wanting to see a functional overview of FUJITSU Enterprise Postgres

Readers of this document are also assumed to have general knowledge of:

- Computers
- Jobs
- Linux
- Windows(R)

Structure of this document

This document is structured as follows:

Chapter 1 FUJITSU Enterprise Postgres Basics

Explains the features of FUJITSU Enterprise Postgres.

Appendix A List of Features

Lists the main features provided by FUJITSU Enterprise Postgres.

Appendix B OSS Supported by FUJITSU Enterprise Postgres

Explains the OSS supported by FUJITSU Enterprise Postgres.

Appendix C Features that can be Used on Servers Other than the Database Server

Explains features that can be used on servers other than the database server.

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Chapter 1 FUJITSU Enterprise Postgres Basics

FUJITSU Enterprise Postgres maintains the operating methods, interfaces for application development and SQL compatibility of PostgreSQL, while providing expanded features for enhanced reliability and operability.

This chapter explains the functionality extended by FUJITSU Enterprise Postgres.

Refer to "Appendix A List of Features" for feature differences between editions.

Additionally, FUJITSU Enterprise Postgres supports various open source software (OSS). Refer to "Appendix B OSS Supported by FUJITSU Enterprise Postgres" for information on OSS supported by FUJITSU Enterprise Postgres.

FUJITSU Enterprise Postgres has the following features:

- Flexible database recovery
  Not only does FUJITSU Enterprise Postgres recover data to its most recent form when a failure occurs, which is essential for databases, but it can also recover to any point in time. Additionally, backup/recovery can be performed using any copy technology.

- Simple GUI-based installation and operation management
  FUJITSU Enterprise Postgres uses GUI to simplify cumbersome database operations, and allows databases to be used intuitively.

- High reliability by using database multiplexing
  Database multiplexing protects important data and enables highly reliable database operation.

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- High reliability by using the failover feature integrated with the cluster software
  FUJITSU Enterprise Postgres links with PRIMECLUSTER, thereby allowing highly reliable systems to be achieved by using failover.

- Seamless migration from Oracle databases
  FUJITSU Enterprise Postgres provides a compatibility feature with Oracle databases that localizes the correction of existing applications and allows easy migration to FUJITSU Enterprise Postgres.

- Linkage with integrated development environment
  FUJITSU Enterprise Postgres links with Visual Studio, thereby allowing a standard framework to be used to create applications.

- Storage Data Protection using Transparent Data Encryption
  Information can be protected from data theft by encrypting data to be stored in the database.

- Data masking for improved security
  The data masking feature changes the returned data for queries from applications, to prevent exposing actual data. This improves security for handling confidential data such as personal information.

- Audit logs for improved security
  Audit logs can be used to counter security threats such as unauthorized access and misuse of privileges for the database.

- Enhanced query plan stability
  The following features can control SQL statement query plans:

  - Optimizer hints
  - Locked statistics

  These features are used for curbing performance deterioration caused by changes in SQL statement query plans, such as with mission-critical jobs that emphasize performance stability over improved SQL statement processing performance.

- Increased aggregation performance using the in-memory feature
  The following features help speed up scans even when aggregating many rows.

  - Vertical Clustered Index (VCI)
  - In-memory data

- High-speed data load
  Data from files can be loaded at high speed into FUJITSU Enterprise Postgres tables using the high-speed data load feature.

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- High availability by using Connection Manager
  With the Connection Manager features, replication operation can be continued without being aware of the connection destination of the applications.

- Memory usage reduction using Global Meta Cache
  The Global Meta Cache feature loads some of meta cahe information in shared memory. This reduces overall system memory usage.

- Memory usage reduction using Local Meta Cache Limit
  Reduce memory consumption by limiting the metacache that is kept in local memory.

1.1 Flexible Database Recovery

Threats such as data corruption due to disk failure and incorrect operations are unavoidable in systems that use databases. The ability to reliably recover corrupted databases without extensive damage to users when such problems occur is an essential requirement in database systems.

FUJITSU Enterprise Postgres provides the following recovery features that flexibly respond to this requirement:

- Media recovery, which recovers up to the most recent point in time
- Point-in-time recovery, which can recover up to a specific point in time
- Backup/recovery that can integrate with various copy technologies

Media recovery, which recovers up to the most recent point in time

When a disk failure occurs, media recovery can recover data to how it was immediately before the failure.

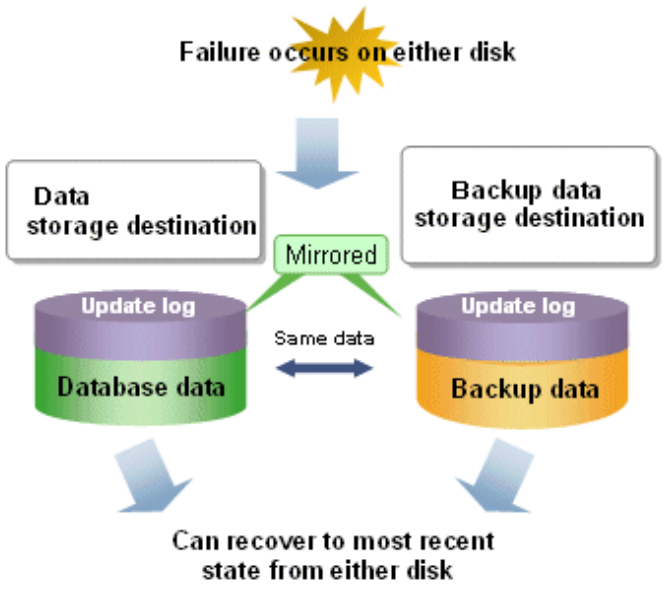
In order to recover the database, FUJITSU Enterprise Postgres accumulates a history of database update operations, such as data additions and deletions, as an update log.

FUJITSU Enterprise Postgres retains a duplicate (mirror image) of the update log after backup execution on the data storage destination and on the backup data storage destination. Therefore, the data on one disk can be used to recover to the most recent state of the database even if a disk failure has occurred on the other.

Media recovery is executed using either a GUI tool provided with FUJITSU Enterprise Postgres (WebAdmin) or server commands.

Information

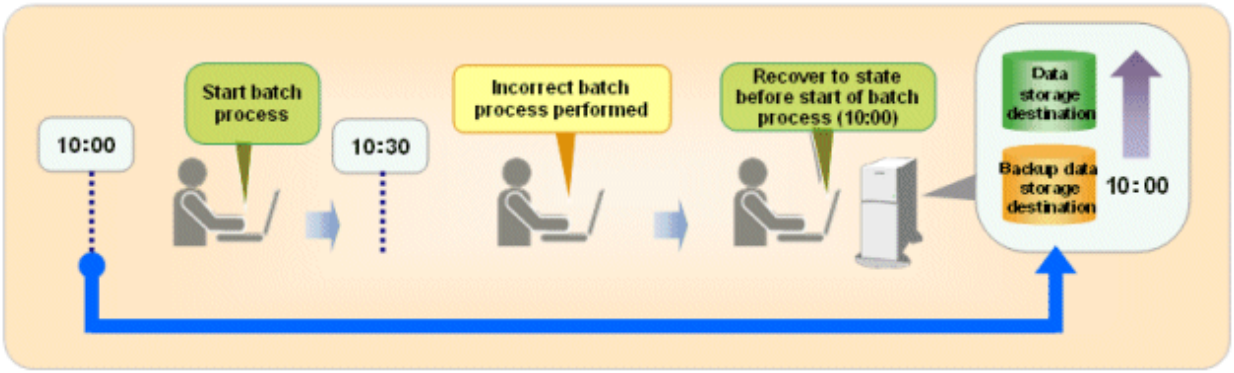
Recovery using WebAdmin requires less time and effort, since WebAdmin automatically determines the scope of the operation.



Point-in-time recovery, which can recover up to a specific point in time

Point-in-time recovery can be used to recover a database that has been updated by an incorrect operation, for example, by specifying any date and time before the incorrect operation.

Point-in-time recovery is executed using FUJITSU Enterprise Postgres server commands.



Backup/recovery that can integrate with various copy technologies

It is possible to back up to the backup data storage destination, or to any backup destination using any copy technology implemented by user exits.

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For example, by using the high-speed copy feature of the storage device, the processing time for backup of large databases can be greatly reduced.

See

Refer to "Backup/Recovery Using the Copy Command" in the Operation Guide for information on backup/recovery using user exits.

1.2 Simple GUI-Based Installation and Operation Management

FUJITSU Enterprise Postgres provides WebAdmin, which is a GUI tool for a range of tasks, from database installation to operation management. This allows the databases to be used simply and intuitively.

WebAdmin can be used for FUJITSU Enterprise Postgres setup, creating and monitoring a streaming replication cluster, database backups, and for recovery. Depending on the configuration, WebAdmin can be used to manage FUJITSU Enterprise Postgres instances in a single server, or instances spread across multiple servers.

- Setup

  To perform setup using WebAdmin, you must create an instance. An instance is a set of server processes that manage a database cluster (database storage area on the data storage destination disk). Instances can be created easily and with only minimal required input, because the tool automatically determines the optimal settings for operation.

- Database backup/recovery

  Database backup and recovery can be performed using simple GUI operations.

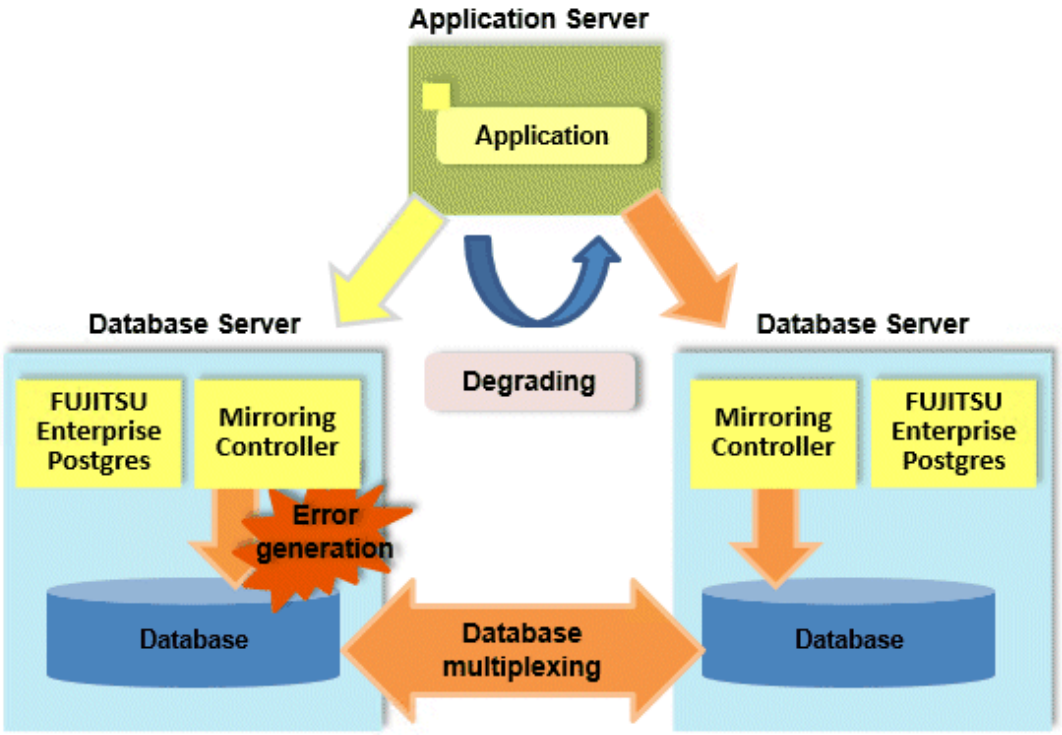
  In particular, FUJITSU Enterprise Postgres can automatically identify and isolate the location of errors. This simplifies the recovery process and enables faster recovery.

In addition, FUJITSU Enterprise Postgres provides the following expanded features in pgAdmin:

- NCHAR type
- Expanded trigger definition
  - REPLACE feature
  - Function call feature

1.3 High Reliability with Database Multiplexing

It is vital for systems that use databases to protect data from damage or loss caused by a range of factors such as hardware and software errors. Database multiplexing protects important data and enables highly reliable database operation.



FUJITSU Enterprise Postgres not only mirrors a database using the PostgreSQL streaming replication feature, but also provides simplified switchover and standby disconnection features as well as a feature to detect faults in elements that are essential for the continuity of database process, disk, network, and other database operations.

Even if a switchover is performed, the client automatically distinguishes between the primary and standby servers, so applications can be connected transparently regardless of the physical server.

The Mirroring Controller option enables the primary server (the database server used for the main jobs) to be switched automatically to the standby server if an error occurs in the former.

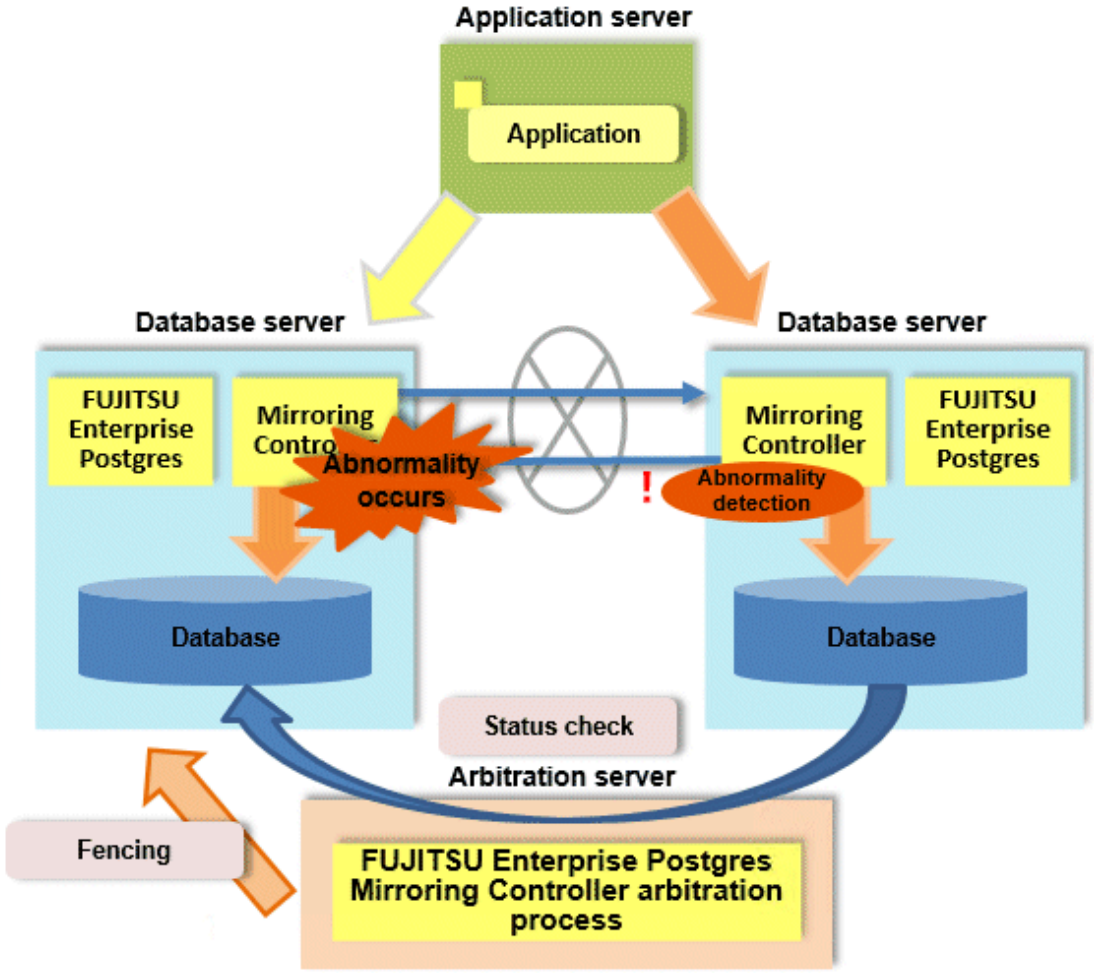
In addition, by using the data on the standby server, reference jobs such as data analysis and form output can be performed in parallel to the jobs on the primary server.

Operation using the arbitration server

Mirroring Controller may not be able to correctly determine the status of the other server if there is a network issue between database servers or a server is in an unstable state. As a result, both servers will temporarily operate as primary servers, so it may be possible to perform updates from either server.

The Server Assistant is a feature that objectively checks the status of database servers as a third party and isolates (fences) unstable servers in such cases.

In database multiplexing mode, the Server Assistant is made available by adding a new server (arbitration server) on which the Server Assistant is installed. Using an arbitration server can prevent the issue mentioned above (both servers temporarily operating as primary servers) and enables highly reliable operation.



See

- Refer to "Database Multiplexing Mode" in the Cluster Operation Guide (Database Multiplexing) for information on the database multiplexing.

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1.4 High Reliability Using Failover Integrated with the Cluster Software

If the system stops, services are interrupted until recovery is complete. In large-scale systems, the interruption takes longer, and may cause significant disruption for many people receiving the services.

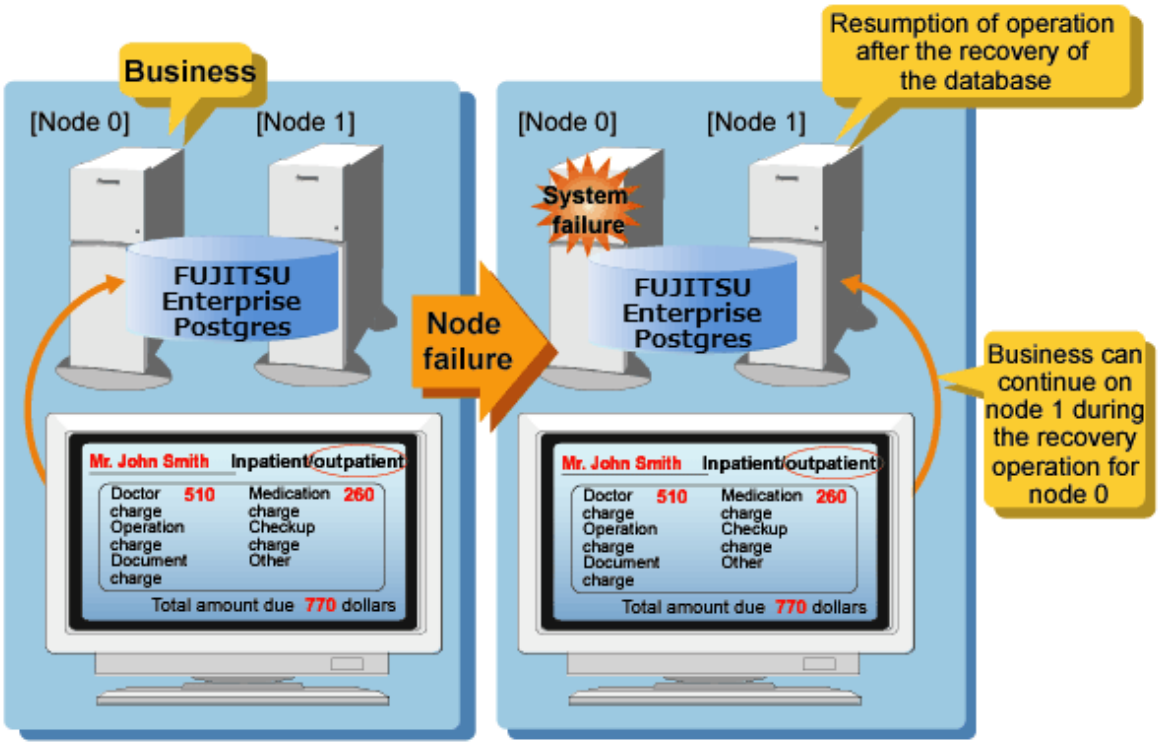
In FUJITSU Enterprise Postgres, the failover feature integrated with the cluster software can minimize the system stoppage time when an issue occurs.

Medical accounting system

Some hospitals with a large number of patients manage and operate the various data required for accounting in a database. If this accounting system stops and takes several minutes to recover, it is expected that this will have a significant impact.

But if failover is applied to this kind of system and an issue occurs on the operating server, it is quickly switched and the standby server takes over operation, so that services are provided without interruption.

The example below illustrates a medical accounting system using failover.



See

Refer to the Cluster Operation Guide (PRIMECLUSTER) for information on the failover feature integrated with the cluster software.

1.5 Seamless Migration from Oracle Databases

FUJITSU Enterprise Postgres supports Orafce, to provide compatibility with Oracle databases.

Using the compatibility feature reduces the cost of correcting existing applications and results in easy database migration.

See

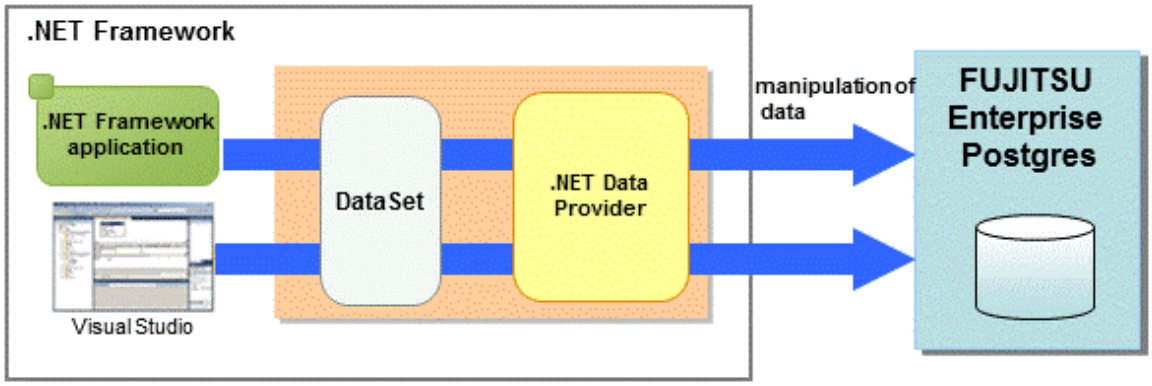
Refer to "Compatibility with Oracle Databases" in the Application Development Guide for information on compatible features.

1.6 Linkage with Integrated Development Environment

You can link with Microsoft Visual Studio to create application. And, you can automatically generate applications to access database resources by linking to Visual Studio.

Relationship between .NET Framework and FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres provides .NET Data Provider, which is an interface for ADO.NET of .NET Framework. This enables you to select FUJITSU Enterprise Postgres as the connection destination database of ADO.NET and use the intuitive and efficient application development features of Visual Studio.

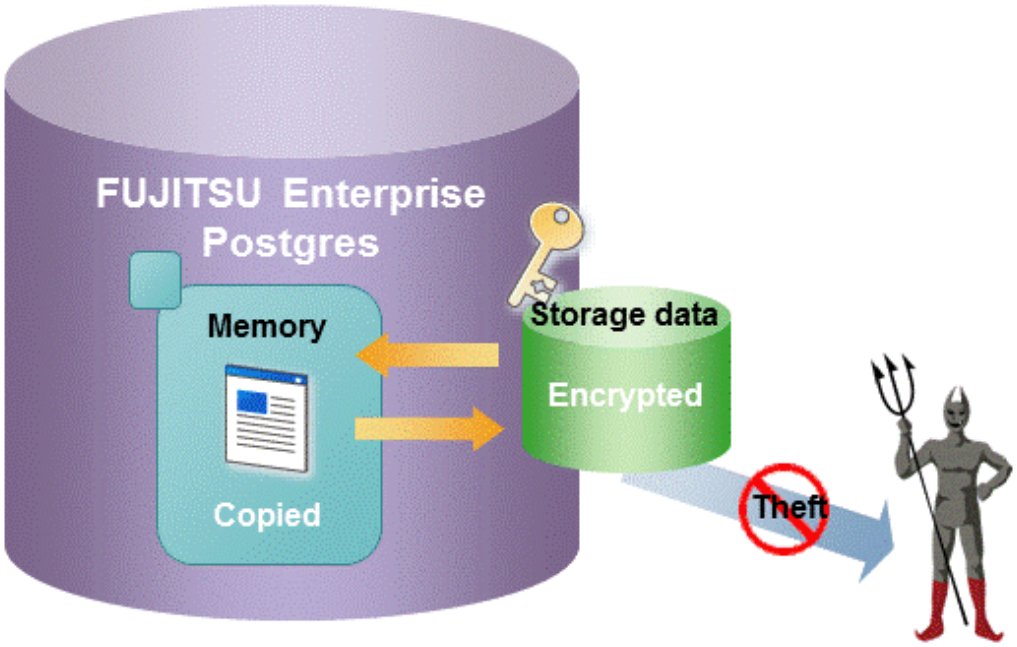


1.7 Storage Data Protection Using Transparent Data Encryption

The encryption of data to be stored in a database is essential under the following encryption requirements of PCI DSS (Payment Card Industry Data Security Standard), the data security standard of the credit industry:

- Confidential information (such as credit card numbers) can be encrypted.
- The encryption key and data are managed as separate entities.
- The encryption key is replaced at regular intervals.

To satisfy these requirements, FUJITSU Enterprise Postgres provides a transparent data encryption feature. Note that PostgreSQL uses an encryption feature called pgcrypto, which can also be used in FUJITSU Enterprise Postgres, but requires applications to be modified. Therefore, we recommend using FUJITSU Enterprise Postgres's transparent data encryption feature.



See

Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for information on stored data encryption.

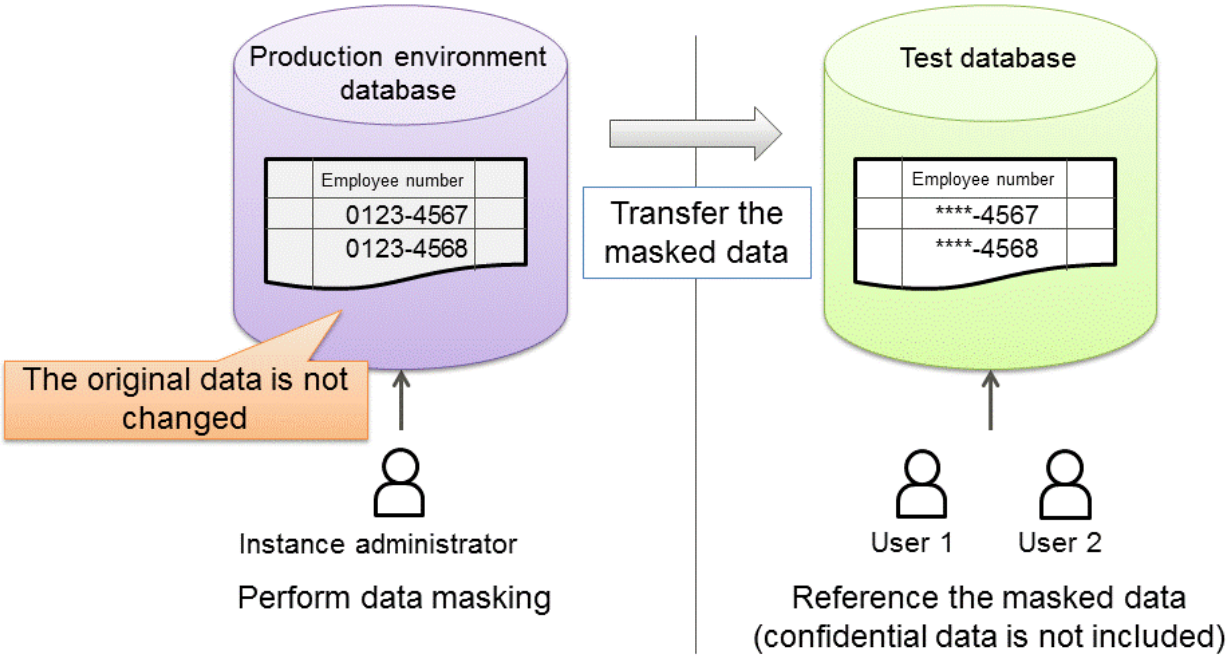
1.8 Data Masking for Improved Security

FUJITSU Enterprise Postgres provides a data masking feature that protects data to maintain security of data handled in systems.

The data masking feature changes the returned data for queries from applications and makes it available for reference without exposing the actual data.

For example, for a query of employee data, digits except the last four digits of an eight-digit employee number can be changed to "*" so that it can be used for reference.

Also, the data changed by the data masking feature can be transferred to a test database so that users who perform testing or development can reference the data. As production data should not be used in a test or development environment because of the risk of data leakage, this feature enables data that is similar to actual production data to be safely used in those environments.



See

Refer to "Data Masking" in the Operation Guide for information on data masking.

1.9 Security Enhancement Using Audit Logs

Details relating to database access can be retrieved in audit logs. The audit log feature can be used to counter security threats such as unauthorized access to the database and misuse of privileges.

In PostgreSQL, logs output as server logs can be used as audit logs by using the log output feature. There are, however, logs that cannot be analyzed properly, such as SQL runtime logs, which do not output the schema name. Additionally, because the output conditions cannot be specified in detail, log volumes can be large, which may lead to deterioration in performance.

The audit log feature of FUJITSU Enterprise Postgres enables retrieval of details relating to database access as an audit log by extending the feature to pgaudit. Additionally, audit logs can be output to a dedicated log file or server log. This enables efficient and accurate log monitoring.

See

Refer to "Audit Log Feature" in the Security Operation Guide for details.

1.10 Enhanced Query Plan Stability

FUJITSU Enterprise Postgres estimates the cost of query plans based on SQL statements and database statistical information, and selects the least expensive query plan. However, like other databases, FUJITSU Enterprise Postgres does not necessarily select the most suitable query plan. For example, it may suddenly select unsuitable query plan due to changes in the data conditions.

In mission-critical systems, stable performance is more important than improved performance, and changes in query plans case to be avoided. In this situation, the following features can stabilize query plans:

- Optimizer hints

  You can use pg_hint_plan to specify a query plan in each individual SQL statement.

- Locked statistics

  You can use pg_dbms_stats to lock statistical information per object, such as a database, schema, or table.

See

Refer to "Optimizer Hints" in the Application Development Guide for information on optimizer hints.

Refer to "Locked Statistics" in the Application Development Guide or information on locked statistics.

Note

Use the features provided when FUJITSU Enterprise Postgres is installed for optimizer hints and locked statistical information. FUJITSU Enterprise Postgres does not support other similar open-source features.

1.11 Increased Aggregation Performance Using the In-memory Feature

FUJITSU Enterprise Postgres provides the in-memory feature, which uses columnar index and memory-resident data. This reduces disk I/Os and enhances aggregation performance.

Note

This feature can only be used in Advanced Edition.

Columnar index

Many aggregation processes may require a large portion of data in a particular column. However, traditional row data structure reads unnecessary columns, resulting in inefficient use of memory and CPU cache, and slower processing. FUJITSU Enterprise Postgres provides a type of columnar index, VCI (Vertical Clustered Index). This addresses the above issues, and enhances aggregation performance.

VCI provides the following benefits:

- Minimizes impact on existing jobs, and can perform aggregation using job data in real time.
- Provided as an index, so no application modification is required.

- Stores data also on the disk, so aggregation jobs can be quickly resumed using a VCI even if a failure occurs (when an instance is restarted).
- If the amount of memory used by VCI exceeds the set value, aggregation can still continue by using VCI data on the disk.

It also provides the features below:

- Disk compression
  Compresses VCI data on the disk, minimizing required disk space. Even if disk access is required, read overhead is low.
- Parallel scan
  Enhances aggregation performance by distributing aggregation processes to multiple CPU cores and then processing them in parallel.

In-memory data

The following features keep VCI data in memory and minimize disk I/Os on each aggregation process.

- Preload feature
  Ensures stable response times by loading VCI data to memory before an application scans it after the instance is restarted.
- Stable buffer feature
  Reduces disk I/Os by suppressing VCI data eviction from memory by other job data.

Purposes of this feature

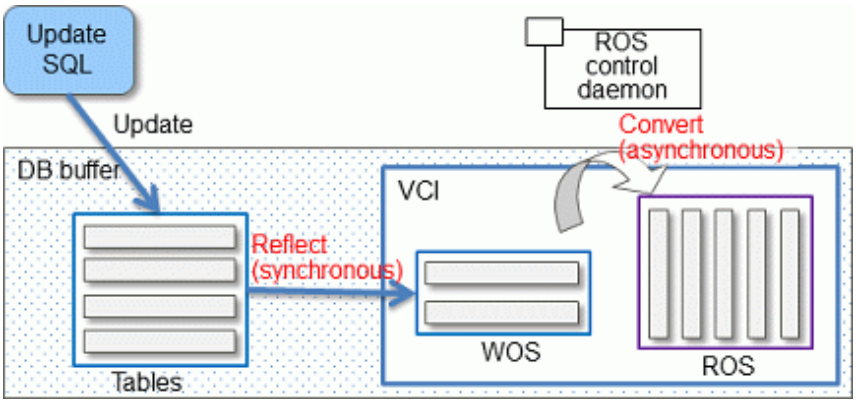
This feature has a data structure that can efficiently use the newly added resources, and aims to enhance the existing aggregation processing in normal operations to be faster than parallel scan. It shares the same purpose of enhancing aggregation performance with the parallel scan feature that is provided separately, but differs in that it speeds up nightly batch processes by utilizing available resources.

VCI architecture

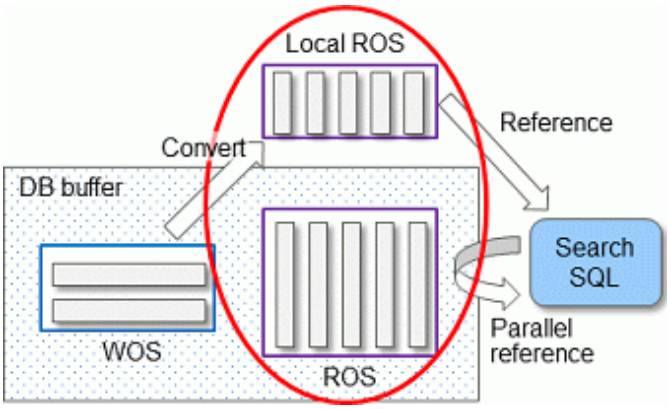
This section briefly explains VCI architecture as it contains basic terminology required, for example, when setting parameters.

Update and aggregation operations to enable real time use of job data are described.

VCI has write buffer row-based WOS (Write Optimized Store) in addition to the columnar data structure ROS (Read Optimized Store). Converting each update into a columnar index has a significant impact on the update process response times. Therefore, data is synchronously reflected to the row-based WOS when updating. After a certain amount of data is stored in WOS, the ROS control daemon asynchronously converts it to ROS. As above, the entire VCI is synchronized with the target table column, minimizing update overhead.



The same scan results can be obtained without a VCI by using WOS in conjunction with ROS. More specifically, WOS is converted to Local ROS in local memory for each aggregation process, and aggregated with ROS.



See

Refer to "Installing and Operating the In-memory Feature" in the Operation Guide for information on installation and operation of VCI.

Refer to "Scan Using a Vertical Clustered Index (VCI)" in the Application Development Guide for information on scan using a VCI.

1.12 High-Speed Data Load

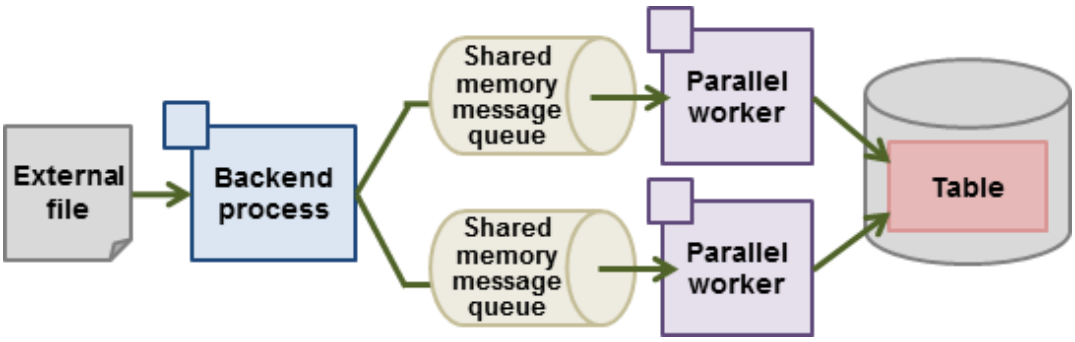
High-speed data load executes COPY FROM commands using multiple parallel workers. Because conversion of data from the external file to the appropriate internal format, table creation, and index creation are performed in parallel, it is possible to load large volumes of data at high speed.

Note

This feature is available only in the Advanced Edition.

Architecture of high-speed data load

High-speed data load is required for parameter setting and resource estimation, so a brief description of its architecture is provided below.



High-speed data load uses a single backend process collaborating with multiple parallel workers to perform data load in parallel. Data is exchanged between the backend process and parallel workers via shared memory message queues. The backend process distributes the loaded data of external files to multiple parallel workers. Each parallel worker then converts the data loaded from the shared memory message queue into the appropriate internal format, and inserts it into the table. If the table has indexes, their keys are extracted and inserted into the index page.

See

Refer to "High-Speed Data Load" in the Operation Guide for details.

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1.13 High availability by using Connection Manager

The Connection Manager provides the following features. You can use these features to increase system availability.

Heartbeat monitoring feature

Detects kernel panics between the server running the client and the server running the instance, physical server failures, and inter-server network link downs, and notifies the client or instance. The client is notified as an error event through the SQL connection, and the instance will be notified in the form of a force collection of SQL connections with clients that are out of service.

Transparent connection support feature

When an application wants to connect to an instance of an attribute (Primary/Standby) configured with replication, it can do so without knowing which server the instance is running on.

Information

The available client drivers for Connection Manager are libpq (C language library) and ECPG (embedded SQL in C).

See

Refer to the Connection Manager User's Guide for details.

1.14 Memory Usage Reduce with Meta cache Reduction and Limit

When executing SQL, you must refer to the definition of the table or index you want to access. These definitions are cached in the local memory of the backend process separately from the shared memory buffer of the database on shared_buffers because they are referenced each time SQL is executed. The direct definition is a tuple of system catalogs. The cache for this tuple is called "Catalog Cache". A structure that makes the definition easy to use is called a "Relations Cache". And in FUJITSU Enterprise Postgres, these two are collectively called "Meta Cache".

The meta cache will be kept indefinitely for performance reasons. In a large database, a single backend process accesses a large number of tables and so on, which results in a large meta-cache for the backend process. As a result, the sum of the local memory of the backend process may exceed the realistic memory size.

On the other hand, the feature to reduce the meta cache for the entire instance by sharing the meta cache between backend processes is the Global Meta Cache feature. The current Global Meta Cache feature only shares the catalog cache. Therefore, the metacache in Global Meta Cache now refers to the catalog cache.

What you still cannot share using the current Global Meta Cache feature and need to keep in local memory is the information (Meta cache header) and relation cache to access Global Meta Cache in shared memory. If you do not use the Global Meta Cache feature, keep the catalog and relation caches in local memory. The meta cache held in local memory is called the "Local Meta Cache". The feature to limit the size of a Local Meta Cache by removing it if it has not been accessed for a long time is the Local Meta Cache limit feature.

The Global Meta Cache feature and the Local Meta Cache limit feature can be used together to provide the strictest control over memory consumption. Of course, you can use only one or the other.

However, the Global Meta Cache feature has several percent overhead to access shared memory. The Local Meta Cache limit feature also causes the overhead of reholding the metacache because it may discard the previously held metacache. Therefore, consider using these features when your estimates do not allow for memory consumption.

1.14.1 Memory Usage Reduction Using Global Meta Cache

The Global Meta Cache feature cache the meta cache in shared memory. The meta cache on shared memory is called the Global Meta Cache (GMC).

Without this feature, the meta cache was cached in per-process memory. Therefore, there was a problem increase in memory usage in environments with large databases and large numbers of connections. The Global Meta Cache feature enables sharing of meta caches on shared memory, thereby reducing overall system memory usage.

Note

This feature is available only in the Advanced Edition.

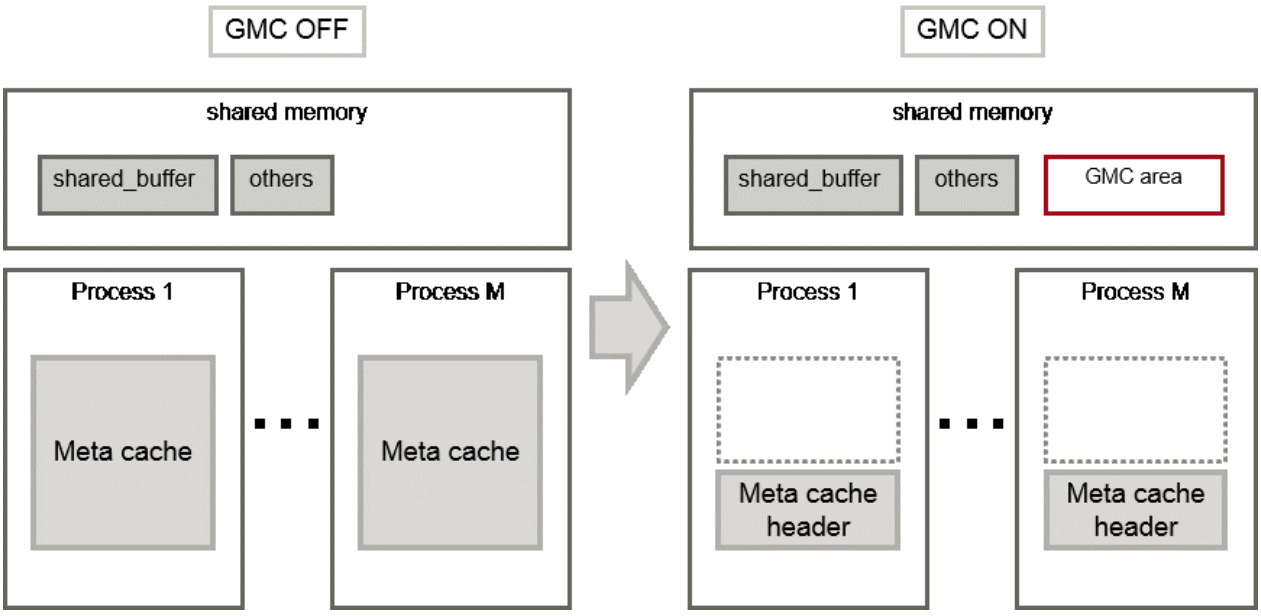
Meta cache

Processing a query involves parsing the query, creating the plan, executing the plan, and so on. PostgreSQL process accesses the system catalog to perform these steps. Once accessed, the system catalog tuples are cached in per-process memory. The direct definition is one tuple of system catalogs. Each process performs faster query processing by searching the meta cache instead of searching for the required tuples in the system catalog each time.

The meta cache usage increases in proportion to the number of tables and columns accessed. It is cached on a per-process basis, so the system's overall meta cache usage increases in proportion to the number of connections.

Architecture of Global Meta Cache feature

Describes the architecture of the Global Meta Cache feature.



When the GMC feature is on, the per-process meta cache is cached in the GMC area on shared memory. Reference to the GMC area and process-specific work information is cached in the memory of each process. PostgreSQL process searches the meta cache for each process and accesses the GMC based on the reference information. If there is no reference information in the process's memory, it searches the GMC area. If the GMC area also does not have a corresponding meta cache, it accesses the system catalog to create meta cache.

Also, sharing the meta cache does not cause any loss of data consistency. If the system catalog or table definition changes while a transaction is running, the cache deletion or creation does not affect outside of the process running the transaction.

After the transaction commits, the GMC area cache is deleted or created. If other transactions are referencing the cache when GMC is tried to be deleted, the deletion is deferred until there are no more references. After a commit, a new transaction sees the new cache instead of the old one.

See

Global Meta Cache feature is disabled by default. Refer to "Global Meta Cache" in the Operation Guide for information how to decide whether introduce it or not and usage.

1.14.2 Memory Usage Reduction Using Local Meta Cache Limit

Local Meta Cache Limit feature limits the size of a Local Meta Cache by removing it if it has not been accessed for a long time.

Of the definitions that SQL accesses, the main factors that make the Local Meta Cache bloat are tables and indexes. In addition, table column definitions are also maintained as a catalog cache.

For example, in a system where one long-lived connection is shared by various businesses, one connection (that is, backend process) will access many tables. If there are 3,000 such connections, and each connection accesses a table of 50,000, the total amount of memory consumed by the 3,000 backend processes may be a few terabytes.

In such a case, using this feature may reduce it to about several tens of gigabytes.

Note

This feature is available only in the Advanced Edition.

Architecture of Local Meta Cache Limit feature

When this feature is enabled, the caching strategy is to keep the cache as long as possible within the specified upper limit. If holding a new cache exceeds the limit, consider locality of reference and delete the cache from the one with the longest unreferenced time.

However, because the cache used by active transactions cannot be deleted, if a transaction uses a large number of caches, the cache may be held above the limit. In this case, delete the cache at the end of the transaction.

See

Local Meta Cache limit feature is disabled by default. Refer to "Local Meta Cache Limit" in the Operation Guide for information how to decide whether introduce it or not and usage.

Appendix A List of Features

The following table lists the main features provided by FUJITSU Enterprise Postgres.

Category	Feature	Linux		Windows	
		AE	SE	AE	SE
Fujitsu-developed software technology	WebAdmin (Rapid setup, One-click recovery)	Y	Y	Y	Y
Improved reliability and availability	Database multiplexing	Y	N	Y	N
	Failover (integration with PRIMECLUSTER)	Y (*1)	Y (*1)	N	N
	Backup/recovery using user exits	Y	N	Y	N
	Connection Manager	Y	N	N	N
Application development	Embedded SQL integration Java integration ODBC integration .NET Framework integration	Y	Y	Y	Y
	Features compatible with Oracle databases	Y	Y	Y	Y
Security	Storage data encryption	Y	Y	Y	Y
	Data masking	Y	Y	Y	Y
	Audit log	Y	N	Y	N
Performance	In-memory feature	Y	N	Y	N
	High-speed data load	Y	N	Y	N
	Global Meta Cache	Y	N	Y	N
	Local Meta Cache Limit	Y	N	Y	N
Performance tuning	Optimizer hints	Y	Y	Y	Y
	Fixed statistical information	Y	Y	Y	Y

Y: Provided

N: Not provided

*1: Supported on RHEL only.

Appendix B OSS Supported by FUJITSU Enterprise Postgres

The OSS supported by FUJITSU Enterprise Postgres is listed below.

OSS name	Version and level	Platform		Description	Reference
		Linux	Windows		
PostgreSQL	13.3	Y	Y	Database management system	PostgreSQL Documentation
orafce	3.13.4	Y	Y	Oracle-compatible SQL features	"Compatibility with Oracle Databases" in the Application Development Guide
Pgpool-II	4.2.0	Y	N	Failover, connection pooling, load balancing, etc.	"Pgpool-II" in the Installation and Setup Guide for Server
oracle_fdw	2.3.0	Y	Y	Connection to the Oracle database server	"oracle_fdw" in the Installation and Setup Guide for Server
pg_statsinfo	12.1	Y	N	Collection and accumulation of statistics	"pg_statsinfo" in the Installation and Setup Guide for Server
pg_hint_plan	13.1.3.7	Y	Y	Tuning (statistics management, query tuning)	- "pg_hint_plan" in the Installation and Setup Guide for Server - "Optimizer Hints" in the Application Development Guide
pg_dbms_stats	1.5.0	Y	Y		- "pg_dbms_stats" in the Installation and Setup Guide for Server - "Locked Statistics" in the Application Development Guide
pg_repack	1.4.6	Y	N	Table reorganization	"pg_repack" in the Installation and Setup Guide for Server
pg_rman	1.3.9	Y	N	Backup and restore management	"pg_rman" in the Installation and Setup Guide for Server
pgAdmin4	4.29	N	Y	Operation and development GUI	Operation Guide
pgBadger	11.4	Y	N	Log analysis	"pgBadger" in the Installation and Setup Guide for Server
pg_bigm	1.2	Y	N	Full-text search (multibyte)	"pg_bigm" in the Installation and Setup Guide for Server
PostgreSQL JDBC driver	42.2.18	Y	Y	JDBC driver	"JDBC Driver" in the Application Development Guide

OSS name	Version and level	Platform		Description	Reference
		Linux	Windows		
psqlODBC	13.00.0000	Y	Y	ODBC driver	"ODBC Driver" in the Application Development Guide
Npgsql	4.1.7	N	Y	.NET data provider	".NET Data Provider" in the Application Development Guide

Y: Supported

N: Not supported

Appendix C Features that can be Used on Servers Other than the Database Server

This chapter explains the configuration and operating environment of features to be installed and used on servers other than the database server when used in conjunction with the FUJITSU Enterprise Postgres database server.

In this chapter, FUJITSU Enterprise Postgres programs are referred to as server programs.

Below are features to be installed and used on servers other than the database server:

- WebAdmin
- Server Assistant
- Pgpool-II (failover, connection pooling, and load balancing)

C.1 WebAdmin

If there is only one database server, WebAdmin is normally installed on the same server as the database (the WebAdmin program can be installed at the same time as the server program).

If there are multiple database servers, database server instances can be managed collectively if a dedicated WebAdmin server is used. In this case, the WebAdmin program is installed on the WebAdmin server, and the server program and WebAdmin program are installed on the database server.

See

- Refer to "1.2 Simple GUI-Based Installation and Operation Management" for information on WebAdmin.
- Refer to "Determining the Preferred WebAdmin Configuration" in the Installation and Setup Guide for Server for information on the server configuration when using WebAdmin.
- Refer to "Required Operating System" in the Installation and Setup Guide for Server for information on the operating environment of WebAdmin.

C.2 Server Assistant

To use the Server Assistant, the Server Assistant program is installed on a dedicated server (arbitration server).

See

- Refer to "Overview of Database Multiplexing Mode" in the Cluster Operation Guide (Database Multiplexing) for information on the Server Assistant and the server configuration.
- Refer to "Required Operating System" in the Installation and Setup Guide for Server Assistant for information on the operating environment of the Server Assistant.

C.3 Failover, Connection Pooling, and Load Balancing Features of Pgpool-II

Pgpool-II is software that is placed between the database server and database client to relay the connection.

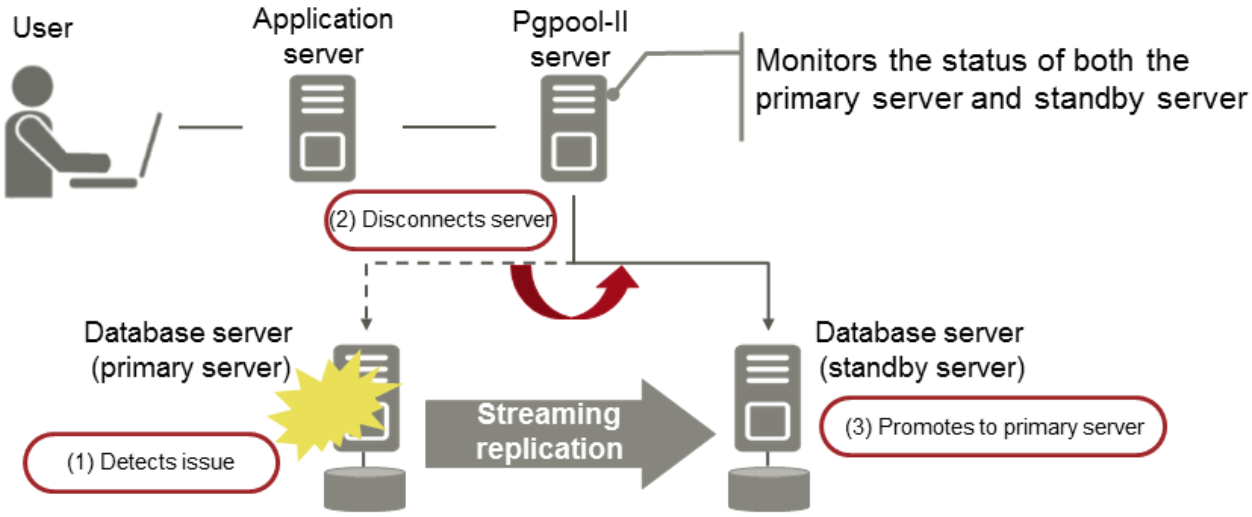
Pgpool-II provides the failover, connection pooling, and load balancing features for use during streaming replication.

Failover

In PostgreSQL, a database can be made redundant (building a high availability system) using synchronous streaming replication.

If the database server of either the primary server or standby server fails or is no longer accessible when using synchronous streaming replication, jobs will stop.

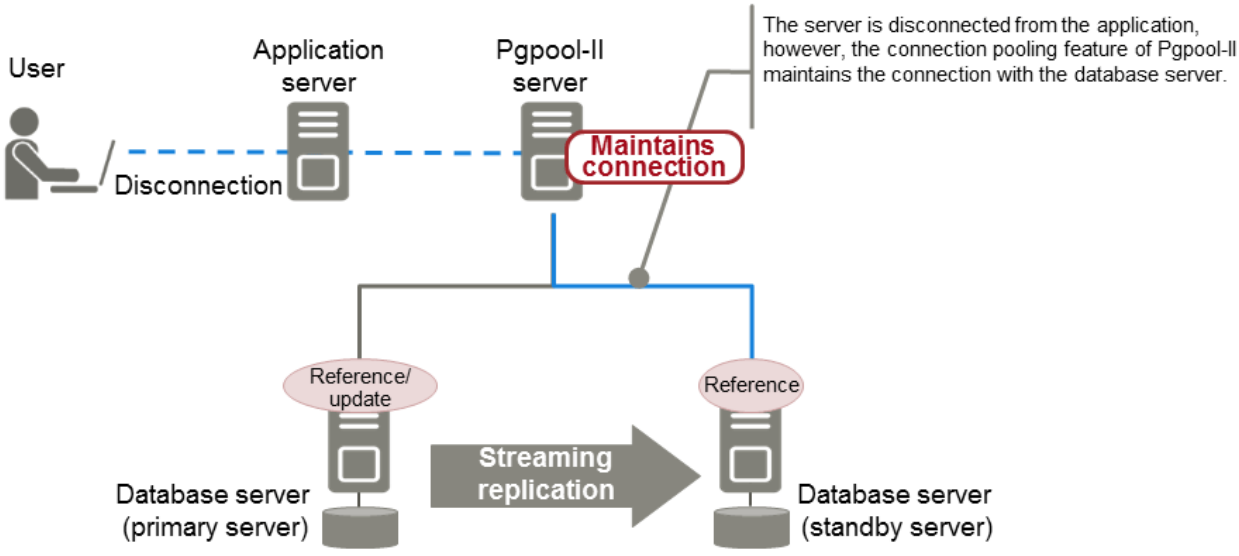
Failover monitors the status of each database and automatically disconnects the server when an error occurs. As a result, jobs can continue uninterrupted on the remaining server.



Connection pooling

This feature maintains (pools) the connection established with the database server, and reuses that connection each time a new connection with the same properties (user name, database, and protocol version) arrives.

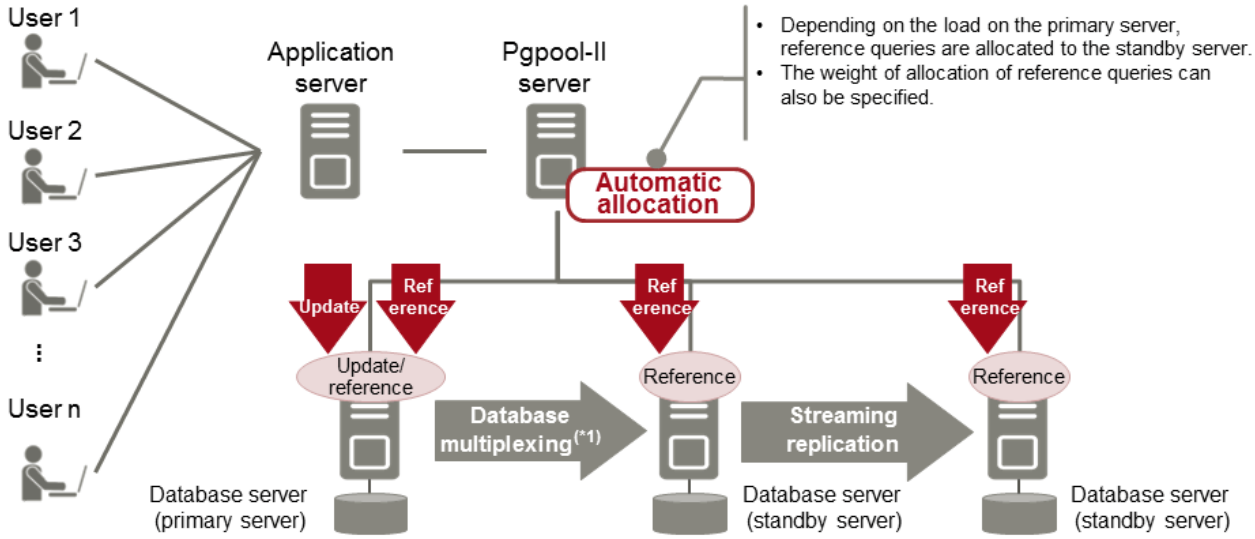
Connection pooling reduces the connection overhead for the database server, improving throughput of the whole system.



Load balancing

This feature distributes reference queries to multiple database servers, improving throughput of the whole system.

By combining load balancing with the FUJITSU Enterprise Postgres database multiplexing feature or the PostgreSQL streaming replication feature, load on the database server is reduced.



*1: The arbitration server used during database multiplexing has been omitted from this document.

See

- Refer to "System configuration when using Pgpool-II" in the Installation and Setup Guide for Server for information on the server configuration when using Pgpool-II.
- Refer to "Required Operating System" in the Installation and Setup Guide for Server for information on the operating environment of Pgpool-II.

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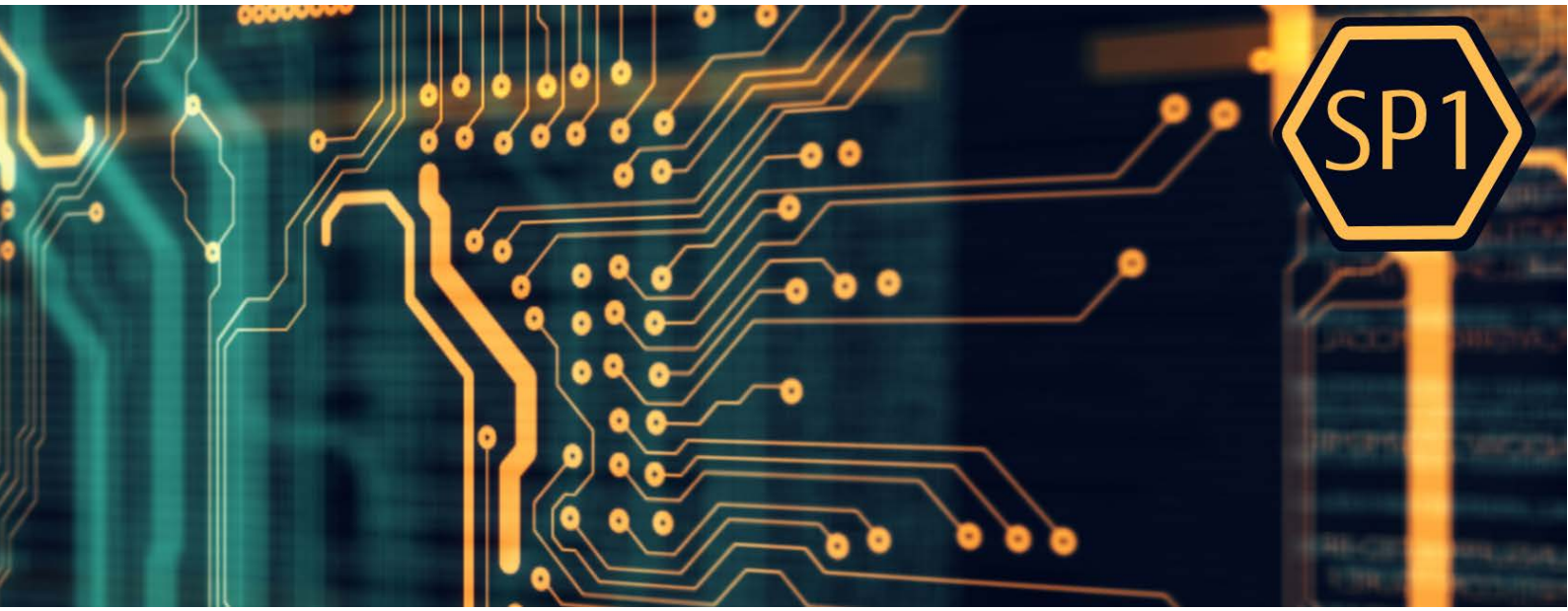
FUJITSU Enterprise Postgres 13



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Linux >

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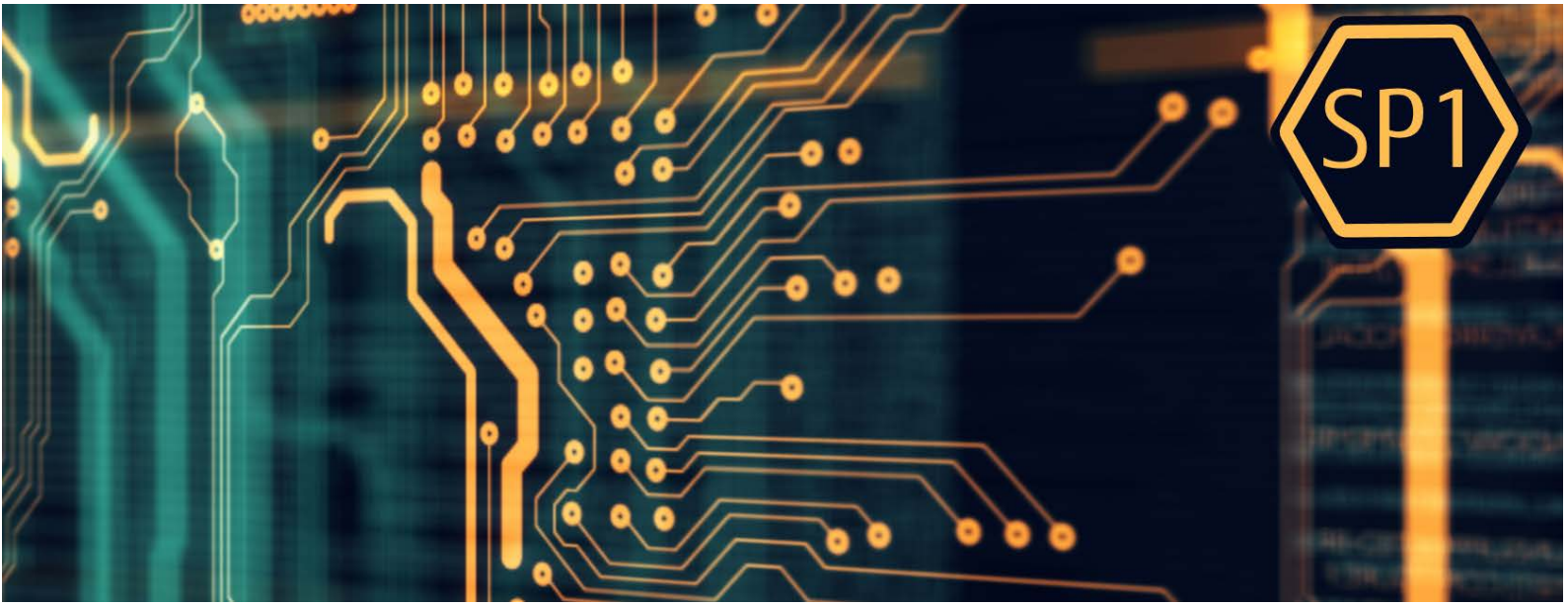

Release Notes

(Linux)

Linux

J2UL-2671-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document provides release information for FUJITSU Enterprise Postgres.

Structure of this document

This document is structured as follows:

Chapter 1 New Features and Improvements

Explains the new features and improvements in this version.

Chapter 2 Compatibility Information

Provides information regarding compatibility.

Chapter 3 Program Updates

Explains updates incorporated in this version.

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Issue date and version

```
Edition 2.0: August 2021
Edition 1.0: April 2021
```

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Chapter 1 New Features and Improvements

This chapter explains FUJITSU Enterprise Postgres new features and improvements added in this version.

Table 1.1 New features and improvements

Version and level	Classification	Feature	Provided in AE	Provided in SE
13 SP1	OSS	PostgreSQL Rebase	Y	Y
13	Application development	Support for OpenJDK	Y	Y
	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y

1.1 Features Added in 13 SP1

This section explains new features and improvements in FUJITSU Enterprise Postgres 13.

1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase

1.1.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 13.3.

Refer to "PostgreSQL Version Used for FUJITSU Enterprise Postgres" in the Installation and Setup Guide for Server for details.

1.2 Features Added in 13

This section explains new features and improvements in FUJITSU Enterprise Postgres 13.

1.2.1 Application Development

This section explains the new features and improvements related to application development:

- Support for OpenJDK

1.2.1.1 Support for OpenJDK

In the FUJITSU Enterprise Postgres client environment, in addition to the Oracle JDK or JRE that we have guaranteed so far, we also guarantee the behavior when using OpenJDK.

Refer to "Related Software" in the Installation and Setup Guide for Client for details.

1.2.2 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.2.2.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 13.1.

Refer to "PostgreSQL Version Used for FUJITSU Enterprise Postgres" in the Installation and Setup Guide for Server for details.

1.2.2.2 Update of OSS Provided

The OSS provided by FUJITSU Enterprise Postgres have been updated.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for details.

Chapter 2 Compatibility Information

This chapter explains incompatible items and actions required when migrating from an earlier version to FUJITSU Enterprise Postgres 13 SP1. Check compatibility before migrating and take the appropriate action.

2.1 Installation/Setup Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Removing Operating System Support for Client Feature	Y	Y	Y	Y	Y	Y
Removing Operating System Support for Client Feature	N	N	Y	Y	Y	N
Removing Operating System Support for Server Feature	N	N	Y	Y	Y	N
Changing kernel parameter settings when an instance is created with WebAdmin	Y	Y	Y	Y	Y	N
Removing Operating System Support for Client Feature	Y	Y	Y	Y	N	N
Removing Operating System Support for Server Feature	Y	Y	Y	Y	N	N
Changing the way OSS is set up	Y	Y	Y	Y	N	N
Modifying Pgpool-II Installation Handling	Y	Y	Y	Y	N	N
Changing Core and Log File Paths when Instance is Created with WebAdmin	Y	Y	Y	Y	N	N
Renaming WebAdmin Services	Y	Y	Y	Y	N	N
Changing the features targeted for installation in a 64-bit environment	Y	Y	N	N	N	N
Changing the access permissions of the Windows client installation folder	Y	Y	N	N	N	N
Changing the WebAdmin installation method	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.1.1 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 SP1 or later, the following operating systems have been removed.

- Windows Server(R) 2012
- Windows Server(R) 2012 R2

Action method

None.

2.1.2 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 or later, the following operating systems have been removed.

- SLES 12 SP4 or earlier

Action method

None.

2.1.3 Removing Operating System Support for Server Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 or later, the following operating systems have been removed.

- SLES 12 SP4 or earlier

Action method

None.

2.1.4 Changing kernel parameter settings when an instance is created with WebAdmin

Incompatibility

For FUJITSU Enterprise Postgres 13 and later, changes kernel parameter settings for WebAdmin instance creation.

FUJITSU Enterprise Postgres 12 or earlier

Kernel Parameters	Value	Calculated Value
SHMMAX	If *currentValue* < *calculatedValue*, configure the calculated value	`((1800 + 270 * max_locks_per_transaction) * max_connections + (1800 + 270 * max_locks_per_transaction) * autovacuum_max_workers + (770 + 270 * max_locks_per_transaction) * max_prepared_transactions + (shared_buffer) + (16 * 1024 * 1024) + ( 770 * 1024)) * 1.05`

SHMALL	Specify *currentValue* + *calculatedValue*	`(SHMMAX / PAGESIZE) + 1`
		
		`PAGESIZE = 4K`

SEMMNI	Specify *currentValue* + *calculatedValue*	`ceil((max_connections + autovacuum_max_workers + 4) / 16)`
SEMMNS	Specify *currentValue* + *calculatedValue*	`ceil((max_connections + autovacuum_max_workers + 4) / 16) * 17`

FUJITSU Enterprise Postgres 13 or later

Kernel Parameters	Value	Calculated Value
SHMMAX	Do not change value	-
SHMALL	Do not change value	-
SEMMNI	Specify *currentValue* + *calculatedValue*	- For instances of FUJITSU Enterprise Postgres 9.5 to 11: `ceil((max_connections + autovacuum_max_workers + max_worker_processes + 5) / 16)`

Kernel Parameters	Value	Calculated Value
		- For Fujitsu Enterprise Postgres 12 and later instances: `ceil((max_connections + autovacuum_max_workers + max_wal_senders + max_worker_processes + 5) / 16)`

SEMMNS	Specify *currentValue* + *calculatedValue*	- For instances of FUJITSU Enterprise Postgres 9.5 to 11:
		`ceil((max_connections + autovacuum_max_workers + max_worker_processes + 5) / 16) * 17`
		- For Fujitsu Enterprise Postgres 12 and later instances:
		`ceil((max_connections + autovacuum_max_workers + max_wal_senders + max_worker_processes + 5) / 16) * 17`

Action method

None.

2.1.5 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, the following operating systems have been removed.

- Windows(R) 7
- Windows Server(R) 2008
- RHEL6

Also, the 32 bit Linux client can no longer be installed because RHEL 6 has been removed from the operating system.

Action method

None.

2.1.6 Removing Operating System Support for Server Feature

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, the following operating systems have been removed.

- RHEL6

Action method

None.

2.1.7 Changing the Way OSS is Set Up

Incompatibility

FUJITSU Enterprise Postgres 12 or later do not place OSS extension modules in the executable directory. The OSS extension modules must be placed in the executable directory when you set up OSS.

Refer to "Setting Up and Removing OSS" in the Installation and Setup Guide for Server for details.

Action method

None.

2.1.8 Modifying Pgpool-II Installation Handling

Incompatibility

For FUJITSU Enterprise Postgres 12 or later, Pgpool-II is not automatically installed when you install the server. Therefore, if you want to take advantage of Pgpool-II, install it separately from the server installation.

The extension modules required for the database server are shipped with the server program. You should set up Pgpool-II on the database server side, even if Pgpool-II is to be used on a different server than the database server.

Refer to "Setting Up and Removing OSS" in the Installation and Setup Guide for Server for details.

Action method

None.

2.1.9 Changing Core and Log File Paths when Instance is Created with WebAdmin

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, change the core and log file paths when creating an instance in WebAdmin.

FUJITSU Enterprise Postgres 11 or earlier

Log File Path: /var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/log

Core File Path: /var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/core

version: product version_edition_architecture

［Example］

Log File Path: /var/tmp/fsep_110_AE_64/naomi_myinst27599/log

Core File Path: /var/tmp/fsep_110_AE_64/naomi_myinst27599/core

FUJITSU Enterprise Postgres 12

Log File Path: /var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/log

Core File Path: /var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/core

version: product version_WA_architecture

［Example］

Log File Path: /var/tmp/fsep_120_WA_64/naomi_myinst27599/core

Core File Path: /var/tmp/fsep_120_WA_64/naomi_myinst27599/log

Action method

None.

2.1.10 Renaming WebAdmin Services

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, change the service name registered when you set up WebAdmin.

FUJITSU Enterprise Postgres 11 or earlier

fsep_*x*SP*z*_*edition*_64_WebAdmin_Port1

fsep_*x*SP*z*_*edition*_64_WebAdmin_Port2

FUJITSU Enterprise Postgres 12 or later

fsep_xSPz_WA_64_WebAdmin_Port1

fsep_xSPz_WA_64_WebAdmin_Port2

Action method

None.

2.1.11 Changing the Features Targeted for Installation in a 64-bit Environment

Incompatibility

32 bit Linux client can no longer be installed on RHEL7 in FUJITSU Enterprise Postgres 10 or later.

Note: 32 bit Linux client can install on RHEL6 in FUJITSU Enterprise Postgres 11 or earlier.

Action method

None.

2.1.12 Changing the Access Permissions of the Windows Client Installation Folder

Incompatibility

When changed for install folder the Windows client from default, the access permissions of the installed files and folder changes to read and execute.

The above changes apply to non-administrators.

This incompatibility occurs with all supported Windows client operating systems. Refer to "Required Operating System" in the Installation and Setup Guide for Client for information on the operating environment.

Action method

This change was made simply to enhance security, therefore, no action is normally required.

However, if existing access permissions are required, this change can be reverted by running *installDir*\setup\revert_cacls.bat as an administrator after installation.

2.1.13 Changing the WebAdmin Installation Method

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or later, WebAdmin is not installed automatically during server installation. Therefore, install WebAdmin separately.

Action method

None.

2.2 Application Migration Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Change the "elif" Statement Behavior in ecobpg	Y	Y	Y	Y	Y	N
Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type	Y	Y	Y	Y	N	N
Changing the method of specifying the application connection switch feature	Y	Y	N	N	N	N
PostgreSQL compatibility of embedded SQL applications in C and COBOL	Y	Y	N	N	N	N
Changing Vertical Clustered Index (VCI)	Y	Y	N	N	N	N
Changing how to use the features compatible with Oracle databases	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.2.1 Change the "elif" Statement Behavior in ecobpg

Incompatibility

The "elif" statement now works correctly with FUJITSU Enterprise Postgres 13.

FUJITSU Enterprise Postgres 12 or earlier

The decision of the "elif" statement is made whether or not the "ifdef/ifndef" condition is met.

[Example]

```
000000     EXEC SQL ifdef DEF1 END-EXEC.
000000     Operation (1).
000000     EXEC SQL elif DEF2 END-EXEC.
000000     Operation (2).
000000     EXEC SQL else END-EXEC.
000000     Operation (3).
```

If "DEF1" and "DEF2" are true, both "Operation (1)" and "Operation (2)" are executed.

FUJITSU Enterprise Postgres 13 or later

If the condition "ifdef/ifndef" is met, the judgment of the "elif" statement is not enforced.

[Example]

```
000000     EXEC SQL ifdef DEF1 END-EXEC.
000000     Operation (1).
000000     EXEC SQL elif DEF2 END-EXEC.
000000     Operation (2).
000000     EXEC SQL else END-EXEC.
000000     Operation (3).
```

If "DEF1" and "DEF2" are true, only "Operation (1)" is executed.

Action method

Check your existing application and fix the elif statement to work correctly.

2.2.2 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type

Incompatibility

In FUJITSU Enterprise Postgres 12, changed to error when running an operator or function that returns non Data Types for Masking type.

FUJITSU Enterprise Postgres 11 or earlier

In the following cases, the operator or function in 3) may be executed without masking.

This is an incorrect result because the data containing the masking column is performed without masking.

1) Create a Masking policy. and

2) Execute a SELECT statement. and

3) Execute an operator or function in the SELECT statement of 2). and

4) The operator or function argument of 3) includes a subquery. and

5) The operator or function argument of 3) contains the column to be protected created in 1). and

6) The operator or function of 3) returns a type not listed in "Data Types for Masking" in "Operation Guide".

FUJITSU Enterprise Postgres 12 or later

Operator or function results of 3) in the following error.

```
ERROR:  The output data type is incompatible with the confidential policy.
HINT:  Data type of the result value(s) produced by expression/function using confidential columns
is not supported by Data masking module. Consider removing confidential columns from such
expressions/functions.
```

This is correct because the operator or function returns a data type not listed in "Data Types for Masking" in "Operation Guide".

Action method

Do one of the following to ensure that the results are identical to those of FUJITSU Enterprise Postgres 11 and earlier:

1) Modify the Masking policy to prevent masking from being performed for the user executing the SQL.

2) Modify SQL to not use operators or functions that return types not listed in "Data Types for Masking" in "Operation Guide".

2.2.3 Changing the Method of Specifying the Application Connection Switch Feature

Incompatibility

The target server specified using the application connection switch feature is changed to the same name as that of PostgreSQL.

Action method

Use the FUJITSU Enterprise Postgres 10 or later client to execute applications that have the target server specified as the application connection switch feature after changing the target server and specified value as listed below and recompiling.

Specified name of the target server

Usage target	Before correction	After correction
JDBC driver	No change	
ODBC driver	TargetServer	target_session_attrs
.NET Data Provider	target_server	TargetServerType
Connection service file	target_server	target_session_attrs
Library (libpq) for C	target_server	target_session_attrs

Usage target	Before correction	After correction
	Environment variable (PGXTARGETSERVER)	Environment variable (PGTARGETSESSIONATTRS)
Embedded SQL	target_server	target_session_attrs
psql	Environment variable (PGXTARGETSERVER)	Environment variable (PGTARGETSESSIONATTRS)

Specified value for the target server

Server selection order	JDBC driver	.NET Data Provider		Other driver	
		Before correction	After correction	Before correction	After correction
Primary server	No change	primary	master	primary	read-write
Standby server	No change	-	slave	-	-
Priority given to a standby server	No change	prefer_standby	preferSlave	prefer_standby	prefer-read
Any	No change	-	any	-	any

2.2.4 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL

Incompatibility

Embedded SQL applications in C and COBOL that were compiled with FUJITSU Enterprise Postgres 9.6 or earlier cannot be used in the FUJITSU Enterprise Postgres 10 client.

Action method

Use the FUJITSU Enterprise Postgres 10 or later client to execute the applications only after recompiling them with the FUJITSU Enterprise Postgres 10 or later client.

2.2.5 Changing Vertical Clustered Index (VCI)

Incompatibility

The functions below have been added to the functions for which VCI is not used.

Type	Function
Date/time functions	age(timestamp) current_date current_timestamp current_time localtime localtimestamp
Session information functions	current_user current_role

Action method

To use VCI, specify the second argument when using the age function, and specify other functions as subqueries.

[Example]

Before: select age(column A), current_date from table

After: select age(column A, **now()**), **(select current_date)** from table

2.2.6 Changing how to Use the Features Compatible with Oracle Databases

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or later, to use the features compatible with Oracle databases, create a new instance and execute the following command for the "postgres" and "template1" databases:

CREATE EXTENSION oracle_compatible

Action method

None.

2.3 Operation Migration Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down	N	N	N	N	Y	Y
Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection	N	N	N	N	Y	Y
Changing the Value of the Category Column in the pg_settings view	N	Y	Y	Y	Y	N
Changing pgx_stat_lwlock of the Statistics View	N	Y	Y	Y	Y	N
Changing the Behavior of pgx_rcvall	Y	Y	Y	Y	Y	N
Mirroring Controller no longer retries to monitor database processes when they are detected as down	Y	N	Y	Y	N	N
Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command	N	N	Y	Y	N	N
Changing Mirroring Controller User Command Input Values	N	N	Y	Y	N	N
Changing the maximum number of connections per server	Y	Y	N	N	N	N
Changing the encryption settings using the ALTER TABLESPACE statement	Y	Y	N	N	N	N
Changing the default configuration of the cluster system using database multiplexing	Y	N	N	N	N	N
Changing the default operation when mc_ctl command options are omitted	Y	N	N	N	N	N
Changing the connection settings when Mirroring Controller connects to an instance	Y	N	N	N	N	N
Changing the status display of the Mirroring Controller server	Y	N	N	N	N	N
Changing the operation when the synchronous_standby_names parameter is changed during database multiplexing operation	Y	N	N	N	N	N

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing masking policy definition for unsupported data types	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.3.1 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down

Incompatibility

In FUJITSU Enterprise Postgres 13 SP1, when using the Connection Manager, if the database server watchdog detects that the Connection Manager is down, it will output a message to the database server.

Incompatibilities may occur if:

1) The application server is using the Connection Manager. and

2) The database server is running the watchdog process. and

3) 1) Application server or Connection Manager goes down.

FUJITSU Enterprise Postgres 13 or earlier

If the database server watchdog detects that the Connection Manager is down, the following message is not output.

```
WARNING:  watchdog: error in heartbeat connection (20331): host=xxx.xxx.xxx.xxx port=xxxxx
pid=xxxxx
```

FUJITSU Enterprise Postgres 13 SP1

If the database server watchdog detects that the Connection Manager is down, the following message may be output.

```
WARNING:  watchdog: error in heartbeat connection (20331): host=xxx.xxx.xxx.xxx port=xxxxx
pid=xxxxx
```

Action method

If you are monitoring the database log for watchdog messages, change the monitoring setting to one that takes into account the possible output of these messages.

2.3.2 Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection

Incompatibility

In FUJITSU Enterprise Postgres 13 SP1 allows an application using the Connection Manager to change the error information when attempting to execute SQL again on a connection that the Connection Manager has determined to be in error due to a database error.

The changed error information is included in the error presented in "Errors when an Application Connection Switch Occurs and Corresponding Actions" for each client driver in "Application Development Guide".

Incompatibilities may occur if the following conditions are met:

1) The application uses one of the following drivers. and

-libpq (C Library)

-ECPG (Embedded SQL in C)

2) You are using the Connection Manager. and

3) The database server to which the application in 1) was connected goes down. and

4) The Connection Manager notifies the application in 1) of an error when the database is down in 3). and

5) The application in 1) does not disconnect from the database server that is down, but executes SQL using the connection.

FUJITSU Enterprise Postgres 13 or earlier

The error information returned depends on the actual database server error condition.

FUJITSU Enterprise Postgres 13 SP1

The following error information is returned:

- For libpq (C Library): CONNECTION_BAD (PQstatus () return value)
- For ECPG (Embedded SQL in C): 57P02 (SQLSTATE return value)

Action method

Consider that the above error may be returned during the SQL error determination process.

Also, if you encounter an error about switching application destinations as described in "Errors when an Application Connection Switch Occurs and Corresponding Actions" for each client driver in "Application Development Guide", you should explicitly disconnect and reconnect or rerun the application.

2.3.3 Changing the Value of the Category Column in the pg_settings view

Incompatibility

For FUJITSU Enterprise Postgres 13, change the value of the category column in the pg_settings view.

FUJITSU Enterprise Postgres 12 or earlier

Original value	wrong value
Preset Options	Fujitsu Enterprise Postgres Parameters
Customized Options	Preset Options
Developer Options	Customized Options

This is an incorrect result because it is different from the original value.

FUJITSU Enterprise Postgres 13 or later

The correct value is the category column in the pg_settings view.

Action method

Replaces the category column in the pg_settings view with the values before migration, so that the results are the same as before migration.

2.3.4 Changing pgx_stat_lwlock of the Statistics View

Incompatibility

In FUJITSU Enterprise Postgres 13, change the wait event name displayed in the lwlock_name column of the statistics view pgx_stat_lwlock.

Wait Event Name

FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
clog (*1)	XactBuffer
commit_timestamp (*1)	CommitTSBuffer
subtrans (*1)	SubtransBuffer

FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
multixact_offset (*1)	MultiXactOffsetBuffer
multixact_member (*1)	MultiXactMemberBuffer
async (*1)	NotifyBuffer
oldserxid (*1)	SerialBuffer
wal_insert (*1)	WALInsert
buffer_content (*1)	BufferContent
buffer_io (*1)	BufferIO
replication_origin (*1)	ReplicationOriginState
replication_slot_io (*1)	ReplicationSlotIO
proc (*1)	LockFastPath
buffer_mapping (*1)	BufferMapping
lock_manager (*1)	LockManager
predicate_lock_manager (*1)	PredicateLockManager
parallel_hash_join (*3)	ParallelHashJoin
parallel_query_dsa (*2)	ParallelQueryDSA
session_dsa (*3)	PerSessionDSA
session_record_table (*3)	PerSessionRecordType
session_typmod_table (*3)	PerSessionRecordTypmod
shared_tuplestore (*3)	SharedTupleStore
tbm (*2)	SharedTidBitmap
parallel_append (*3)	ParallelAppend
serializable_xact (*4)	PerXactPredicateList
shared_mcxt (*4)	SharedMcxt
meta_cache_map (*4)	MetaCacheMap
global_metacache (*4)	GlobalCatcache
cached_buf_tranche_id (*4)	CachedBufTranche

*1）Events added in FUJITSU Enterprise Postgres 9.6.

*2）Events added in FUJITSU Enterprise Postgres 10.

*3）Events added in FUJITSU Enterprise Postgres 11.

*4）Events added in FUJITSU Enterprise Postgres 12.

Action method

None.

2.3.5 Changing the Behavior of pgx_rcvall

Incompatibility

In FUJITSU Enterprise Postgres 13, change the pgx_rcvall command to fail if the -e option of the pgx_rcvall command specifies a future time or if the -n option specifies a list appointment that does not exist.

FUJITSU Enterprise Postgres 12 or earlier

All archived WALs are applied for recovery if the -e option of the pgx_rcvall command specifies a time in the future, or if the -n option specifies a list appointment that does not exist.

FUJITSU Enterprise Postgres 13 or later

The pgx_rcvall command fails if the -e option of the pgx_rcvall command specifies a time in the future, or if the -n option specifies a list appointment that does not exist.

Action method

Specify recovery objectives correctly, if necessary.

2.3.6 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down

Incompatibility

For the FUJITSU Enterprise Postgres Mirroring Controller, change the heartbeat monitoring of the database process so that it does not retry monitoring when it detects down.

Action method

None.

2.3.7 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command

Incompatibility

In the FUJITSU Enterprise Postgres 12 Mirroring Controller, change the name of the post-promote command, which is the state transition command, and the parameter name in the server configuration file that specifies the post-promote command.

FUJITSU Enterprise Postgres 11 or earlier

- Command Name

  post-promote command

- The parameter name in the server configuration file that specifies the post-promote command

  post_promote_command

FUJITSU Enterprise Postgres 12 or later

- Command Name

  post-switch command

- The parameter name in the server configuration file that specifies the post-promote command

  post_switch_command

Action method

The post_promote_command parameter in the server configuration file continues to be available in FUJITSU Enterprise Postgres 12 or later.If specified in the server configuration file, it acts as a post-switch command.You cannot specify the post_promote_command and post_switch_command parameters at the same time.

2.3.8 Changing Mirroring Controller User Command Input Values

Incompatibility

Arguments (Fixed value: primarycenter) have been added to the following user commands:

- Fencing command of the database server
- Arbitration command
- Post-switch command
- Pre-detach command
- Post-attach command

Action method

If you are checking the number of arguments in a user command, increase the number of arguments by one.

2.3.9 Changing the Maximum Number of Connections per Server

Incompatibility

The maximum number of connections per server is changed from 262,143 to 65,535.

Action method

None.

2.3.10 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

Incompatibility

The ALTER TABLESPACE statement can be used to change the tablespace encryption settings if data is not stored in the tablespace.

Action method

None.

2.3.11 Changing the Default Configuration of the Cluster System Using Database Multiplexing

Incompatibility

In FUJITSU Enterprise Postgres 10, a split brain will not occur if heartbeat monitoring using an admin network times out, so the default is changed to a system configuration requiring an arbitration server acting as a third party.

FUJITSU Enterprise Postgres 9.6 or earlier

A cluster system comprises two database servers.

FUJITSU Enterprise Postgres 10 or later

By default, a cluster system comprises two database servers and an arbitration server.

Action method

If selecting the same system configuration as that in FUJITSU Enterprise Postgres 9.6 or earlier, set the parameters below in the server configuration file to perform automatic degradation unconditionally when a heartbeat abnormality is detected during OS/server heartbeat monitoring.

- Parameter: heartbeat_error_action
- Value: fallback

2.3.12 Changing the Default Operation when mc_ctl Command Options are Omitted

Incompatibility

In FUJITSU Enterprise Postgres 10, the default operation when the mc_ctl command options below are omitted has been changed:

- The -f option during start mode
- The -w option during start mode

FUJITSU Enterprise Postgres 9.6 or earlier

- If the -f option is omitted, automatic switching and disconnection immediately after the startup of Mirroring Controller will not be enabled.
- If the -w option is omitted, the system will not wait for operations to finish.

FUJITSU Enterprise Postgres 10 or later

- Even if the -f option is omitted, automatic switching and disconnection immediately after the startup of Mirroring Controller will be enabled.
- Even if the -w option is omitted, the system will wait for operations to finish.

Action method

If selecting the same operation as that in FUJITSU Enterprise Postgres 9.6 or earlier, take the action below when executing start mode of the mc_ctl command.

- If the -f option is omitted, specify the -F option.
- If the -w option is omitted, specify the -W option.

2.3.13 Changing the Connection Settings when Mirroring Controller Connects to an Instance

Incompatibility

In FUJITSU Enterprise Postgres 10, Mirroring Controller changes the connection setting below when connecting to an instance to detect failure of each database element.

- Application name

FUJITSU Enterprise Postgres 9.6 or earlier

- The application name is an empty string.

FUJITSU Enterprise Postgres 10 or later

- The application name is 'mc_agent'.

Action method

There is no method for changing the application name.

Therefore, if there is an application that identifies a database connection session of Mirroring Controller with the application name being an empty string, modify the process so that identification is performed using 'mc_agent'.

2.3.14 Changing the Status Display of the Mirroring Controller Server

Incompatibility

In FUJITSU Enterprise Postgres 10, the condition for displaying an abnormality for the process (WAL receive process) that receives transaction logs has been changed in regard to the server status display performed in status mode of the mc_ctl command of Mirroring Controller.

- Role of the applicable server (host_role): standby (standby)
- Display item: DBMS process status (db_proc_status)
- Display content: abnormal (abnormal process name)
  The applicability for incompatibility is determined based on whether 'wal_receiver' is included in the abnormality process name.

FUJITSU Enterprise Postgres 9.6 or earlier

Displays an abnormality when Mirroring Controller detects that the WAL send process has stopped.

FUJITSU Enterprise Postgres 10 or later

Displays an abnormality when Mirroring Controller detects that a streaming replication connection has not been established with the primary server using the WAL receive process.

Action method

If there is an application that determines the WAL receive process status from the display content retrieved using status mode of the mc_ctl command, modify as below to determine at the same level of accuracy as previously. However, this is not recommended due to incompatibilities accompanying the improvement in accuracy.

- If 'wal_sender' is included in the abnormal process name displayed in the 'abnormal' db_proc_status item of the 'primary' host_role, it is determined that an abnormality has occurred in the WAL receive process.
- If 'wal_sender' is not included in the abnormal process name displayed in the 'abnormal' db_proc_status item of the 'primary' host_role, it is determined that an abnormality has not occurred in the WAL receive process.

2.3.15 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or earlier, Mirroring Controller periodically accesses the database to retrieve the synchronous_standby_names parameter value using the SHOW command, and automatically recovers if changes are detected, in case the user accidentally changes the synchronous_standby_names parameter in postgresql.conf during database multiplexing mode. However, because this process uses the CPU of the database server for redundancy and SQL statements are executed with high frequency, these processes are not executed by default in FUJITSU Enterprise Postgres 10.

FUJITSU Enterprise Postgres 9.6 or earlier

Mirroring Controller checks if the synchronous_standby_names parameter in postgresql.conf has been mistakenly changed by the user.

FUJITSU Enterprise Postgres 10 or later

By default, Mirroring Controller does not check if the synchronous_standby_names parameter in postgresql.conf has been mistakenly changed by the user.

Action method

If selecting the same operation as that in FUJITSU Enterprise Postgres 9.6 or earlier, set the parameter below in the server definition file.

- Parameter: check_synchronous_standby_names_validation
- Value: 'on'

2.3.16 Changing Masking Policy Definition for Unsupported Data Types

Incompatibility

The data masking feature of FUJITSU Enterprise Postgres is updated so that an error occurs when a masking policy is defined for a column of an unsupported data type (array type or timestamp with timezone type).

FUJITSU Enterprise Postgres 9.5

The definition of a masking policy for a column of array type or timestamp with timezone type ends normally, but an error occurs when accessing a column of a table for which the policy is defined.

FUJITSU Enterprise Postgres 9.6 or later

An error occurs when defining a masking policy for a column of array type or timestamp with timezone type.

Action method

If a policy that was defined in FUJITSU Enterprise Postgres 9.5 includes masking of a column of an unsupported data type (array type or timestamp with timezone type), perform one of the following in FUJITSU Enterprise Postgres 9.6 or later:

- Ignore the error if the masking policy contains columns of only these data types, or delete the policy with the pgx_drop_confidential_policy system administration function.
- If the masking policy target contains columns of these data types and a supported data type, delete the problematic columns with the pgx_alter_confidential_policy system function.

2.4 JDBC Drive Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the targetServerType Value	Y	Y	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.4.1 Changing the targetServerType Value

Incompatibility

In FUJITSU Enterprise Postgres 13, the value of targetServerType specified in the connection string was changed. Therefore, the previously used values are no longer available.

Action method

If you specified a value for targetServerType, change the value as follows:

Table 2.1 Specified values for the target server

Server Selection Order	FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
Primary Server	master	primary
Standby Server	slave	secondary
Prefer Standby Server	preferSlave	preferSecondary
Any	any	any

2.5 .NET Data Provider Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the TargetServerType Value	Y	Y	Y	Y	Y	N
Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider	Y	Y	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.5.1 Changing the TargetServerType Value

Incompatibility

In FUJITSU Enterprise Postgres 13, the value of TargetServerType specified in the connection string was changed. Therefore, the previously used values are no longer available.

Action method

If you specified a value for TargetServerType, change the value as follows:

Table 2.2 Specified values for the target server

Server Selection Order	FUJITSU Enterprise Postgres 9.6 or earlier	FUJITSU Enterprise Postgres 10/11/12	FUJITSU Enterprise Postgres 13
Primary Server	primary	master	primary
Standby Server	-	slave	standby
Prefer Standby Server	prefer_standby	preferSlave	preferStandby
Any	-	any	any

2.5.2 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider

Incompatibility

FUJITSU Enterprise Postgres 10 or later, the following changes occur when you view database resources in Server Explorer.

- "Schema Name.Table Name" display under the Tables folder.
- The Indexes folder is not displayed.
- The Triggers folder does not displayed.
- The Sequences folder is not displayed.
- The Procedures folder does not displayed.

Action method

None.

2.6 oracle_fdw Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the Oracle Client Version	N	N	Y	Y	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.6.1 Changing the Oracle Client Version

Incompatibility

FUJITSU Enterprise Postgres 12 change the version of the Oracle client used to build oracle_fdw to 11.2.

Action method

Use Oracle client version 11.2 or later.

Also,if a file named libclntsh.so.11.1 does not exist in OCI library, create a symbolic link named libclntsh.so.11.1.

2.7 pgaudit Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes	N	N	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.7.1 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes

Incompatibility

In FUJITSU Enterprise Postgres 13, the trigger function additionally outputs NEW and OLD values to the audit log when the pgaudit.log_parameter is set to on.

FUJITSU Enterprise Postgres 12 or earlier

The following (18) does not output the values of NEW, OLD.

[Example]

```
AUDIT: SESSION,WRITE,2020-09-03 07:07:39 UTC,
        (1)    (2)   (3)
[local],9775,psql,k5user,postgres,3/536, 1, 2, INSERT, ,
(4)     (5)  (6)  (7)    (8)      (9)   (10)(11)(12)(13)
TABLE,public.trig_audit, ,
(14)  (15)    (16)
 "INSERT INTO trig_audit SELECT 'U', now(), user, OLD.*, NEW.*",
(17)
trig_audit AFTER ROW UPDATE 92027 trig_test trig_test public 0  f aaaa
(18)
```

FUJITSU Enterprise Postgres 13 or later

NEW, OLD values are output.

[Example]

```
AUDIT: SESSION,WRITE,2020-09-03 07:07:39 UTC,
[local],9775,psql,k5user,postgres,3/536,1,2,INSERT,,TABLE,public.
trig_audit,,
"INSERT INTO trig_audit SELECT 'U', now(), user, OLD.*, NEW.*",
(bbb) (aaa) trig_audit AFTER ROW UPDATE 92027 trig_test trig_test
public 0  f aaaa
```

Action method

If you are using an application that works by monitoring the string that the trigger function output to the audit log, modify the application to work with the NEW and OLD values.

Chapter 3 Program Updates

For program fix information, see "Program Updates".

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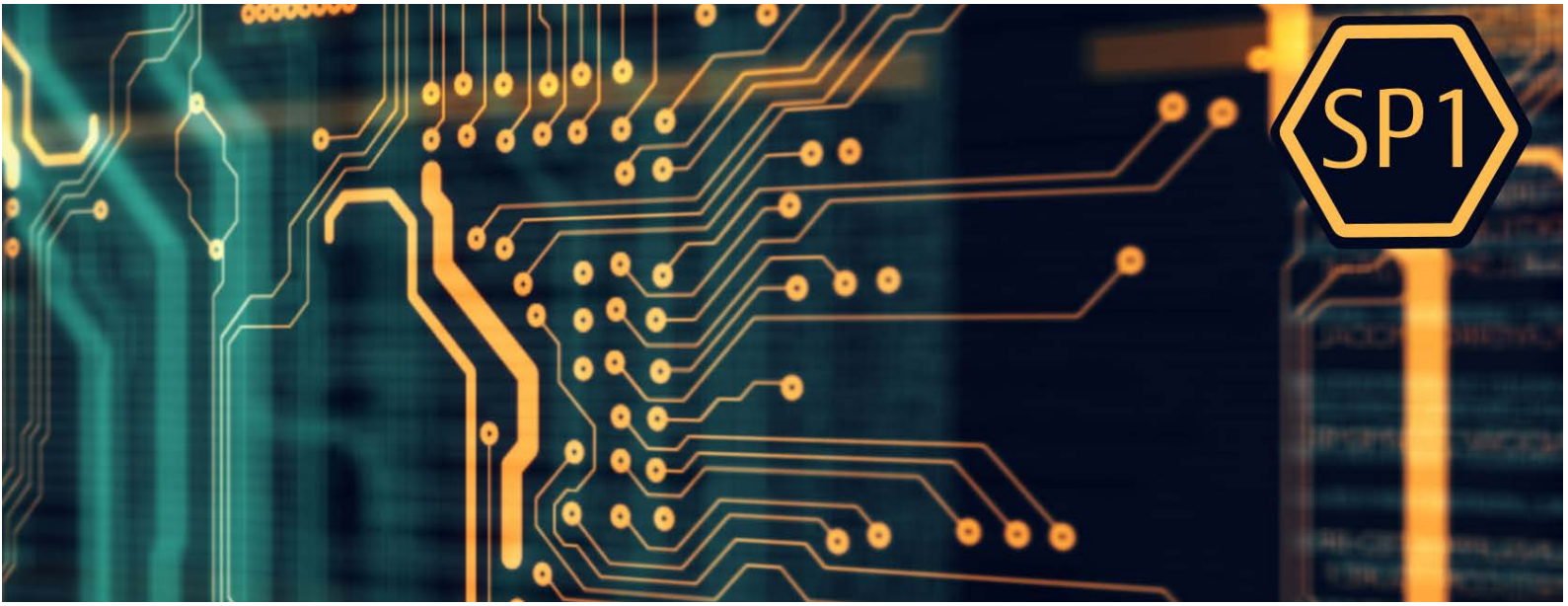
FUJITSU

FUJITSU Enterprise Postgres 13



Release Notes

(Windows)

Windows

B1WS-1436-02ENZ0(00)
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Preface

Purpose of this document

This document provides release information for FUJITSU Enterprise Postgres.

Structure of this document

This document is structured as follows:

Chapter 1 New Features and Improvements

Explains the new features and improvements in this version.

Chapter 2 Compatibility Information

Provides information regarding compatibility.

Chapter 3 Program Updates

Explains updates incorporated in this version.

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Issue date and version

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Edition 2.0: August 2021
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Chapter 1 New Features and Improvements

This chapter explains FUJITSU Enterprise Postgres new features and improvements added in this version.

Table 1.1 New features and improvements

Version and level	Classification	Feature	Provided in AE	Provided in SE
13 SP1	OSS	PostgreSQL Rebase	Y	Y
13	Application development	Support for OpenJDK	Y	Y
	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y

1.1 Features Added in 13 SP1

This section explains new features and improvements in FUJITSU Enterprise Postgres 13.

1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase

1.1.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 13.3.

See

Refer to "PostgreSQL Version Used for FUJITSU Enterprise Postgres" in the Installation and Setup Guide for Server for details.

1.2 Features Added in 13

This section explains new features and improvements in FUJITSU Enterprise Postgres 13.

1.2.1 Application Development

This section explains the new features and improvements related to application development:

- Support for OpenJDK

1.2.1.1 Support for OpenJDK

In the FUJITSU Enterprise Postgres client environment, in addition to the Oracle JDK or JRE that we have guaranteed so far, we also guarantee the behavior when using OpenJDK.

See

Refer to "Related Software" in the Installation and Setup Guide for Client for details.

1.2.2 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.2.2.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 13.1.

Refer to "PostgreSQL Version Used for FUJITSU Enterprise Postgres" in the Installation and Setup Guide for Server for details.

1.2.2.2 Update of OSS Provided

The OSS provided by FUJITSU Enterprise Postgres have been updated.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for details.

Chapter 2 Compatibility Information

This chapter explains incompatible items and actions required when migrating from an earlier version to FUJITSU Enterprise Postgres 13 SP1. Check compatibility before migrating and take the appropriate action.

2.1 Installation/Setup Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Removing Operating System Support for Client Feature	Y	Y	Y	Y	Y	Y
Removing Operating System Support for Server Feature	Y	Y	Y	Y	Y	Y
Removing Operating System Support for Client Feature	N	N	Y	Y	Y	N
Removing Operating System Support for Client Feature	Y	Y	Y	Y	N	N
Removing Operating System Support for Server Feature	Y	Y	Y	Y	N	N
Changing the way OSS is set up	Y	Y	Y	Y	N	N
Changing Core and Log File Paths when Instance is Created with WebAdmin	Y	Y	Y	Y	N	N
Renaming WebAdmin Services	Y	Y	Y	Y	N	N
Changing the features targeted for installation in a 64-bit environment	Y	Y	N	N	N	N
Changing the access permissions of the Windows client installation folder	Y	Y	N	N	N	N
Changing the WebAdmin installation method	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.1.1 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 SP1 or later, the following operating systems have been removed.

- Windows Server(R) 2012
- Windows Server(R) 2012 R2

Action method

None.

2.1.2 Removing Operating System Support for Server Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 SP1 or later, the following operating systems have been removed.

- Windows Server(R) 2012
- Windows Server(R) 2012 R2

Action method

None.

2.1.3 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 13 or later, the following operating systems have been removed.

- SLES 12 SP4 or earlier

Action method

None.

2.1.4 Removing Operating System Support for Client Feature

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, the following operating systems have been removed.

- Windows(R) 7
- Windows Server(R) 2008
- RHEL6

Also, the 32 bit Linux client can no longer be installed because RHEL 6 has been removed from the operating system.

Action method

None.

2.1.5 Removing Operating System Support for Server Feature

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, the following operating systems have been removed.

- Windows Server(R) 2008

Action method

None.

2.1.6 Changing the Way OSS is Set Up

Incompatibility

FUJITSU Enterprise Postgres 12 or later do not place OSS extension modules in the executable directory. The OSS extension modules must be placed in the executable directory when you set up OSS.

Refer to "Setting Up and Removing OSS" in the Installation and Setup Guide for Server for details.

Action method

None.

2.1.7 Changing Core and Log File Paths when Instance is Created with WebAdmin

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, change the core and log file paths when creating an instance in WebAdmin.

FUJITSU Enterprise Postgres 11 or earlier

Log File Path: *userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceNamePortNumber*\log

Core File Path: *userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceNamePortNumber*\core

version: product version_edition_architecture

［Example］

Log File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep_110_AE_64\myinst27599\log

Core File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep_110_AE_64\myinst27599\core

FUJITSU Enterprise Postgres 12

*userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceNamePortNumber*\log

Core File Path: *userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceNamePortNumber*\core

version: product version_WA_architecture

［Example］

Log File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep_120_WA_64\myinst27599\log

Core File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep_120_WA_64\myinst27599\core

Action method

None.

2.1.8 Renaming WebAdmin Services

Incompatibility

In FUJITSU Enterprise Postgres 12 or later, change the service name registered when you set up WebAdmin.

FUJITSU Enterprise Postgres 11 or earlier

fsep_*x*SP*z*_*edition*_64_WebAdmin_Port1

fsep_*x*SP*z*_*edition*_64_WebAdmin_Port2

FUJITSU Enterprise Postgres 12 or later

fsep_xSPz_WA_64_WebAdmin_Port1

fsep_xSPz_WA_64_WebAdmin_Port2

Action method

None.

2.1.9 Changing the Features Targeted for Installation in a 64-bit Environment

Incompatibility

32 bit Linux client can no longer be installed on RHEL7 in FUJITSU Enterprise Postgres 10 or later.

Note: 32 bit Linux client can install on RHEL6 in FUJITSU Enterprise Postgres 11 or earlier.

Action method

None.

2.1.10 Changing the Access Permissions of the Windows Client Installation Folder

Incompatibility

When changed for install folder the Windows client from default, the access permissions of the installed files and folder changes to read and execute.

The above changes apply to non-administrators.

This incompatibility occurs with all supported Windows client operating systems. Refer to "Required Operating System" in the Installation and Setup Guide for Client for information on the operating environment.

Action method

This change was made simply to enhance security, therefore, no action is normally required.

However, if existing access permissions are required, this change can be reverted by running *installDir*\setup\revert_cacls.bat as an administrator after installation.

2.1.11 Changing the WebAdmin Installation Method

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or later, WebAdmin is not installed automatically during server installation. Therefore, install WebAdmin separately.

Action method

None.

2.2 Application Migration Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Change the "elif" Statement Behavior in ecobpg	Y	Y	Y	Y	Y	N
Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type	Y	Y	Y	Y	N	N
Removing UTL_FILE for Oracle Database Compatibility Features	Y	Y	Y	Y	N	N
Changing the method of specifying the application connection switch feature	Y	Y	N	N	N	N
PostgreSQL compatibility of embedded SQL applications in C and COBOL	Y	Y	N	N	N	N
Changing Vertical Clustered Index (VCI)	Y	Y	N	N	N	N
Changing how to use the features compatible with Oracle databases	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.2.1 Change the "elif" Statement Behavior in ecobpg

Incompatibility

The "elif" statement now works correctly with FUJITSU Enterprise Postgres 13.

FUJITSU Enterprise Postgres 12 or earlier

The decision of the "elif" statement is made whether or not the "ifdef/ifndef" condition is met.

[Example]

```
000000     EXEC SQL ifdef DEF1 END-EXEC.
000000     Operation (1).
000000     EXEC SQL elif DEF2 END-EXEC.
000000     Operation (2).
000000     EXEC SQL else END-EXEC.
000000     Operation (3).
```

If "DEF1" and "DEF2" are true, both "Operation (1)" and "Operation (2)" are executed.

FUJITSU Enterprise Postgres 13 or later

If the condition "ifdef/ifndef" is met, the judgment of the "elif" statement is not enforced.

[Example]

```
000000     EXEC SQL ifdef DEF1 END-EXEC.
000000     Operation (1).
000000     EXEC SQL elif DEF2 END-EXEC.
000000     Operation (2).
000000     EXEC SQL else END-EXEC.
000000     Operation (3).
```

If "DEF1" and "DEF2" are true, only "Operation (1)" is executed.

Action method

Check your existing application and fix the elif statement to work correctly.

2.2.2 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type

Incompatibility

In FUJITSU Enterprise Postgres 12, changed to error when running an operator or function that returns non Data Types for Masking type.

FUJITSU Enterprise Postgres 11 or earlier

In the following cases, the operator or function in 3) may be executed without masking.

This is an incorrect result because the data containing the masking column is performed without masking.

1) Create a Masking policy. and

2) Execute a SELECT statement. and

3) Execute an operator or function in the SELECT statement of 2). and

4) The operator or function argument of 3) includes a subquery. and

5) The operator or function argument of 3) contains the column to be protected created in 1). and

6) The operator or function of 3) returns a type not listed in "Data Types for Masking" in "Operation Guide".

FUJITSU Enterprise Postgres 12 or later

Operator or function results of 3) in the following error.

```
ERROR:  The output data type is incompatible with the confidential policy.
HINT:  Data type of the result value(s) produced by expression/function using confidential columns
```

```
is not supported by Data masking module. Consider removing confidential columns from such
expressions/functions.
```

This is correct because the operator or function returns a data type not listed in "Data Types for Masking" in "Operation Guide".

Action method

Do one of the following to ensure that the results are identical to those of FUJITSU Enterprise Postgres 11 and earlier:

1) Modify the Masking policy to prevent masking from being performed for the user executing the SQL.

2) Modify SQL to not use operators or functions that return types not listed in "Data Types for Masking" in "Operation Guide".

2.2.3 Removing UTL_FILE for Oracle Database Compatibility Features

Incompatibility

In FUJITSU Enterprise Postgres 12, remove the Oracle database compatibility UTL_FILE.

Action method

None.

2.2.4 Changing the Method of Specifying the Application Connection Switch Feature

Incompatibility

The target server specified using the application connection switch feature is changed to the same name as that of PostgreSQL.

Action method

Use the FUJITSU Enterprise Postgres 10 or later client to execute applications that have the target server specified as the application connection switch feature after changing the target server and specified value as listed below and recompiling.

Specified name of the target server

Usage target	Before correction	After correction
JDBC driver	No change	
ODBC driver	TargetServer	target_session_attrs
.NET Data Provider	target_server	TargetServerType
Connection service file	target_server	target_session_attrs
Library (libpq) for C	target_server Environment variable (PGXTARGETSERVER)	target_session_attrs Environment variable (PGTARGETSESSIONATTRS)
Embedded SQL	target_server	target_session_attrs
psql	Environment variable (PGXTARGETSERVER)	Environment variable (PGTARGETSESSIONATTRS)

Specified value for the target server

Server selection order	JDBC driver	.NET Data Provider		Other driver	
		Before correction	After correction	Before correction	After correction
Primary server	No change	primary	master	primary	read-write
Standby server	No change	-	slave	-	-

Server selection order	JDBC driver	.NET Data Provider		Other driver	
		Before correction	After correction	Before correction	After correction
Priority given to a standby server	No change	prefer_standby	preferSlave	prefer_standby	prefer-read
Any	No change	-	any	-	any

2.2.5 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL

Incompatibility

Embedded SQL applications in C and COBOL that were compiled with FUJITSU Enterprise Postgres 9.6 or earlier cannot be used in the FUJITSU Enterprise Postgres 10 client.

Action method

Use the FUJITSU Enterprise Postgres 10 or later client to execute the applications only after recompiling them with the FUJITSU Enterprise Postgres 10 or later client.

2.2.6 Changing Vertical Clustered Index (VCI)

Incompatibility

The functions below have been added to the functions for which VCI is not used.

Type	Function
Date/time functions	age(timestamp) current_date current_timestamp current_time localtime localtimestamp
Session information functions	current_user current_role

Action method

To use VCI, specify the second argument when using the age function, and specify other functions as subqueries.

[Example]

Before: select age(column A), current_date from table

After: select age(column A, **now()**), **(select current_date)** from table

2.2.7 Changing how to Use the Features Compatible with Oracle Databases

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or later, to use the features compatible with Oracle databases, create a new instance and execute the following command for the "postgres" and "template1" databases:

CREATE EXTENSION oracle_compatible

Action method

None.

2.3 Operation Migration Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the Value of the Category Column in the pg_settings view	N	Y	Y	Y	Y	N
Changing pgx_stat_lwlock of the Statistics View	N	Y	Y	Y	Y	N
Changing the Behavior of pgx_rcvall	Y	Y	Y	Y	Y	N
Mirroring Controller no longer retries to monitor database processes when they are detected as down	Y	N	Y	Y	N	N
Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command	N	N	Y	Y	N	N
Changing Mirroring Controller User Command Input Values	N	N	Y	Y	N	N
Changing the maximum number of connections per server	Y	Y	N	N	N	N
Changing the encryption settings using the ALTER TABLESPACE statement	Y	Y	N	N	N	N
Changing the default configuration of the cluster system using database multiplexing	Y	N	N	N	N	N
Changing the default operation when mc_ctl command options are omitted	Y	N	N	N	N	N
Changing the connection settings when Mirroring Controller connects to an instance	Y	N	N	N	N	N
Changing the status display of the Mirroring Controller server	Y	N	N	N	N	N
Changing the operation when the synchronous_standby_names parameter is changed during database multiplexing operation	Y	N	N	N	N	N
Changing masking policy definition for unsupported data types	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.3.1 Changing the Value of the Category Column in the pg_settings view

Incompatibility

For FUJITSU Enterprise Postgres 13, change the value of the category column in the pg_settings view.

FUJITSU Enterprise Postgres 12 or earlier

Original value	wrong value
Preset Options	Fujitsu Enterprise Postgres Parameters
Customized Options	Preset Options

Original value	wrong value
Developer Options	Customized Options

This is an incorrect result because it is different from the original value.

FUJITSU Enterprise Postgres 13 or later

The correct value is the category column in the pg_settings view.

Action method

Replaces the category column in the pg_settings view with the values before migration, so that the results are the same as before migration.

2.3.2 Changing pgx_stat_lwlock of the Statistics View

Incompatibility

In FUJITSU Enterprise Postgres 13, change the wait event name displayed in the lwlock_name column of the statistics view pgx_stat_lwlock.

Wait Event Name

FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
clog (*1)	XactBuffer
commit_timestamp (*1)	CommitTSBuffer
subtrans (*1)	SubtransBuffer
multixact_offset (*1)	MultiXactOffsetBuffer
multixact_member (*1)	MultiXactMemberBuffer
async (*1)	NotifyBuffer
oldserxid (*1)	SerialBuffer
wal_insert (*1)	WALInsert
buffer_content (*1)	BufferContent
buffer_io (*1)	BufferIO
replication_origin (*1)	ReplicationOriginState
replication_slot_io (*1)	ReplicationSlotIO
proc (*1)	LockFastPath
buffer_mapping (*1)	BufferMapping
lock_manager (*1)	LockManager
predicate_lock_manager (*1)	PredicateLockManager
parallel_hash_join (*3)	ParallelHashJoin
parallel_query_dsa (*2)	ParallelQueryDSA
session_dsa (*3)	PerSessionDSA
session_record_table (*3)	PerSessionRecordType
session_typmod_table (*3)	PerSessionRecordTypmod
shared_tuplestore (*3)	SharedTupleStore
tbm (*2)	SharedTidBitmap
parallel_append (*3)	ParallelAppend
serializable_xact (*4)	PerXactPredicateList

FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
shared_mcxt (*4)	SharedMcxt
meta_cache_map (*4)	MetaCacheMap
global_metacache (*4)	GlobalCatcache
cached_buf_tranche_id (*4)	CachedBufTranche

*1) Events added in FUJITSU Enterprise Postgres 9.6.

*2) Events added in FUJITSU Enterprise Postgres 10.

*3) Events added in FUJITSU Enterprise Postgres 11.

*4) Events added in FUJITSU Enterprise Postgres 12.

Action method

None.

2.3.3 Changing the Behavior of pgx_rcvall

Incompatibility

In FUJITSU Enterprise Postgres 13, change the pgx_rcvall command to fail if the -e option of the pgx_rcvall command specifies a future time or if the -n option specifies a list appointment that does not exist.

FUJITSU Enterprise Postgres 12 or earlier

All archived WALs are applied for recovery if the -e option of the pgx_rcvall command specifies a time in the future, or if the -n option specifies a list appointment that does not exist.

FUJITSU Enterprise Postgres 13 or later

The pgx_rcvall command fails if the -e option of the pgx_rcvall command specifies a time in the future, or if the -n option specifies a list appointment that does not exist.

Action method

Specify recovery objectives correctly, if necessary.

2.3.4 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down

Incompatibility

For the FUJITSU Enterprise Postgres Mirroring Controller, change the heartbeat monitoring of the database process so that it does not retry monitoring when it detects down.

Action method

None.

2.3.5 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command

Incompatibility

In the FUJITSU Enterprise Postgres 12 Mirroring Controller, change the name of the post-promote command, which is the state transition command, and the parameter name in the server configuration file that specifies the post-promote command.

FUJITSU Enterprise Postgres 11 or earlier

- Command Name

  post-promote command

- The parameter name in the server configuration file that specifies the post-promote command

  post_promote_command

FUJITSU Enterprise Postgres 12 or later

- Command Name

  post-switch command

- The parameter name in the server configuration file that specifies the post-promote command

  post_switch_command

Action method

The post_promote_command parameter in the server configuration file continues to be available in FUJITSU Enterprise Postgres 12 or later.If specified in the server configuration file, it acts as a post-switch command.You cannot specify the post_promote_command and post_switch_command parameters at the same time.

2.3.6 Changing Mirroring Controller User Command Input Values

Incompatibility

Arguments (Fixed value: primarycenter) have been added to the following user commands:

- Fencing command of the database server
- Arbitration command
- Post-switch command
- Pre-detach command
- Post-attach command

Action method

If you are checking the number of arguments in a user command, increase the number of arguments by one.

2.3.7 Changing the Maximum Number of Connections per Server

Incompatibility

The maximum number of connections per server is changed from 262,143 to 65,535.

Action method

None.

2.3.8 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

Incompatibility

The ALTER TABLESPACE statement can be used to change the tablespace encryption settings if data is not stored in the tablespace.

Action method

None.

2.3.9 Changing the Default Configuration of the Cluster System Using Database Multiplexing

Incompatibility

In FUJITSU Enterprise Postgres 10, a split brain will not occur if heartbeat monitoring using an admin network times out, so the default is changed to a system configuration requiring an arbitration server acting as a third party.

FUJITSU Enterprise Postgres 9.6 or earlier

A cluster system comprises two database servers.

FUJITSU Enterprise Postgres 10 or later

By default, a cluster system comprises two database servers and an arbitration server.

Action method

If selecting the same system configuration as that in FUJITSU Enterprise Postgres 9.6 or earlier, set the parameters below in the server configuration file to perform automatic degradation unconditionally when a heartbeat abnormality is detected during OS/server heartbeat monitoring.

- Parameter: heartbeat_error_action
- Value: fallback

2.3.10 Changing the Default Operation when mc_ctl Command Options are Omitted

Incompatibility

In FUJITSU Enterprise Postgres 10, the default operation when the mc_ctl command options below are omitted has been changed:

- The -f option during start mode
- The -w option during start mode

FUJITSU Enterprise Postgres 9.6 or earlier

- If the -f option is omitted, automatic switching and disconnection immediately after the startup of Mirroring Controller will not be enabled.
- If the -w option is omitted, the system will not wait for operations to finish.

FUJITSU Enterprise Postgres 10 or later

- Even if the -f option is omitted, automatic switching and disconnection immediately after the startup of Mirroring Controller will be enabled.
- Even if the -w option is omitted, the system will wait for operations to finish.

Action method

If selecting the same operation as that in FUJITSU Enterprise Postgres 9.6 or earlier, take the action below when executing start mode of the mc_ctl command.

- If the -f option is omitted, specify the -F option.
- If the -w option is omitted, specify the -W option.

2.3.11 Changing the Connection Settings when Mirroring Controller Connects to an Instance

Incompatibility

In FUJITSU Enterprise Postgres 10, Mirroring Controller changes the connection setting below when connecting to an instance to detect failure of each database element.

- Application name

FUJITSU Enterprise Postgres 9.6 or earlier

- The application name is an empty string.

FUJITSU Enterprise Postgres 10 or later

- The application name is 'mc_agent'.

Action method

There is no method for changing the application name.

Therefore, if there is an application that identifies a database connection session of Mirroring Controller with the application name being an empty string, modify the process so that identification is performed using 'mc_agent'.

2.3.12 Changing the Status Display of the Mirroring Controller Server

Incompatibility

In FUJITSU Enterprise Postgres 10, the condition for displaying an abnormality for the process (WAL receive process) that receives transaction logs has been changed in regard to the server status display performed in status mode of the mc_ctl command of Mirroring Controller.

- Role of the applicable server (host_role): standby (standby)
- Display item: DBMS process status (db_proc_status)
- Display content: abnormal (abnormal process name)
  The applicability for incompatibility is determined based on whether 'wal_receiver' is included in the abnormality process name.

FUJITSU Enterprise Postgres 9.6 or earlier

Displays an abnormality when Mirroring Controller detects that the WAL send process has stopped.

FUJITSU Enterprise Postgres 10 or later

Displays an abnormality when Mirroring Controller detects that a streaming replication connection has not been established with the primary server using the WAL receive process.

Action method

If there is an application that determines the WAL receive process status from the display content retrieved using status mode of the mc_ctl command, modify as below to determine at the same level of accuracy as previously. However, this is not recommended due to incompatibilities accompanying the improvement in accuracy.

- If 'wal_sender' is included in the abnormal process name displayed in the 'abnormal' db_proc_status item of the 'primary' host_role, it is determined that an abnormality has occurred in the WAL receive process.
- If 'wal_sender' is not included in the abnormal process name displayed in the 'abnormal' db_proc_status item of the 'primary' host_role, it is determined that an abnormality has not occurred in the WAL receive process.

2.3.13 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation

Incompatibility

In FUJITSU Enterprise Postgres 9.6 or earlier, Mirroring Controller periodically accesses the database to retrieve the synchronous_standby_names parameter value using the SHOW command, and automatically recovers if changes are detected, in case the user accidentally changes the synchronous_standby_names parameter in postgresql.conf during database multiplexing mode. However,

because this process uses the CPU of the database server for redundancy and SQL statements are executed with high frequency, these processes are not executed by default in FUJITSU Enterprise Postgres 10.

FUJITSU Enterprise Postgres 9.6 or earlier

Mirroring Controller checks if the synchronous_standby_names parameter in postgresql.conf has been mistakenly changed by the user.

FUJITSU Enterprise Postgres 10 or later

By default, Mirroring Controller does not check if the synchronous_standby_names parameter in postgresql.conf has been mistakenly changed by the user.

Action method

If selecting the same operation as that in FUJITSU Enterprise Postgres 9.6 or earlier, set the parameter below in the server definition file.

- Parameter: check_synchronous_standby_names_validation
- Value: 'on'

2.3.14 Changing Masking Policy Definition for Unsupported Data Types

Incompatibility

The data masking feature of FUJITSU Enterprise Postgres is updated so that an error occurs when a masking policy is defined for a column of an unsupported data type (array type or timestamp with timezone type).

FUJITSU Enterprise Postgres 9.5

The definition of a masking policy for a column of array type or timestamp with timezone type ends normally, but an error occurs when accessing a column of a table for which the policy is defined.

FUJITSU Enterprise Postgres 9.6 or later

An error occurs when defining a masking policy for a column of array type or timestamp with timezone type.

Action method

If a policy that was defined in FUJITSU Enterprise Postgres 9.5 includes masking of a column of an unsupported data type (array type or timestamp with timezone type), perform one of the following in FUJITSU Enterprise Postgres 9.6 or later:

- Ignore the error if the masking policy contains columns of only these data types, or delete the policy with the pgx_drop_confidential_policy system administration function.
- If the masking policy target contains columns of these data types and a supported data type, delete the problematic columns with the pgx_alter_confidential_policy system function.

2.4 JDBC Drive Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the targetServerType Value	Y	Y	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.4.1 Changing the targetServerType Value

Incompatibility

In FUJITSU Enterprise Postgres 13, the value of targetServerType specified in the connection string was changed. Therefore, the previously used values are no longer available.

Action method

If you specified a value for targetServerType, change the value as follows:

Table 2.1 Specified values for the target server

Server Selection Order	FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
Primary Server	master	primary
Standby Server	slave	secondary
Prefer Standby Server	preferSlave	preferSecondary
Any	any	any

2.5 .NET Data Provider Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing the TargetServerType Value	Y	Y	Y	Y	Y	N
Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider	Y	Y	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.5.1 Changing the TargetServerType Value

Incompatibility

In FUJITSU Enterprise Postgres 13, the value of TargetServerType specified in the connection string was changed. Therefore, the previously used values are no longer available.

Action method

If you specified a value for TargetServerType, change the value as follows:

Table 2.2 Specified values for the target server

Server Selection Order	FUJITSU Enterprise Postgres 9.6 or earlier	FUJITSU Enterprise Postgres 10/11/12	FUJITSU Enterprise Postgres 13
Primary Server	primary	master	primary
Standby Server	-	slave	standby
Prefer Standby Server	prefer_standby	preferSlave	preferStandby
Any	-	any	any

2.5.2 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider

Incompatibility

FUJITSU Enterprise Postgres 10 or later, the following changes occur when you view database resources in Server Explorer.

- "Schema Name.Table Name" display under the Tables folder.
- The Indexes folder is not displayed.

- The Triggers folder does not displayed.
- The Sequences folder is not displayed.
- The Procedures folder does not displayed.

Action method

None.

2.6 pgaudit Incompatibility

Item	Pre-migration version					
	9.5	9.6	10	11	12	13
Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes	N	N	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.6.1 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes

Incompatibility

In FUJITSU Enterprise Postgres 13, the trigger function additionally outputs NEW and OLD values to the audit log when the pgaudit.log_parameter is set to on.

FUJITSU Enterprise Postgres 12 or earlier

The following (18) does not output the values of NEW, OLD.

[Example]

```
AUDIT: SESSION,WRITE,2020-09-03 07:07:39 UTC,
        (1)    (2)   (3)
[local],9775,psql,k5user,postgres,3/536, 1, 2, INSERT, ,
(4)     (5)  (6)  (7)    (8)      (9)   (10)(11)(12)(13)
TABLE,public.trig_audit, ,
(14)  (15)    (16)
 "INSERT INTO trig_audit SELECT 'U', now(), user, OLD.*, NEW.*",
(17)
trig_audit AFTER ROW UPDATE 92027 trig_test trig_test public 0  f aaaa
(18)
```

FUJITSU Enterprise Postgres 13 or later

NEW, OLD values are output.

[Example]

```
AUDIT: SESSION,WRITE,2020-09-03 07:07:39 UTC,
[local],9775,psql,k5user,postgres,3/536,1,2,INSERT,,TABLE,public.
trig_audit,,
"INSERT INTO trig_audit SELECT 'U', now(), user, OLD.*, NEW.*",
(bbb) (aaa) trig_audit AFTER ROW UPDATE 92027 trig_test trig_test
public 0  f aaaa
```

Action method

If you are using an application that works by monitoring the string that the trigger function output to the audit log, modify the application to work with the NEW and OLD values.

Chapter 3 Program Updates

For program fix information, see "Program Updates".

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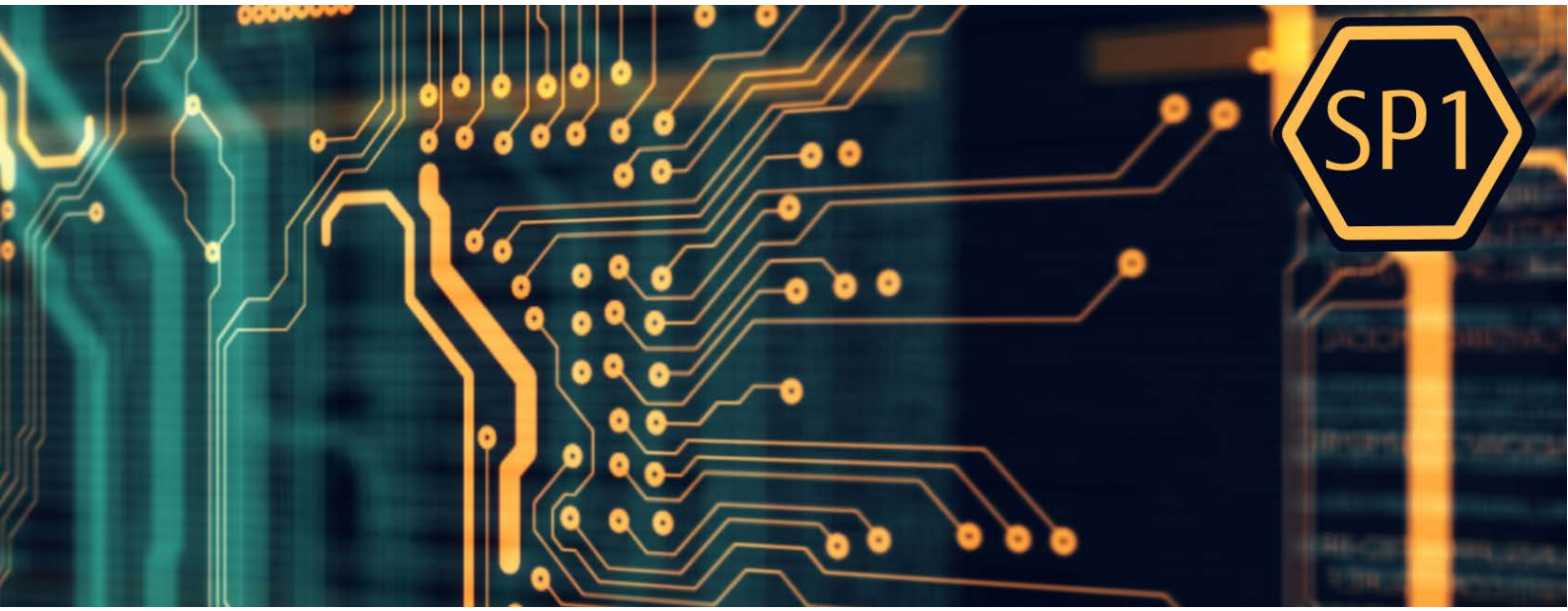
FUJITSU Enterprise Postgres 13



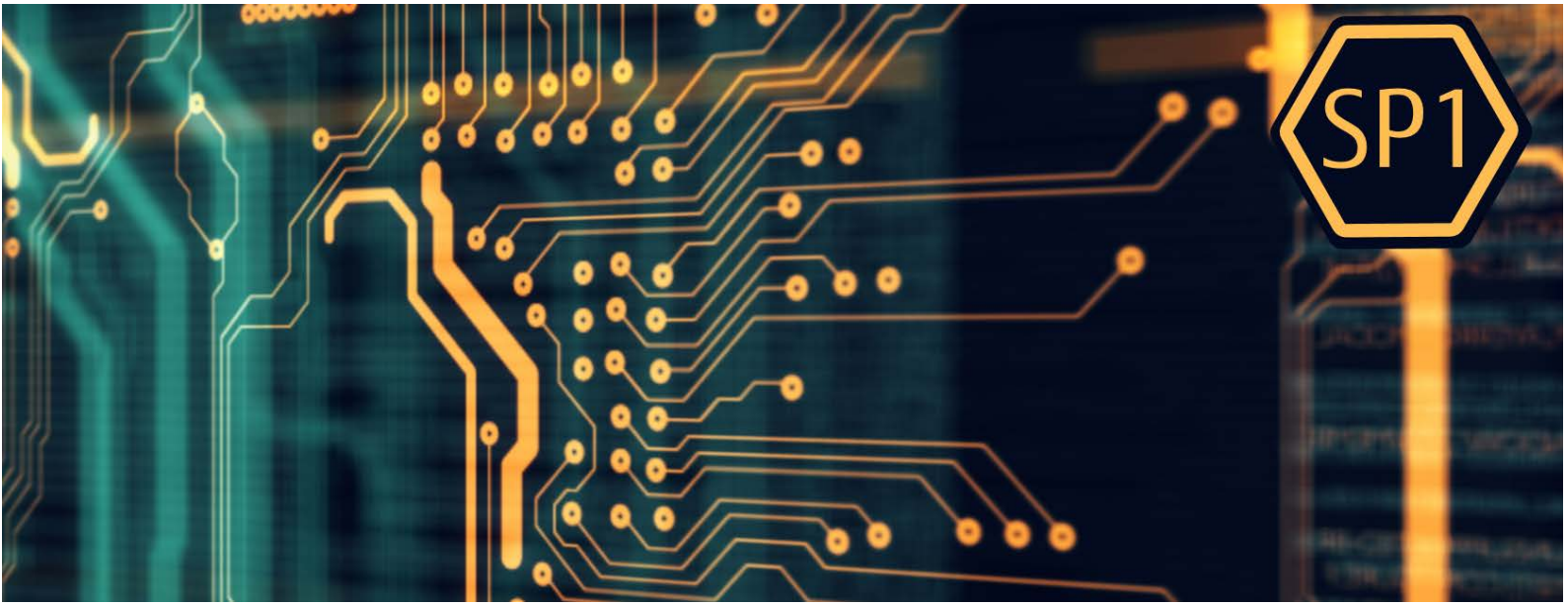
Program Updates

Linux >

Windows >

FUJITSU

FUJITSU Enterprise Postgres 13



Program Updates

(Linux)

Linux

J2UL-2672-02ENZ0(00)
August 2021

Preface

This document explains the updates that have been fixed at this version.

The contents of this document are subject to change without notice.

Notations

The status for each edition is shown in the following table.

P number	Update summary	AE	SE
Number that uniquely identifies the update	Summary of update details	Symbol indicating the fixed status	

AE

Indicates Advanced Edition.

SE

Indicates Standard Edition.

Symbol

Indicates the incorporated status for each edition.

Y: Fixed

-: Not relevant to this product

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Issue date and version

```
Edition 2.0: August 2021
Edition 1.0: April 2021
```

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Chapter 1 Program Updates

This version incorporates the following fixes:

- PostgreSQL 13
- PostgreSQL 13.1
- PostgreSQL 13.2
- PostgreSQL 13.3

See

Refer to the PostgreSQL Global Development Group website for information on the updates implemented in the following releases:

[PostgreSQL 13]

```
https://www.postgresql.org/docs/13/release-13.html
```

[PostgreSQL 13.1]

```
https://www.postgresql.org/docs/13/release-13-1.html
```

[PostgreSQL 13.2]

```
https://www.postgresql.org/docs/13/release-13-2.html
```

[PostgreSQL 13.3]

```
https://www.postgresql.org/docs/13/release-13-3.html
```

In addition, issues that occurred in previous versions are also fixed.

Refer to the following for details of the program fixes included in this version and level.

- FUJITSU Enterprise Postgres 13 SP1 Program Updates
- FUJITSU Enterprise Postgres 13 Program Updates

FUJITSU Enterprise Postgres 13 SP1 Program Updates

P number	Update summary	AE	SE
PH20157	If FUJITSU Enterprise Postgres fails to install and then is installed again with the same destination, an error message is output.	Y	Y
PH20356	Propagate fault fixes absorbed by PostgreSQL 13.2 or 13.3 to Fujitsu Enterprise Postgres.	Y	Y

FUJITSU Enterprise Postgres 13 Program Updates

P number	Update summary	AE	SE
PH14670	Memory access violations can occur when executing SQL statements from embedded SQL COBOL applications and receiving string results in host variables.	Y	Y
PH16199	If you used WebAdmin to create a synchronous standby instance, WebAdmin might incorrectly set the application name in the parameter synchronous_standby_names.	Y	Y
PH16471	Embedded SQL applications that use the COBOL language may not be able to retrieve data from the database.	Y	Y
PH16473	Executing SQL using outer join operators(+) may produce errors.	Y	Y
PH16631	Transaction log duplexing may stop.	Y	Y
PH16646	During failover operation in conjunction with PRIMECLUSTER, it may not switch normally.	Y	Y
PH17742	Indexes on unlogged tables can become corrupted, causing errors when referencing or updating tables.	Y	Y
PH17860	Precompiling an embedded SQL COBOL application using the DO in SQL statement may fail.	Y	Y
PH18047	If the data masking is used, results may not be masked.	Y	Y
PH18746	The Global Meta Cache feature may cause the database to go down.	Y	-
PH18945	The Global Meta Cache feature may cause the database to become unresponsive.	Y	-
PH18957	In ECOBPG, add the feature to use host variables of type bytea.	Y	Y
PH18958	The Global Meta Cache feature can degrade database performance.	Y	-
PH18962	When using JIT compilation, only a fixed version of LLVM is available. As a result, only the desupported version may be available.	Y	Y
PH19008	If pgaudit is enabled and you execute a function or procedure defined in PL/pgSQL, you may get an error.	Y	-
PH19011	When you create an instance using WebAdmin, the database server kernel is set to an incorrect value.	Y	Y
PH19013	If pgaudit is enabled and you execute a function or procedure defined in PL/pgSQL, some parameters are not output to the audit log.	Y	-
PH19081	Adds a feature to the Global Meta Cache feature that limits the amount of metacache cached in memory per process.	Y	-
PH19111	When using the Connection Manager, if you attempt to connect to the database using the password entered in the password file, you will receive an authentication error.	Y	-
PH19182	The conmgr process may abend with the following message: could not listen for socket: Too many open files	Y	-
PH19184	When you disconnect from a database using the Connection Manager, you may experience a missing connection to the conmgr process and a memory leak.	Y	-
PH19536	In the connection switch feature of .NET Data Provider, it may not be possible to connect to the new primary server after failover.	Y	Y
PH19544	When using the connection switch feature of .NET Data Provider, the connection may not be pooled.	Y	Y
PH19591	Incorrect value for category column in pg_settings view.	Y	Y
PH19629	When it is set to output the audit log for DML operation to the table or index, the audit log for DML operation for the parent table which is a partitioned table is not output.	Y	-
PH19815	OSS that is not supported by FUJITSU Enterprise Postgres may not be available.	Y	Y
PH19839	The automatic start / stop procedure when using the rc script is not supported, but it is described in the manual.	Y	Y
PH19853	If the installation of FUJITSU Enterprise Postgres fails, the installed packages will not be uninstalled.	Y	Y
PH19861	When you start the Mirroring Controller, both servers may temporarily become the primary server.	Y	-

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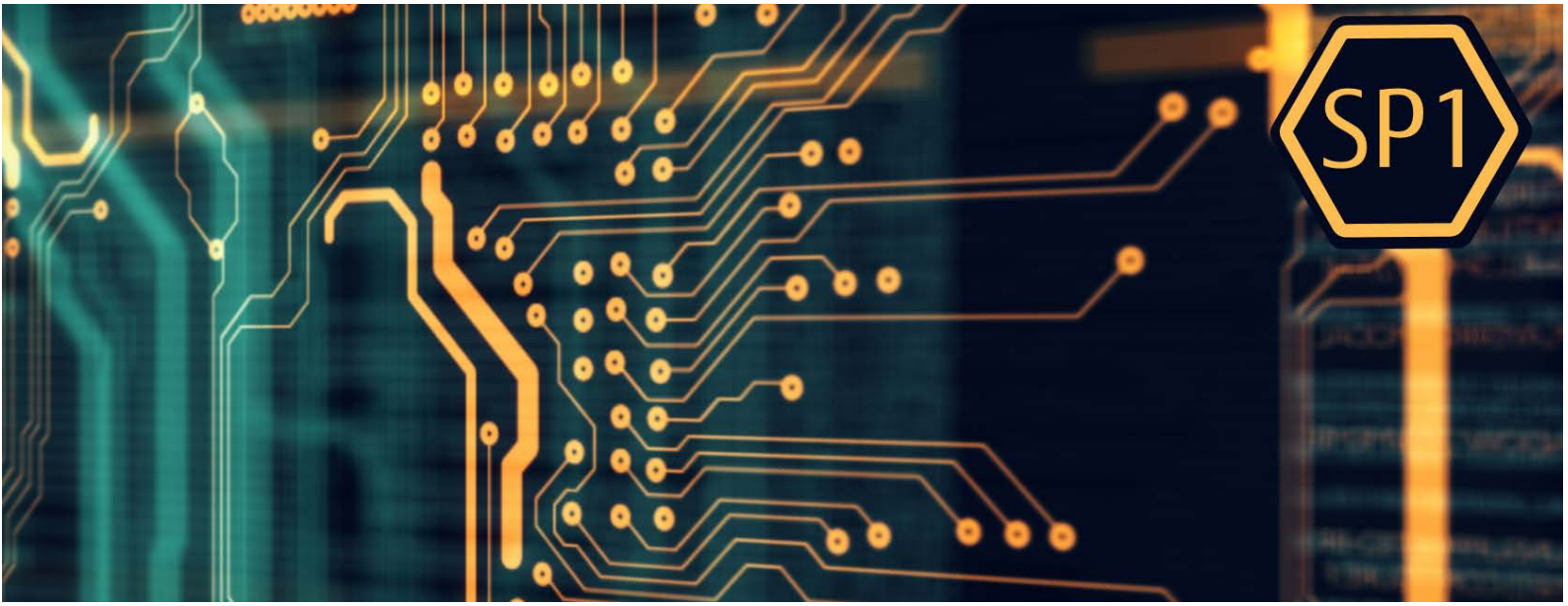
FUJITSU Enterprise Postgres 13



Program Updates

(Windows)

Windows

B1WS-1437-02ENZ0(00)
August 2021

Preface

This document explains the updates that have been fixed at this version.

The contents of this document are subject to change without notice.

Notations

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Issue date and version

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Edition 2.0: August 2021
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Chapter 1 Program Updates

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[PostgreSQL 13.2]

```
https://www.postgresql.org/docs/13/release-13-2.html
```

[PostgreSQL 13.3]

```
https://www.postgresql.org/docs/13/release-13-3.html
```

In addition, issues that occurred in previous versions are also fixed.

Refer to the following for details of the program fixes included in this version and level.

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- FUJITSU Enterprise Postgres 13 Program Updates

FUJITSU Enterprise Postgres 13 SP1 Program Updates

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PH20356	Propagate fault fixes absorbed by PostgreSQL 13.2 or 13.3 to Fujitsu Enterprise Postgres.	Y	Y

FUJITSU Enterprise Postgres 13 Program Updates

P number	Update summary	AE	SE
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PH16199	If you used WebAdmin to create a synchronous standby instance, WebAdmin might incorrectly set the application name in the parameter synchronous_standby_names.	Y	Y
PH16471	Embedded SQL applications that use the COBOL language may not be able to retrieve data from the database.	Y	Y
PH16473	Executing SQL using outer join operators(+) may produce errors.	Y	Y
PH16631	Transaction log duplexing may stop.	Y	Y
PH17742	Indexes on unlogged tables can become corrupted, causing errors when referencing or updating tables.	Y	Y
PH17860	Precompiling an embedded SQL COBOL application using the DO in SQL statement may fail.	Y	Y
PH18047	If the data masking is used, results may not be masked.	Y	Y
PH18746	The Global Meta Cache feature may cause the database to go down.	Y	-
PH18945	The Global Meta Cache feature may cause the database to become unresponsive.	Y	-
PH18957	In ECOBPG, add the feature to use host variables of type bytea.	Y	Y
PH18958	The Global Meta Cache feature can degrade database performance.	Y	-
PH19008	If pgaudit is enabled and you execute a function or procedure defined in PL/pgSQL, you may get an error.	Y	-
PH19013	If pgaudit is enabled and you execute a function or procedure defined in PL/pgSQL, some parameters are not output to the audit log.	Y	-
PH19081	Adds a feature to the Global Meta Cache feature that limits the amount of metacache cached in memory per process.	Y	-
PH19536	In the connection switch feature of .NET Data Provider, it may not be possible to connect to the new primary server after failover.	Y	Y
PH19544	When using the connection switch feature of .NET Data Provider, the connection may not be pooled.	Y	Y
PH19591	Incorrect value for category column in pg_settings view.	Y	Y
PH19629	When it is set to output the audit log for DML operation to the table or index, the audit log for DML operation for the parent table which is a partitioned table is not output.	Y	-
PH19815	OSS that is not supported by FUJITSU Enterprise Postgres may not be available.	Y	Y
PH19839	The automatic start / stop procedure when using the rc script is not supported, but it is described in the manual.	Y	Y
PH19861	When you start the Mirroring Controller, both servers may temporarily become the primary server.	Y	-

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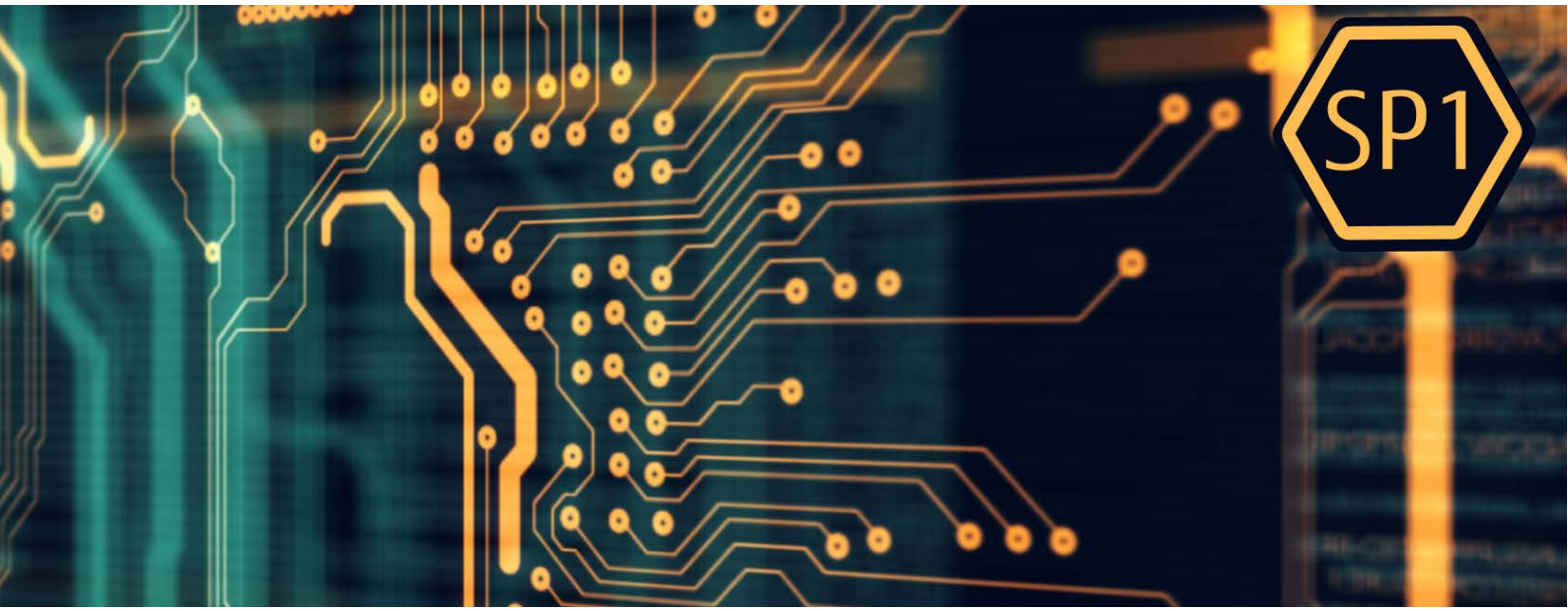
FUJITSU Enterprise Postgres 13



Installation/Setup

Server >

Client >

Server Assistant >

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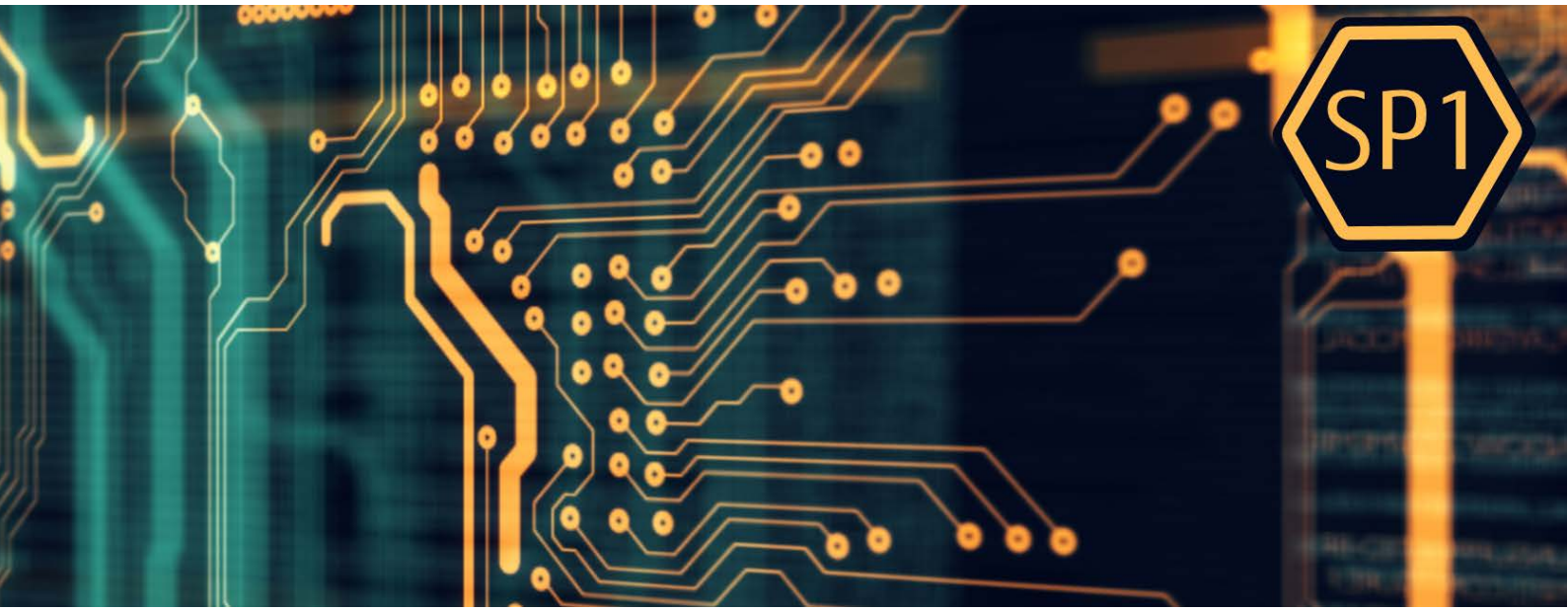
FUJITSU Enterprise Postgres 13



Installation and Setup Guide for Server

Linux >

Windows >

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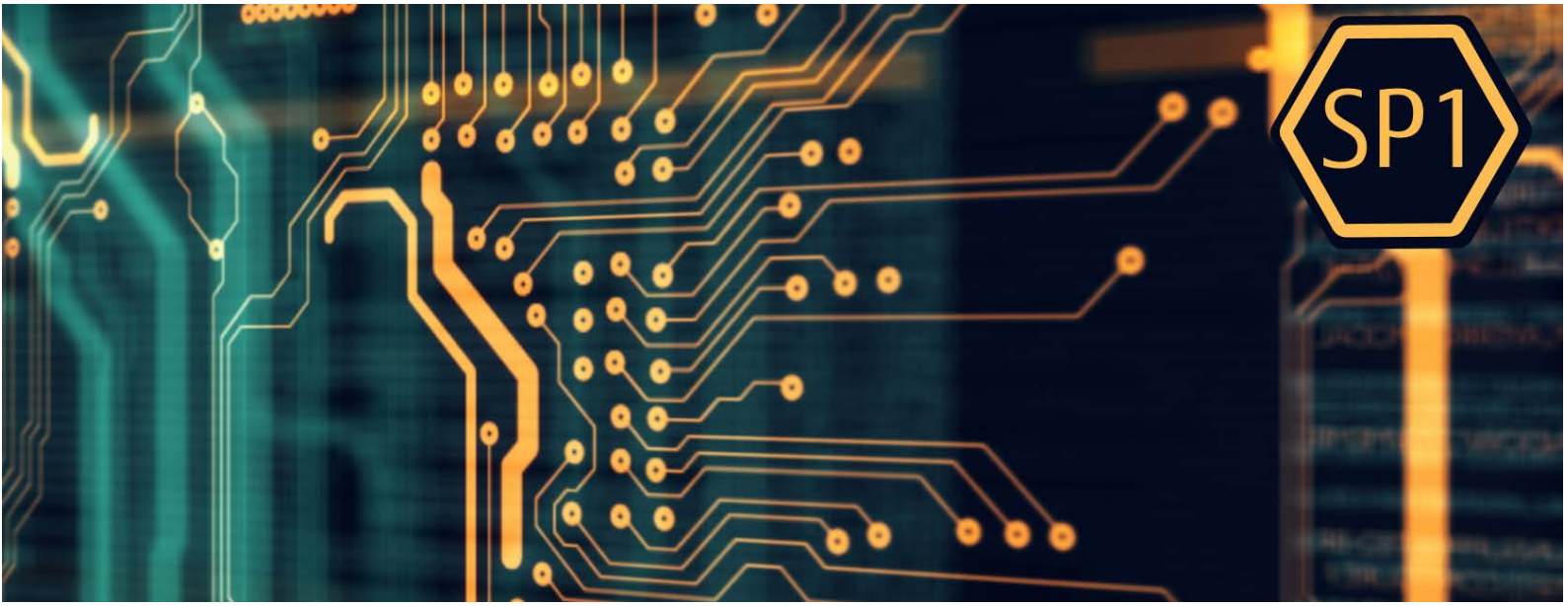
FUJITSU Enterprise Postgres 13



Installation and Setup Guide for Server

(Linux)

Linux

J2UL-2674-02ENZ0(00)
August 2021

Preface

Purpose of this document

The FUJITSU Enterprise Postgres database system extends the PostgreSQL features and runs on the Linux platform.

This document describes how to install and set up "FUJITSU Enterprise Postgres".

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

- PostgreSQL
- SQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Installation

Describes the installation types and procedures

Chapter 2 Operating Environment

Describes the operating environment required to use FUJITSU Enterprise Postgres

Chapter 3 Installation

Describes how to perform a new installation of FUJITSU Enterprise Postgres

Chapter 4 Setup

Describes the setup to be performed after installation

Chapter 5 Uninstallation

Describes how to uninstall FUJITSU Enterprise Postgres

Appendix A Recommended WebAdmin Environments

Describes the recommended WebAdmin environment.

Appendix B Setting Up and Removing WebAdmin

Describes how to set up and remove WebAdmin

Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters

Describes characters that are not allowed in WebAdmin.

Appendix D Configuring Parameters

Describes FUJITSU Enterprise Postgres parameters.

Appendix E Estimating Database Disk Space Requirements

Describes how to estimate database disk space requirements

Appendix F Estimating Memory Requirements

Describes the formulas for estimating memory requirements

Appendix G Quantitative Limits

Describes the quantity range

Appendix H Configuring Kernel Parameters

Describes the settings for kernel parameters

Appendix I Determining the Preferred WebAdmin Configuration

Describes the two different configurations in which WebAdmin can be used and how to select the most suitable configuration

Appendix J System Configuration when using Pgpool-II

Describes the system configuration when using Pgpool-II.

Appendix K Supported contrib Modules and Extensions Provided by External Projects

Lists the PostgreSQL contrib modules and the extensions provided by external projects supported by FUJITSU Enterprise Postgres.

Appendix L Procedure when Modifying the JRE Installation

Describes the procedures to follow when modifying the JRE installation.

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Issue date and version


```
Edition 2.0: August 2021
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```


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Chapter 1 Overview of Installation

This chapter provides an overview of FUJITSU Enterprise Postgres installation.

1.1 Features that can be Installed

Each FUJITSU Enterprise Postgres feature is installed on the machine that was used to build the database environment.

The following table shows the relationship between the product to be installed and the features that can be installed.

Feature that can be installed	Product name	
	AE	SE
Basic feature (server feature, client feature)	Y	Y

Y: Can be installed

1.2 Installation Types

The following installation types are available for FUJITSU Enterprise Postgres:

- New installation
- Reinstallation
- Multi-version installation

1.2.1 New Installation

In initial installation, FUJITSU Enterprise Postgres is installed for the first time.

1.2.2 Reinstallation

Perform reinstallation to repair installed program files that have become unusable for any reason.

1.2.3 Multi-Version Installation

FUJITSU Enterprise Postgres products can be installed on the same server if the product version (indicated by "*x*" in "*x* SP*z*") is different from that of any version of the product that is already installed.

1.3 Installation Procedure

The following installation procedures are available for FUJITSU Enterprise Postgres:

- Installation in interactive mode
- Installation in silent mode

Select the installation procedure that corresponds to your environment.

Note

If you have antivirus software installed, the server may crash, fail to start, or stop responding, during installation or when starting up after installation. Set scan exception settings for the installation directory and resource allocation directory so that the files in these directories are not scanned for viruses.

1.3.1 Installation in Interactive Mode

Interactive mode enables installation to be performed while the required information is entered interactively.

In the interactive mode installation, the installation state of FUJITSU Enterprise Postgres is determined automatically. Install FUJITSU Enterprise Postgres using one of the following installation types in accordance with the installation state:

- New installation
- Reinstallation
- Multi-version installation

1.3.2 Installation in Silent Mode

Silent mode enables installation to be performed without the need to enter any information interactively.

New installations and multi-version installations can be performed in silent mode.

1.4 Uninstallation

Uninstallation removes the system files of the installed FUJITSU Enterprise Postgres.

Chapter 2 Operating Environment

This chapter describes the operating environment required to use FUJITSU Enterprise Postgres.

See

Refer to "Operating Environment" in the Installation and Setup Guide for Client when installing the FUJITSU Enterprise Postgres client feature at the same time.

2.1 Required Operating System

One of the operating systems shown below is required in order to use FUJITSU Enterprise Postgres.

- RHEL7.2 or later minor version
- RHEL8.1 or later minor version
- SLES 12 SP5

Note

SLES 12 cannot be used if performing failover operation integrated with PRIMECLUSTER.

Information

- The following packages are required for operations on RHEL7.

Package name	Remarks
alsa-lib	-
audit-libs	-
dstat	Required when using parallel scan.
gdb	Required to run FJQSS.
glibc	-
glibc.i686	-
iputils	Required for Mirroring Controller.
libgcc	-
libicu	Provides collation support. Install 50.x.
libmemcached	Required when using Pgpool-II.
libselinux	Required for sepgsql.
libstdc++	-
libtool-ltdl	Required when using ODBC drivers.
llvm	Version 10.0.x of llvm is required to run SQL with runtime compilation (just-in-time compilation). Install the package that contains libLLVM-10.so.For example, the "llvm-toolset-10.0-llvm-libs" published in Red Hat Developer Tools and Red Hat Software Collections includes libLLVM10.so.

Package name	Remarks
	FUJITSU Enterprise Postgres uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
ncurses-libs	-
net-tools	-
nss-softokn-freebl	-
pam	Required when using PAM authentication.
perl-libs	Required when using PL/Perl. Install 5.16.
python3	Required when using PL/Python based on Python 3. Install 3.6.x .
redhat-lsb	-
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
tcl	Required when using PL/Tcl. Install 8.5.
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on RHEL8.

Package name	Remarks
alsa-lib	-
audit-libs	-
cyrus-sasl-lib	-
gdb	Required to run FJQSS.
pcp-system-tools	Required when using parallel scan.
glibc	-
glibc.i686	-
iputils	Required for Mirroring Controller.
libnsl2	-
libicu	Provides collation support. Install 60.x.
libgcc	-
libmemcached	Required when using Pgpool-II.
libselinux	Required for sepgsql.
libstdc++	-

Package name	Remarks
libtool-ltdl	Required when using ODBC drivers.
llvm	Vversions 10.0.x, 9.0.x, 8.0.x, or 7.0.x of llvm is required to run SQL with runtime compilation (just-in-time compilation). Install the package that contains libLLVM-10.so, libLLVM-9.so, libLLVM-8.so, or libLLVM-7.so. For example, version 10.0.x of "llvm-libs" published with Application Streams includes libLLVM-10.so. By default, version 10.0.x is used. If you use a version other than 10.0.x, specify the version you want to use in the jit_provider parameter in postgresql.conf. For example, use llvmjit-vsn9 when using version 9.0.x.FUJITSU Enterprise Postgres uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
ncurses-libs	-
net-tools	-
nss-softokn-freebl	-
pam	Required when using PAM authentication.
perl-libs	Required when using PL/Perl. Install 5.26.
python3	Required when using PL/Python based on Python 3. Install 3.6.x .
redhat-lsb	-
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
tcl	Required when using PL/Tcl. Install 8.6.
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on SLES 12.

Package name	Remarks
dstat	Required when using parallel scan.
gdb	Required to run FJQSS.
glibc	-
glibc-32bit	-
iputils	Required for Mirroring Controller.

Package name	Remarks
JRE 8	Required when using the installer, database multiplexing, and WebAdmin. The following JREs are available: - Oracle JRE Use update 31 or later of the 64-bit version. - OpenJDK Past the Java TCK (Technology Compatibility Kit)
libasound2	-
libaudit1	-
libfreebl3	-
libicu	Provides collation support. Install 52.
libgcc	-
libltdl7	Required when using ODBC drivers.
liblzma5	-
libmemcached	Required when using Pgpool-II.
libncurses5	-
libstdc++	-
libz1	-
llvm	Version 7.0.x of llvm is required to run SQL with runtime compilation (just-in-time compilation). Install the package that contains libLLVM.so.7. For example, the "libLLVM7" published in SLES12-SP5-Updates includes libLLVM.so.7. FUJITSU Enterprise Postgres uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
LLVM-libs	Install version 5.0.2 or later.
net-tools	-
pam	Required when using PAM authentication.
perl-libs	Required when using PL/Perl. Install 5.18.
python3	Required when using PL/Python based on Python 3. Install 3.4.x.
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
tcl	Required when using PL/Tcl. Install 8.6.
unzip	-

2.2 Related Software

The following table lists the software required to use FUJITSU Enterprise Postgres.

Table 2.1 Related software

No.	Product name	Version	FUJITSU Enterprise Postgres product name		Remarks
			AE	SE	
1	PRIMECLUSTER (*1)	4.5A10 (*1)	Y	Y	Mandatory when performing failover operation integrated with PRIMECLUSTER.

*1: The applicable products are shown below:

- PRIMECLUSTER Enterprise Edition
- PRIMECLUSTER HA Server

The following table lists servers that can be connected to the FUJITSU Enterprise Postgres client feature.

Table 2.2 Connectable servers

OS	Product name
Windows Linux	- FUJITSU Software Enterprise Postgres Advanced Edition 9.5 or later - FUJITSU Software Enterprise Postgres Standard Edition 9.4 or later
Solaris	- FUJITSU Software Enterprise Postgres Standard Edition 9.6 or later

2.3 Excluded Software

This section describes excluded software.

FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres cannot be installed if all the following conditions are met:

- The product version (indicated by "*x*" in "*x* SP*z*") of the product to be installed is the same as that of the installed product
- The editions are different

Example

In the following cases, FUJITSU Enterprise Postgres cannot be installed as an exclusive product:

- The installed product is FUJITSU Software Enterprise Postgres Standard Edition (64bit) 13
- The product to be installed is FUJITSU Software Enterprise Postgres Advanced Edition (64bit) 13

Other products

There are no exclusive products.

2.4 Required Patches

There are no required patches.

2.5 Hardware Environment

The following hardware is required to use FUJITSU Enterprise Postgres.

Memory

At least 512 MB of memory is required.

2.6 Disk Space Required for Installation

The following table shows the disk space requirements for new installation of FUJITSU Enterprise Postgres. If necessary, increase the size of the file system.

RHEL

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	248 (*1) +1 (*2)
Installation destination of the server	674
Installation destination of WebAdmin	691
Installation destination of the client (64-bit)	131
Installation destination of Pgpool-II	14

*1: Required for the installation of the Uninstall (middleware) tool.

*2: Required for the installation of FJQSS.

SLES

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	2 (*1) +1 (*2)
Installation destination of the server	216
Installation destination of WebAdmin	353
Installation destination of the client (64-bit)	126
Installation destination of Pgpool-II	12

*1: Required for the installation of the Uninstall (middleware) tool.

*2: Required for the installation of FJQSS.

2.7 Supported System Environment

This section describes the supported system environment.

2.7.1 TCP/IP Protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

2.7.2 File System

All file systems with a POSIX-compliant interface are supported.

However, for stable system operation, the disk where the database is deployed must use a highly reliable file system. Consider this aspect when selecting the file system to be used.

The recommended file system is "ext4".

2.8 PostgreSQL Version Used for FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres is based on PostgreSQL 13.3.

2.9 Notes on Using Streaming Replication

To use streaming replication, build the primary server and all standby servers using the same FUJITSU Enterprise Postgres version (*1).

*1: The product version is indicated by "*x*" in the notation "*x* SP*z*".

Note

Streaming replication cannot be used in combination with Open Source PostgreSQL.

Chapter 3 Installation

This chapter explains each of the installation procedures of FUJITSU Enterprise Postgres.

3.1 Pre-installation Tasks

Check the system environment below before installing FUJITSU Enterprise Postgres.

Check the disk space

Ensure that there is sufficient disk space to install FUJITSU Enterprise Postgres.

Refer to "2.6 Disk Space Required for Installation" for information on the required disk space.

Reconfigure the disk partition if disk space is insufficient.

Set JAVA_HOME (SLES 12 only)

Ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

Refer to "Appendix L Procedure when Modifying the JRE Installation" for information on modifying JRE after installation.

Check the installed products and determine the installation method

Using the operation shown below, start Uninstall (middleware), and check the installed products.

Example

```
# /opt/FJSVcir/cimanager.sh -c
Loading Uninstaller...


Currently installed products
1. productName
2. productName
3. productName
4. productName
5: productName

Type [number] to select the software you want to uninstall.
[number,q]
=>q



Exiting Uninstaller.
```

If FUJITSU Enterprise Postgres is already installed, determine which installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation as the installation method, remove applied updates using the procedure shown below.

If a product is installed without removing applied updates, the following problems will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.
  Perform reinstallation after removing the update.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
# /opt/FJSVfupde/bin/uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
# /opt/FJSVfupde/bin/uam remove -i update-number
```

Note

If the installation directory/lib is set in the environment variable LD_LIBRARY_PATH for the running user, remove the installation directory/lib from LD_LIBRARY_PATH.

Determine the preferred WebAdmin configuration

Starting with FUJITSU Enterprise Postgres 9.5, WebAdmin can be installed in two configurations:

- Single-server
- Multiserver

See

Refer to "Appendix I Determining the Preferred WebAdmin Configuration" for details.

Determining the Pgpool-II System Configuration

The system configuration when using Pgpool-II is as follows:

- Place on database server
- Place on application server
- Place on dedicated server

See

Refer to "Appendix J System Configuration when using Pgpool-II".

3.2 Installation in Interactive Mode

Install according to the following procedure:

Note

- The following characters can be used as input values:

  Alphanumeric characters, hyphens, commas and forward slashes

- When reinstalling the product, back up the following folder in which the WebAdmin instance management information is stored:

  webAdminInstallFolder/data/fepwa

  Follow the procedure below to perform the backup.

  1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
  2. Back up the following folder:

     webAdminInstallFolder/data/fepwa

  Replace the above folder with the backed up folder when the reinstallation is complete.

Point

For installation in interactive mode, default values are set for the installation information. The following settings can be changed for a new installation or a multi-version installation:

- Installation directory
- WebAdmin setup information, if WebAdmin is selected

  To change the port number, confirm that it is an unused port number between 1024 and 32767.

1. Stop applications and programs

If the installation method is the following, all applications and programs that use the product must be stopped:

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product
- Instance
- Web server feature of WebAdmin

  Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

  Example

  If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

  ```
  # cd /opt/fsepv<x>webadmin/sbin
  # ./WebAdminStop
  ```

- Mirroring Controller

  Execute the mc_ctl command with the stop mode option specified and stop the Mirroring Controller.

  Example

  ```
  $ mc_ctl stop -M /mcdir/inst1
  ```

- pgBadger
- Pgpool-II

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Mount the DVD drive

Insert the server program DVD into the DVD drive, and run the command given below.

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./install.sh
```

In the example above, /media/dvd is the DVD mount point.

5. Select the product for installation

The list of installation target products is displayed.
Type the number for the product to be installed, or "all", and press Enter.

Information

- The FUJITSU Enterprise Postgres server component and WebAdmin can be installed on the same machine by selecting the "FUJITSU Enterprise Postgres server component" and the "WebAdmin component".
- Pgpool-II to be installed on the same server as the database server, you can install it on the same machine by selecting "FUJITSU Enterprise Postgres Server Component" and "Pgpool-II component". Pgpool-II to be installed on the same server as the application server, or on a dedicated server that is different from the database server and application server, see "Appendix J System Configuration when using Pgpool-II".
- If the selected product has been installed, a window for selecting reinstallation or multi-version installation is displayed for each product. Follow the on-screen instructions to select the installation method.

6. Check the settings

The window for checking the installation information is displayed.
Type "y" and press Enter to start the installation.
To change the settings, type "c", press Enter, and follow the on-screen instructions. This option is not displayed if there is no information that can be modified.

If you have not set up WebAdmin during installation, refer to "Appendix B Setting Up and Removing WebAdmin" for details.

7. Check the changed settings

If the installation information has been modified, the new installation information is displayed.
Type "y" and press Enter to start the installation.
To change the settings again, type "c" and press Enter.

8. Display the installation status

When the installation is started, the installation status is displayed.

Note that even if WebAdmin setup fails, the process will continue.

If the following message is displayed, manually execute WebAdmin setup after installation is completed.
Refer to "B.1 Setting Up WebAdmin" for information on the WebAdmin setup procedure.

```
Starting setup.

Setting up WebAdmin.

ERROR: WebAdmin setup failed.
```

9. Finish the installation

When the installation is complete, a message is displayed showing the status.
If installation was successful, a message like the one shown below is displayed:

```
Installed successfully.
```

Note

If an error occurs during the installation, read the error message and remove the cause of the error, and then reexecute the install.sh command.

3.3 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

The installation procedure is described below.

1. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

2. Mount the DVD drive

Insert the server program DVD into the DVD drive, and run the command given below.

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

3. Create an installation parameters CSV file

Consider the features that will be required for system operations, and then create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
    :
```

Information

The template for the installation parameters CSV file is "*mountPoint*/sample/sample.csv".

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./silent.sh /home/work/inspara.csv
```

In the example above, /media/dvd is the DVD mount point, and /home/work/inspara.csv is the installation parameter CSV.

If the installer ends in an error, a message is output to the log file and return values are returned.

Chapter 4 Setup

This chapter describes the setup procedures to be performed after installation completes.

4.1 Operating Method Types and Selection

This section describes how to operate FUJITSU Enterprise Postgres.

There are two methods of managing FUJITSU Enterprise Postgres operations - select one that suits your purposes:

The Operation Guide describes the operating method using WebAdmin, and the equivalent operating method using the server commands.

Simple operation management using a web-based GUI tool (WebAdmin)

Suitable when using frequently used basic settings and operations for operation management.

This method allows you to perform simple daily tasks such as starting the system before beginning business, and stopping the system when business is over, using an intuitive operation.

Usage method

Usage is started by using WebAdmin to create the instance.

By using an external scheduler and the pgx_dmpall command, periodic backups can be performed, which can then be used in recovery using WebAdmin.

Note

Do not use a server command other than pgx_dmpall and pgx_keystore or a server application. Operation modes that use server commands and server applications cannot be used in conjunction with WebAdmin. If used, WebAdmin will not be able to manage the instances correctly.
In addition, to perform a backup by copy command from the pgx_dmpall command, select the operating method using the server commands.
Refer to Reference and the PostgreSQL Documentation for information on server commands and server applications.

Advanced operation management using server commands

When operating in a system that is automated by operation management middleware (Systemwalker Centric Manager, for example), this method allows you to use more detailed settings and operations and perform higher level operation management.

An overview of the operating method using the GUI, and its relationship with the operating method using the server commands, are shown below.

Refer to the Operation Guide for details.

Operation		Operation with the GUI	Operation with commands
Setup	Creating an instance	WebAdmin is used. The server machine capacity, and the optimum parameter for operations using WebAdmin, are set automatically.	The configuration file is edited directly using the initdb command.
	Creating a standby instance	WebAdmin is used. WebAdmin performs a base backup of the source instance and creates a standby instance.	A standby instance is created using the pg_basebackup command.
	Changing the configuration files	WebAdmin is used.	The configuration file is edited directly.
Starting and stopping an instance		WebAdmin is used.	The pg_ctl command is used.

Operation		Operation with the GUI	Operation with commands
Creating a database		This is defined using pgAdmin of the GUI tool, or using the psql command or the application after specifying the DDL statement.	
Backing up the database		WebAdmin, or the pgx_dmpall command, is used.	It is recommended that the pgx_dmpall command be used. Recovery to the latest database can be performed.
Database recovery		WebAdmin is used.	To use the backup that was performed using the pgx_dmpall command, the pgx_rcvall command is used.
Monitoring	Database errors	The status in the WebAdmin window can be checked. (*1)	The messages that are output to the database server log are monitored (*1)
	Disk space	The status in the WebAdmin window can be checked. A warning will be displayed if the free space falls below 20%. (*1)	This is monitored using the df command of the operating system, for example. (*1)
	Connection status	This can be checked using pgAdmin of the GUI tool, or referencing pg_stat_activity of the standard statistics view from psql or the application.	

*1: This can be used together with system log monitoring using operations management middleware (Systemwalker Centric Manager, for example).

See

Refer to "Periodic Operations" and "Actions when an Error Occurs" in the Operation Guide for information on monitoring and database recovery.

4.2 Preparations for Setup

This section describes the preparation required before setting up FUJITSU Enterprise Postgres.

4.2.1 Creating an Instance Administrator

Decide which OS user account will be assigned the instance administrator role. You can assign it to a new user or to an existing one, but you cannot assign it to the OS superuser (root).

The following example shows an OS user account with the name "fsepuser" being assigned the instance administrator role.

Example

```
# useradd fsepuser
# passwd fsepuser
```

Note

The following note applies if using WebAdmin for operations:

- If the password is changed for the user account of the instance administrator, set the changed password using ALTER ROLE WITH ENCRYPTED PASSWORD. This will encrypt the password with the default MD5 algorithm. To encrypt the password with the SCRAM-SHA-256 algorithm, set the password encryption parameter to "scram-sha-256" using SET password_encryption = 'scram-sha-256' prior to using the ALTER ROLE function.

4.2.2 Preparing Directories for Resource Deployment

Prepare the directories required when creating instances.

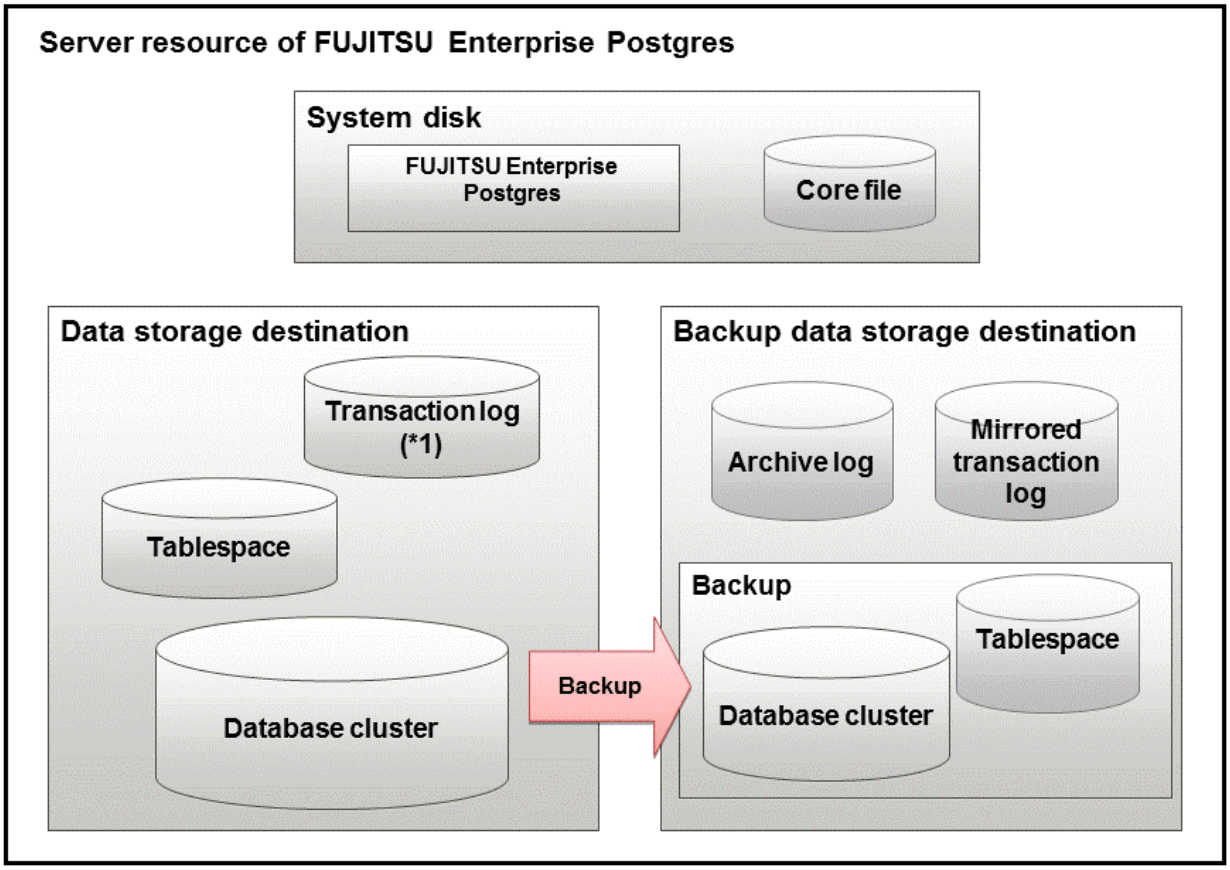
Considerations when deploying resources

The disk configuration on the resource deployment destination is important, because it affects not only recovery following disk corruption, but normal operation as well. The points for determining the disk configuration are as follows:

1. If the backup data storage destination and the data storage destination are both lost, it will not be possible to recover the data, so deploy them to separate disks.
2. To shorten the recovery time following a single disk fault, deploy the system disk and data storage destination to separate disks.
3. The backup data storage destination requires at least double the capacity of the data storage destination, so deploy it to the disk with the most space available.
4. When large amounts of data are updated, the write-to load for the data storage destination, transaction log storage destination, and backup data storage destination (mirrored transaction log) will also be great. For this reason, deploy them to separate disks, out of consideration for performance.

Note

When using the volume manager provided by the operating system, be aware of which physical disk the file system has been created on, for example, by deploying the data storage destination and the backup data storage destination to separate disks.



*1: To distribute the I/O load, place the transaction log on a different disk from the data storage destination.

Resource	Role
Database cluster	The area where the database is stored. It is a collection of databases managed by an instance.
Tablespace	Stores table files and index files in a separate area from the database cluster. Specify a space other than that under the database cluster.
Transaction log	Stores log information in preparation for a crash recovery or rollback. This is the same as the WAL (Write Ahead Log).
Archive log	Stores log information for recovery
Mirrored transaction log (mirrored WAL)	Enables a database cluster to be restored to the state immediately before an error even if both the database cluster and transaction log fail when performing backup/recovery operations using the pgx_dmpall command or WebAdmin.
Corefile	FUJITSU Enterprise Postgres process corefile output when an error occurs with a FUJITSU Enterprise Postgres process.

Examples of disk deployment

The following are examples of disk deployment:

Number of disks	Disk	Deployment
3	System disk	FUJITSU Enterprise Postgres program
		Corefile
	Connected physical disk	Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination
2	System disk	FUJITSU Enterprise Postgres program
		Corefile
		Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination

Proposal for disk deployment using WebAdmin

To generate an instance using WebAdmin, we recommend an optimum deployment that takes into account the status of all disks at the time of instance generation, and items 1 to 3 in the "Considerations when deploying resources" subheading above, based on the limitations below (note that a different deployment can also be specified).

- The mount point does not include national characters
- The instance administrator has the proper permissions to read and write on the mount point

Preparing directories

The directories to be prepared depend on the way that you create the instances.

The following shows the directories that need to be prepared:

Directory to be prepared	Using WebAdmin	Using the initdb command
Data storage destination	Y (*1)	Y
Backup data storage destination	O (*1) (*4)	O

Directory to be prepared	Using WebAdmin	Using the initdb command
Transaction log storage destination	O (*1) (*2)	O
Corefile output destination	N (*3)	O

Y: Required
O: Optional
N: Not required

*1: WebAdmin automatically creates a directory

*2: The default is to create in a directory in the data storage destination. When it is necessary to distribute the I/O load for the database data and the transaction log, consider putting the transaction log storage destination on a different disk from the data storage destination

*3: The corefile path is as follows:

`/var/tmp/fsep_`*`version`*`/`*`instanceAdminUser`*`_`*`instanceNamePortNumber`*`/core`

version: product version_WA_architecture

Note: The product version is normally the version of WebAdmin used to create the instance. For example, WebAdmin 13 allows a user to create a FUJITSU Enterprise Postgres 9.6 instance on a database server having WebAdmin 9.6. In this case, because WebAdmin 9.6 is used to create the instance, the product version will be "96".

instanceAdminUser: operating system user name

PortNumber: port number specified when creating the instance

Example:

/var/tmp/fsep_130_WA_64/naomi_myinst27599/core

Note that resources placed in /var/tmp that have not been accessed for 30 days or more will be deleted by the default settings of the operating system. Consider excluding them from deletion targets or changing the output destination in the operating system settings.

To change the output destination, configure the core_directory and the core_contents parameters in postgresql.conf. Refer to "Parameters" in the Operation Guide for information on the settings for these parameters.

*4: This directory is required when instance backup is enabled.

- The directories must meet the following conditions:
  - The directory owner must be the OS user account that you want to be the instance administrator
  - The directory must have write permission
  - The directory must be empty
- It is not possible to use a directory mounted by NFS (Network File System) when using WebAdmin.

Example

The following example shows the OS superuser creating /database/inst1 as the directory for storing the database data and changing the owner of the directory to the OS user account "fsepuser".

```
# mkdir -p /database/inst1
# chown -R fsepuser:fsepuser /database/inst1
# chmod 700 /database/inst1
```

4.2.3 Estimating Resources

Estimate the resources to be used on the FUJITSU Enterprise Postgres.

Refer to "Appendix E Estimating Database Disk Space Requirements" for information on estimating database disk space requirements.

Refer to "Parameters automatically set by WebAdmin according to the amount of memory" when creating multiple instances with WebAdmin.

Refer to "Appendix F Estimating Memory Requirements" when creating instances with the initdb command, to estimate memory usage.

4.2.4 Configuring Corefile Names

If a process crashes, a corefile for the process will be generated by the operating system. If a corefile is generated with the same name as an existing corefile generated for a different process, the newly-generated corefile will overwrite the previously dumped corefile. To prevent this, configure a unique corefile name for each crash by appending the process ID, program name, and datetime.

Corefile names can be configured using the "kernel.core_pattern" and "kernel.core_uses_pid" kernel parameters.
Refer to the "man page" in "core(5)" for information on how to use these parameters.

Note that with regard to the location for storing corefiles, the operating system settings take precedence over the core_directory parameter of postgresql.conf.

If you specify systemd-coredump as the core_pattern, the core file is not placed in the location specified by the core_directory parameter.See the systemd-coredump (8) man page for the location of core files.

Use coredumpctl to retrieve core files.For more information about using coredumpctl, see the coredumpctl (1) man page.

4.3 Creating Instances

There are two methods that can be used to create an instance:

- 4.3.1 Using WebAdmin
- 4.3.2 Using the initdb Command

Creating multiple instances

Multiple instances can be created.

The memory allocated needs to be adjusted when multiple instances are created with WebAdmin (refer to "Parameters automatically set by WebAdmin according to the amount of memory" for details).

Features that cannot be set up using WebAdmin

The "Storage data protection using transparent data encryption" feature cannot be set up using WebAdmin.

To set up this feature in an instance created by WebAdmin, perform the additional setup tasks detailed in "Storage Data Protection using Transparent Data Encryption" in the Operation Guide.

- Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin. Refer to "4.3.1.4 Importing Instances" for details.
- Always use WebAdmin to delete instances that were created or imported using WebAdmin. Because WebAdmin management information cannot be deleted, WebAdmin will determine that the instance is abnormal.
- Databases with the names 'template0' and 'template1' are automatically created when an instance is created.
  These databases are used as the templates for databases created later. Furthermore, a default database with the name 'postgres' is automatically created, which will be used with FUJITSU Enterprise Postgres commands. It is important that you do not delete these databases created by default.

4.3.1 Using WebAdmin

This section describes how to create an instance using WebAdmin.

WebAdmin must be set up correctly before it can be used. Refer to "B.1 Setting Up WebAdmin" for details. Additionally, if WebAdmin needs to be configured to use an external repository database, refer to "B.3 Using an External Repository for WebAdmin" for details.

It is recommended to use the following browsers with WebAdmin:

- Internet Explorer 11
- Microsoft Edge (Build41 or later)

WebAdmin will work with other browsers, such as Firefox and Chrome, however, the look and feel may be slightly different.

Configure your browser to allow cookies and pop-up requests from the server on which FUJITSU Enterprise Postgres is installed.

Refer to "Appendix A Recommended WebAdmin Environments" for information on how to change the pop-up request settings チand other recommended settings.

- WebAdmin does not run in Windows(R) safe mode.
- If the same instance is operated from multiple WebAdmin windows, it will not work correctly.
- If the same instance is operated from multiple WebAdmin versions, it will not work correctly. Always use the latest version of WebAdmin for instance operations.
- For efficient use of WebAdmin, it is recommended not to use the browser [Back] and [Forward] navigation buttons, the [Refresh] button, and context-sensitive menus, including equivalent keyboard shortcuts.
- Copying and pasting the WebAdmin URLs are not supported. Additionally, bookmarking of WebAdmin URLs is not supported.
- It is recommended to match the language between the instance server locale and WebAdmin.
- WebAdmin supports only two languages: English and Japanese.
- It is recommended to change the WebAdmin language setting from the instance details page only.
- It is recommended to operate WebAdmin using the WebAdmin launcher.
- WebAdmin uses the labels "Data storage path", "Backup storage path" and "Transaction log path" to indicate "data storage destination", "backup data storage destination" and "transaction log storage destination" respectively. In this manual these terms are used interchangeably.
- If the browser was not operated for a fixed period (about 30 minutes), the session will time out and the login page will be displayed again for the next operation.
- Port access permissions
  If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
  Consider the security risks carefully when opening ports.
- When creating or importing an instance in WebAdmin, set the log_directory parameter in postgresql.conf to '/var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/log'. Note that resources placed in /var/tmp that have not been accessed for 30 days or more will be deleted by the default settings of the operating system. Therefore, consider excluding instances created using WebAdmin from deletion targets in the operating system settings if you need to stop those instances for a long time.

4.3.1.1 Logging in to WebAdmin

This section describes how to log in to WebAdmin.

Startup URL for WebAdmin

In the browser address bar, type the startup URL of the WebAdmin window in the following format:

```
http://hostNameOrIpAddress:portNumber/
```

- *hostNameOrIpAddress*: Host name or IP address of the server where WebAdmin is installed.
- *portNumber*: Port number of WebAdmin. The default port number is 27515.

The startup URL window shown below is displayed. From this window you can log in to WebAdmin or access the product documentation.

Logging in to WebAdmin

Click [Launch WebAdmin] in the startup URL window to start WebAdmin and display the login window. Enter the instance administrator user ID (operating system user account name) and password, and log in to WebAdmin. User credential (instance administrator user ID and password) should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

4.3.1.2 Creating an Instance

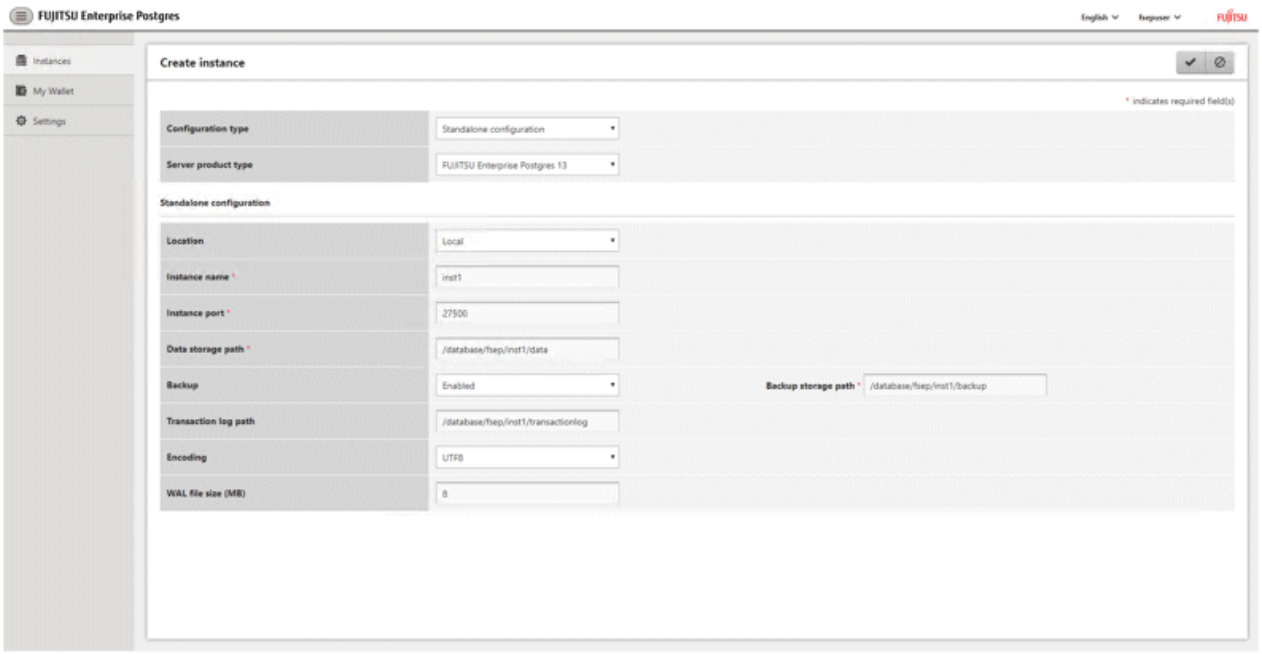
This section describes how to create an instance.

Information

WebAdmin calculates values using the formula indicated in "Managing Kernel Resources" under "Server Administration" in the PostgreSQL Documentation, and configures these in the kernel parameters. Refer to "Appendix H Configuring Kernel Parameters" for information on configuring parameter names.
Refer to "Appendix D Configuring Parameters" for information on the postgresql.conf values required to derive the set values.

1. Start WebAdmin, and log in to the database server.
2. In the [Instances] tab, click ➕.

3. Enter the information for the instance to be created.



Enter the following items:

- [Configuration type]: Whether to create a standalone instance or an instance that is part of a cluster.
- [Server product type]: Sets which of the following instances to create:
  - FUJITSU Enterprise Postgres 9.5 Instances
  - FUJITSU Enterprise Postgres 9.6 Instances
  - FUJITSU Enterprise Postgres 10 Instances
  - FUJITSU Enterprise Postgres 11 Instances
  - FUJITSU Enterprise Postgres 12 Instances
  - FUJITSU Enterprise Postgres 13 Instances

  The default is "FUJITSU Enterprise Postgres 13".
  WebAdmin can create and manage instances compatible with the following, but new functionality in FUJITSU Enterprise Postgres 13 may not support the instance or it may be disabled.
  - FUJITSU Enterprise Postgres 9.5
  - FUJITSU Enterprise Postgres 9.6
  - FUJITSU Enterprise Postgres 10
  - FUJITSU Enterprise Postgres 11
  - FUJITSU Enterprise Postgres 12
- [Location]: Whether to create the instance in the server that the current user is logged into, or in a remote server. The default is "Local", which will create the instance in the server machine where WebAdmin is currently running.
- [Instance name]: Name of the database instance to manage

  The name must meet the conditions below:
  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters

- [Instance port]: Port number of the database server
- [Data storage path]: Directory where the database data will be stored
- [Backup]: Whether to enable or disable the WebAdmin backup feature. The default is "Enabled". Select "Disabled" to disable all backup and restore functionality for the instance. If "Enabled" is selected, enter the following item:
  - [Backup storage path]: Directory where the database backup will be stored
- [Transaction log path]: Directory where the transaction log will be stored
- [Encoding]: Database encoding system
- [WAL file size]: Allow the WAL file size to be set when creating an instance. The default is 16 MB if the field is blank. The size specified must be a power of 2 between 1 and 1024. This option is not available for standby instances.

If "Remote" is selected for [Location], enter the following additional items:

- [Host name]: Name of the host where the instance is to be created
- [Operating system credential]: Operating system user name and password for the remote machine where the instance is to be created
- [Remote WebAdmin port for standalone]: Port in which WebAdmin is accessible in the remote machine

Note

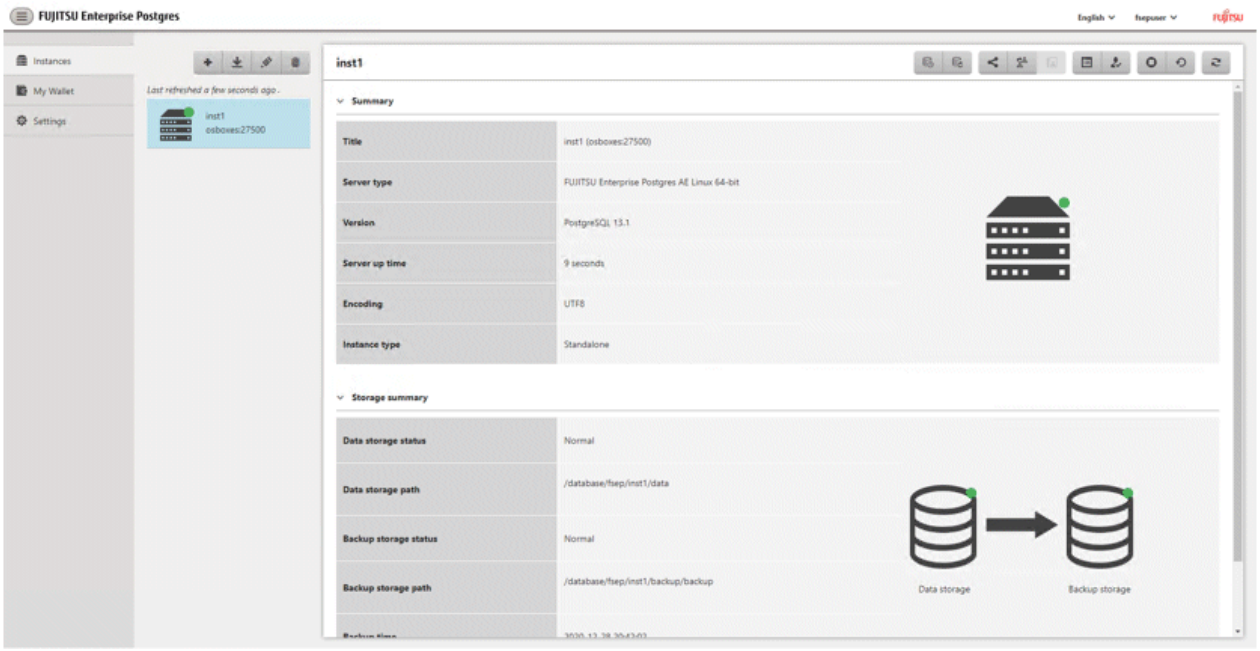
- Refer to "4.2.2 Preparing Directories for Resource Deployment" - "Considerations when deploying resources" for information on points to consider when determining the data storage path, backup storage path, and transaction log path.
- The following items can be modified after the instance has been created. These items cannot be modified on instances that have compatibility with FUJITSU Enterprise Postgres 9.5.
  - Instance name
  - Port number
  - Backup storage path

  Refer to "Editing instance information" for details.
- Do not specify directories that include symbolic link or multibyte characters when specifying the data storage destination or backup data storage destination.
- In the instance that is created using WebAdmin, the locale of the character set to be used in the database, and the locale of the collating sequence, are fixed using C.
- For enhanced security, WebAdmin encrypts the superuser password using SCRAM-SHA-256 authentication for all FUJITSU Enterprise Postgres 10 or later instances. The client/driver must therefore support SCRAM-SHA-256 authentication if they need to connect to FUJITSU Enterprise Postgres 10 or later instances created by WebAdmin with superuser credentials.
- Host name and Operating system credential (Operating system user name and password) should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

4. Click to create the instance.

   If the instance is created successfully, a message indicating the same will be displayed.

5. The instance will be started when it is created successfully.



6. Back up the basic information that was set

   Back up the WebAdmin management information periodically to ensure operational continuity when a fault occurs on the system disk. Follow the procedure below to perform the backup.

   a. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.

   b. Back up the following directory:

      webAdminInstallDir/data/fepwa

4.3.1.3 Changing Instance Settings

You can change the information that is set when an instance is created.

Change the following settings to suit the operating and management environment for FUJITSU Enterprise Postgres.

- Instance configuration
  - Character encoding
  - Communication
  - SQL options
  - Memory
  - Streaming replication
- Changing client authentication information
- Editing instance information

Information

These settings are the same as the parameters that can be set in the files shown below. Refer to "Appendix D Configuring Parameters" for information on the equivalence relationship between the item name and the parameter.

- postgresql.conf
- pg_hba.conf

Note

The files shown below can also be modified directly, however if a parameter not described in "Appendix D Configuring Parameters" was edited by mistake, WebAdmin may not run correctly.

- postgresql.conf
- pg_hba.conf

Instance configuration

1. Start WebAdmin and log in to the database server.
2. In the [Instances] tab, click .
3. Click to change the configuration.
4. Click to save your changes.

See

Select a client-side encoding system that can be converted to/from the database encoding system. Refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the PostgreSQL Documentation for information on the encoding system combinations that can be converted.

Changing client authentication information

1. Start WebAdmin and log in to the database server.
2. In the [Instances] tab, click .

   Click to register new authentication information.

   To change authentication information, select the information, and then click .

   To delete authentication information, select the information, and then click .

Note

When creating the instance, do not delete the entry below, because it is a connection required for WebAdmin to monitor the operational status of the database:
Type=local, Database=all, User=all, and Method=md5

Editing instance information

Use the [Edit instance] page to modify the following items for an instance:

- Instance name
- Port number
- Backup storage path

1. In the [Instances] tab, click . The [Edit instance] page is displayed.
2. Modify the relevant items.

   If [Backup storage path] is changed, [Backup management] is enabled. Select the required option:

   Retain existing backup: Create a backup in [Backup storage path] and retain the existing backup in its original location.

Copy existing backup to new path: Copy the existing backup to [Backup storage path]. A new backup will not be created. The existing backup will be retained in its original location.

Move existing backup to new path: Move the existing backup to [Backup storage path]. A new backup will not be created.

Remove existing backup: Create a backup in [Backup storage path]. The existing backup will be removed.

3. Click to save your changes.

Note

- The [Edit instance] page is also displayed when the user selects 'Navigate to the "Edit instance" page' from the [Anomaly Error] dialog box. Refer to "Anomaly Detection and Resolution" in the Operation Guide for information on what takes place when an anomaly is detected.
- When [Instance name] or [Instance port] is modified, the log_directory and core_directory parameters in postgresql.conf are updated. Also, the specified directories are created if they do not exist.

  Refer to "4.3.1.4 Importing Instances" for information on the format of these directories.

4.3.1.4 Importing Instances

Instances can be created using WebAdmin, or via the command line using the initdb command. Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin.

This section explains how to import command line instances into WebAdmin.

1. In the [Instances] tab, click . The [Import instance] page is displayed.
2. Enter the information for the instance being imported. Refer to "4.3.1.2 Creating an Instance" for information on the items that need to be entered.
3. Click to import the instance.

Note

- Importing neither starts nor stops the instance.
- The following restrictions apply to instance import:
  - Any instance already managed by WebAdmin cannot be imported again.
  - The postgresql.conf file must be located in the same directory as [Data storage path].
  - Read/write permissions are required for [Data storage path].
  - The location specified in postgresql.conf for the following files must not have been changed:
    - hba_file
    - ident_file
  - If the instance is part of a cluster that is monitored by Mirroring Controller, WebAdmin will be unable to detect the Mirroring Controller settings.
  - Instances making use of Mirroring Controller functionality should not be imported, because subsequent operations on those instances may cause unexpected and undesirable side-effects.
  - It is not possible to import and operate an instance that uses a directory mounted by Network File System (NFS).
  - You must make the following changes to the parameters in postgresql.conf prior to importing the instance in WebAdmin.

Parameter	Requirements
port	The port parameter should be uncommented.

The log_directory and core_directory parameters in postgresql.conf are updated during import. Also, the specified directories are created if they do not exist.

The format of these directories is as follows:

log_directory: '/var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/log'

core_directory: '/var/tmp/fsep_*version*/*instanceAdminUser_instanceNamePortNumber*/core'

version: product version_WA_architecture

instanceAdminUser: operating system user name

PortNumber: port number specified when creating the instance

Examples:

log_directory: '/var/tmp/fsep_130_WA_64/naomi_myinst27599/log'

core_directory: '/var/tmp/fsep_130_WA_64/naomi_myinst27599/core'

- When a standby instance is imported, a valid entry, using the IP address of the standby instance, must exist in the pg_hba.conf file of the master instance to allow the standby instance to connect to the master instance.
- When a standby instance is imported, the value for "host" in the primary_conninfo parameter of postgresql.auto.conf should match the host name of the master instance.
- When a standby instance is imported, you cannot specify "passfile" in the primary_conninfo parameter of postgresql.auto.conf. Be sure to specify "password".
- Instances created by other operating systems cannot be imported.
- If a FUJITSU Enterprise Postgres 10 or later instance is being imported while it is running, WebAdmin will encrypt the superuser password using SCRAM-SHA-256 authentication.

4.3.2 Using the initdb Command

This section describes the procedure to create an instance using the initdb command.

If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
Consider the security risks carefully when opening ports.

4.3.2.1 Editing Kernel Parameters

Refer to "Appendix H Configuring Kernel Parameters" prior to editing these settings.

After the settings are complete, check the command specifications of the relevant operating system and restart the system if required.

4.3.2.2 Creating an Instance

Create an instance, with the database cluster storage destination specified in the PGDATA environment variable or in the -D option. Furthermore, the user that executed the initdb command becomes the instance administrator.

- Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin. Refer to "4.3.1.4 Importing Instances" for details.

- If creating multiple instances, ensure that there is no duplication of port numbers or the directories that store database clusters.

See

Refer to "initdb" in "Reference" in the PostgreSQL Documentation for information on the initdb command.

The procedure to create an instance is described below.

1. Use the OS user account that you want as the instance administrator.

   Connect with the server using the OS user account that you want as the instance administrator.

   You cannot use the OS superuser (root).

   The following example shows the OS superuser connected to the server being changed to the OS user account "fsepuser".

   Example

   ```
   # su fsepuser
   ```

2. Configure the environment variables

   Configure the environment variables in the server with the newly created instance.

   Set the following environment variables:

   - PATH environment variables

     Add the installation directory "/bin".

   - MANPATH environment variables

     Add the installation directory "/share/man".

   - LD_LIBRARY_PATH environment variables

     Add the installation directory "/lib".

   Example

   The following example configures environment variables when the installation directory is "/opt/fsepv<*x*>server64".

   Note that "<*x*>" indicates the product version.

   sh, bash

   ```
   $ PATH=/opt/fsepv<x>server64/bin:$PATH ; export PATH
   $ MANPATH=/opt/fsepv<x>server64/share/man:$MANPATH ; export MANPATH
   $ LD_LIBRARY_PATH=/opt/fsepv<x>server64/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
   ```

   csh, tcsh

   ```
   $ setenv PATH /opt/fsepv<x>server64/bin:$PATH
   $ setenv MANPATH /opt/fsepv<x>server64/share/man:$MANPATH
   $ setenv LD_LIBRARY_PATH /opt/fsepv<x>server64/lib:$LD_LIBRARY_PATH
   ```

   ### Note

   If you execute any command other than FUJITSU Enterprise Postgres (OS commands, etc.) after LD_LIBRARY_PATH is set, remove the installation directory/lib from LD_LIBRARY_PATH.

3. Create a database cluster

   Create the database cluster with the initdb command, specifying the storage destination directory.

   Specify the transaction log storage destination and the locale setting option as required.

Example

```
$ initdb -D /database/inst1 --waldir=/transaction/inst1 --lc-collate="C" --lc-ctype="C" --
encoding=UTF8
```

Point

In some features, instance names are requested, and those names are required to uniquely identify the instance within the system. These features allow names that conform to WebAdmin naming conventions, so refer to the following points when determining the names:

- Maximum of 16 characters
- The first character must be ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

Note

- To balance I/O load, consider deploying the transaction log storage destination to a disk device other than the database cluster storage destination and the backup data storage destination.
- Specify "C" or "POSIX" for collation and character category. Performance deteriorates if you specify a value other than "C" or "POSIX", although the behavior will follow the rules for particular languages, countries and regions. Furthermore, this may need to be revised when running applications on systems with different locales.
  For example, specify as follows:

  ```
  initdb --locale="C" --lc-messages="C"
  initdb --lc-collate="C" --lc-ctype="C"
  ```

- Specify the same string in the LANG environment variable of the terminal that starts FUJITSU Enterprise Postgres as was specified in lc-messages of initdb (lc_messages of postgresql.conf). If the same string is not specified, messages displayed on the terminal that was started, as well as messages output to the log file specified in the -l option of the pg_ctl command or the postgres command used for startup, may not be output correctly.
- Specify an encoding system other than SQL_ASCII for the database. If SQL_ASCII is used, there is no guarantee that the encryption system for data in the database will be consistent, depending on the application used to insert the data.

See

Refer to "Locale Support" in "Localization" in "Server Administration" in the PostgreSQL Documentation for information on locales.

4. Set port number.

   Specify a port number in the port parameter of postgresql.conf. Ensure that the specified port number is not already used for other software. If a port number is not specified, "27500" is selected.

   Register the specified port numbers in the /etc/services file if WebAdmin is used to create other instances. WebAdmin uses the /etc/services file to check if port numbers specified as available candidates have been duplicated.

   Register any name as the service name.

5. Set the corefile output destination.

   Specify the output destination of the corefile, which can later be used to collect information for investigation, by setting the core_directory and core_contents parameters of postgresql.conf.

See

Refer to "Parameters" in the Operation Guide for information on the settings for these parameters.

6. Set the backup storage destination.

   Specify the backup data storage destination and other backup settings when backup is to be performed as a provision against database errors.

See

Refer to "Backup Methods" in the Operation Guide for information on specifying backup settings.

7. Start an instance.

   Start with the start mode of the pg_ctl command.

   If either of the following conditions are met, the message "FATAL:the database system is starting up(11189)" may be output.

   - An application, command, or process connects to the database while the instance is starting
   - An instance was started without the -W option specified

   This message is output by the pg_ctl command to check if the instance has started successfully.
   Therefore, ignore this message if there are no other applications, commands, or processes that connect to the database.

   Example

```
$ pg_ctl start -D /database/inst1
```

See

Refer to "pg_ctl" in "Reference" in the PostgreSQL Documentation for information on the pg_ctl command.

Note

If the -W option is specified, the command will return without waiting for the instance to start. Therefore, it may be unclear as to whether instance startup was successful or failed.

4.4 Configuring Remote Connections

This section describes the settings required when connecting remotely to FUJITSU Enterprise Postgres from a database application or a client command.

4.4.1 When an Instance was Created with WebAdmin

Settings related to connection

The default is to accept connections from remote computers to the database.

Change "listen_addresses" in postgresql.conf to modify the default behavior.

Refer to "Appendix D Configuring Parameters" for information on postgresql.conf.

Client Authentication Information settings

The following content is set by default when WebAdmin is used to create an instance.

- Authentication of remote connections from local machines is performed.

When changing Client Authentication Information, select [Client Authentication] from [Setting], and then change the settings.

4.4.2 When an Instance was Created with the initdb Command

Connection settings

The default setting only permits local connections from the client to the database. Remote connections are not accepted.

Change "listen_addresses" in postgresql.conf to perform remote connection.

All remote connections will be allowed when changed as shown below.

Example

```
listen_addresses = '*'
```

Also, configure the parameters shown below in accordance with the applications and number of client command connections.

Parameter name	Parameter description
superuser_reserved_connections	Number of connections reserved for database maintenance, for example backup or index rebuilding. If you need to simultaneously perform a large number of processes that exceed the default value, change this value accordingly.
max_connections	Set the value as: *numberOfSimultaneousConnectionsToInstance* + superuser_reserved_connections

Client authentication information settings

When trying to connect from a client to a database, settings are required to determine whether the instance permits connections from the client - if it does, then it is possible to make settings to determine if authentication is required.

See

Refer to "The pg_hba.conf File" in "Server Administration" in the PostgreSQL Documentation for details.

4.5 Other Settings

This section describes settings that are useful for operations.

4.5.1 Error Log Settings

This section explains the settings necessary to monitor errors in applications and operations, and to make discovering the causes easier.

Make error log settings only when instances are created with the initdb command.

When creating instances with WebAdmin, these settings are already made and hence do not need to be set.

Furthermore, some parameters are used by WebAdmin, and if changed, may cause WebAdmin to no longer work properly. Refer to "Appendix D Configuring Parameters" for details.

Note

Set the output destination for the system log to the server log so that it cannot be viewed by administrators of other instances.

Application errors are output to the system log or server log. The output destination directory for the system log and server log should have access permissions set so that they cannot be viewed by people other than the instance administrator.

Edit the following parameters in postgresql.conf:

Parameter name	Parameter description	How to enable the settings
syslog_ident	Used to specify labels to attach to messages, so that these can be identified when output to the system log if more than one FUJITSU Enterprise Postgres is used.	reload option of the pg_ctl mode
logging_collector	Specify "on" to ensure that messages are output by FUJITSU Enterprise Postgres to the server log file. The server log file is created in the log directory in the database cluster.	restart option of the pg_ctl mode
log_destination	Specify "stderr,syslog" to output messages from FUJITSU Enterprise Postgres to the screen and either the system log or the event log.	reload option of the pg_ctl mode
log_line_prefix	Specify information to be added at the start of messages output by an instance. This information is useful for automatic monitoring of messages. You can output the SQLSTATE value, output time, executing host, application name, and user ID. Refer to "What To Log" in the PostgreSQL Documentation for details. Example: log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '	reload option of the pg_ctl mode

Point

- If you want fewer application errors being output to the system log, refer to "When To Log" and "What To Log" in the PostgreSQL Documentation for information on how to reduce the output messages.
- If you want to separate errors output from other software, refer to "Where To Log" in the PostgreSQL Documentation to change the output destination to the server log file rather than the system log.

4.5.2 Configuring Automatic Start and Stop of an Instance

You can automatically start or stop an instance when the operating system on the database server is started or stopped.

Use the following procedure to configure automatic start and stop of an instance.

Note that, if an instance is started in a failover operation, the cluster system will control the start or stop, therefore this feature should not be used. Also, when performing database multiplexing, refer to "Enabling Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" in the Cluster Operation Guide (Database Multiplexing).

Note that "<*x*>" in paths indicates the product version.

Note

You should wait for time correction, network setup, and so on.

1. Create a unit file

   Copy the unit file sample stored in the directory below, and revise it to match the target instance.

   fujitsuEnterprisePostgresInstallDir/share/fsepsvoi.service.sample

   Example

   In the following example, the installation directory is "/opt/fsepv<*x*>server64", and the instance name is "inst1".

   ```
   # cp /opt/fsepv<x>server64/share/fsepsvoi.service.sample /usr/lib/systemd/system/
   fsepsvoi_inst1.service
   ```

Revise the underlined portions of the options below in the unit file.

Section	Option	Specified value	Description
Unit	Description	FUJITSU Enterprise Postgres *instanceName*	Specifies the feature overview. Specifies the name of the target instance. (*1)
Service	ExecStart	/bin/bash -c '*installDir*/bin/pgx_symstd start *installDir dataStorageDestinationDir*'	Command to be executed when the service is started.
	ExecStop	/bin/bash -c '*installDir*/bin/pgx_symstd stop *installDir dataStorageDestinationDir*'	Command to be executed when the service is stopped.
	ExecReload	/bin/bash -c '*installDir*/bin/pgx_symstd reload *installDir dataStorageDestinationDir*'	Command to be executed when the service is reloaded
	User	User	OS user account of the instance administrator.
	Group	Group	Group to which the instance administrator user belongs.

*1: The instance name should be as follows:

If WebAdmin is used to create the instance: *instanceName*

If the initdb command is used to create the instance: *nameThatIdentifiesTheInstance*
The naming conventions for the instance name or for identifying the instance are as follows:

- Up to 16 bytes
- The first character must be an ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

2. Enable automatic start and stop

   As the OS superuser, use the systemctl command to enable automatic start and stop.

   Example

```
# systemctl enable fsepsvoi_inst1.service
```

4.5.3 Settings when Using the Features Compatible with Oracle Databases

To use the features compatible with Oracle databases, create a new instance and execute the following command for the "postgres" and "template1" databases:

```
CREATE EXTENSION oracle_compatible;
```

Features compatible with Oracle databases are defined as user-defined functions in the "public" schema created by default when database clusters are created, so they can be available for all users without the need for special settings.

For this reason, ensure that "public" (without the double quotation marks) is included in the list of schema search paths specified in the search_path parameter.

There are also considerations for use the features compatible with Oracle databases. Refer to " Precautions when Using the Features Compatible with Oracle Databases" in the Application Development Guide for details.

4.6 Integration with Message-Monitoring Software

To monitor messages output by FUJITSU Enterprise Postgres using software, configure the product to monitor SQLSTATE, instead of the message text - this is because the latter may change when FUJITSU Enterprise Postgres is upgraded.

Configure FUJITSU Enterprise Postgres to output messages in a format that can be read by the message-monitoring software by specifying "%e" in the log_line_prefix parameter of postgresql.conf to output the SQLSTATE value.

A setting example is shown below - it outputs the output time, executing host, application name, and user ID, in addition to the SQLSTATE value.

Example

```
log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
```

See

Refer to "What To Log" in the PostgreSQL Documentation for information on how to configure the settings.

4.7 Setting Up and Removing OSS

This section explains how to set up OSS supported by FUJITSU Enterprise Postgres.

If you want to use OSS supported by FUJITSU Enterprise Postgres, follow the setup procedure.

If you decide not to use the OSS supported by FUJITSU Enterprise Postgres, follow the removing procedure.

To build and use OSS obtained from the web, etc., instead of OSS supported by FUJITSU Enterprise Postgres, see "4.7.10 Build with PGXS".

Information

- In this section, the applicable database that enables the features of each OSS is described as "postgres".
- Execute CREATE EXTENSION for the "template1" database also, so that each OSS can be used by default when creating a new database.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for information on OSS other than those described below.

4.7.1 oracle_fdw

4.7.1.1 Setting Up oracle_fdw

1. Add the path of the OCI library to the environment variable. The available version of the OCI library is 11.2 or later.
   Add the installation path of the OCI library to the LD_LIBRARY_PATH environment variable.
2. As superuser, run the following command:

   ```
   $ su -
   Password:******
   # cp -r /opt/fsepv<x>server64/OSS/oracle_fdw/* /opt/fsepv<x>server64
   ```

3. If a file named libclntsh.so.11.1 does not exist in your OCI library, create a symbolic link with the name libclntsh.so.11.1 to libclntsh.so.xx.1 (xx is the version of the OCI library).

   ```
   # ln -s libclntsh.so.12.1 libclntsh.so.11.1
   ```

4. Restart FUJITSU Enterprise Postgres.
5. Execute CREATE EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

   ```
   postgres=# CREATE EXTENSION oracle_fdw;
   CREATE EXTENSION
   ```

Information

- If the OCI library is not installed on the server, install it using the Oracle client or Oracle Instant Client.
  Refer to the relevant Oracle manual for information on the installation procedure.
- If the version of the OCI library is updated, change the path of the OCI library in the LD_LIBRARY_PATH environment variable to the updated path. Also, re-create the symbolic link named libclntsh.so.11.1 if necessary.

Note

This feature cannot be used on instances created in WebAdmin. It can only be used via server commands.

4.7.1.2 Removing oracle_fdw

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION oracle_fdw CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/oracle_fdw
```

4.7.2 pg_bigm

4.7.2.1 Setting Up pg_bigm

1. Set the postgresql.conf file parameters.
   Add "pg_bigm" to the shared_preload_libraries parameter.
2. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_bigm/* /opt/fsepv<x>server64
```

3. Restart FUJITSU Enterprise Postgres.
4. Execute CREATE EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_bigm;
CREATE EXTENSION
```

4.7.2.2 Removing pg_bigm

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_bigm CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_bigm
```

3. Set the postgresql.conf file parameters.
   Delete "pg_bigm" to the shared_preload_libraries parameter.
4. Restart FUJITSU Enterprise Postgres.

4.7.3 pg_hint_plan

4.7.3.1 Setting Up pg_hint_plan

1. Set the postgresql.conf file parameters.
   Add "pg_hint_plan" to the "shared_preload_libraries" parameter.
2. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_hint_plan/* /opt/fsepv<x>server64
```

3. Restart FUJITSU Enterprise Postgres.
4. Run CREATE EXTENSION for the database that uses this feature.
   The target database is described as "postgres" here.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_hint_plan;
CREATE EXTENSION
```

See

Refer to " Optimizer Hints" in the Application Development Guide for details.

4.7.3.2 Removing pg_hint_plan

Note

Unsetting pg_hint_plan will cause hints registered in the hint_plan.hints table to be lost. Therefore, it is recommended that pg_dump back up the hint_plan.hints table for each database if it is likely that pg_hint_plan will be used again later.

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_hint_plan CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_hint_plan
```

3. Set the postgresql.conf file parameters.
   Delete "pg_hint_plan" to the shared_preload_libraries parameter.
4. Restart FUJITSU Enterprise Postgres.

4.7.4 pg_dbms_stats

4.7.4.1 Setting Up pg_dbms_stats

1. Set the postgresql.conf file parameter.
   Add "pg_dbms_stats" to the "shared_preload_libraries" parameter.
2. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_dbms_stats/* /opt/fsepv<x>server64
```

3. Restart FUJITSU Enterprise Postgres.
4. Run CREATE EXTENSION for the database that will use this feature.
   The target database is described as "postgres" here.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_dbms_stats;
CREATE EXTENSION
```

See

Refer to "Optimizer Hints" in the Application Development Guide for details.

4.7.4.2 Removing pg_dbms_stats

Note

Unsetting pg_dbms_stats causes statistics managed by pg_dbms_stats to be lost. Therefore, it is recommended that you back up each table in the dbms_stats folder of each database in binary format if you may want to use pg_dbms_stats again later.

```
postgres > # COPY <dbms_stats Schema's table name> TO '<Filename>' FORMAT binary;
```

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_dbms_stats CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_dbms_stats
```

3. Set the postgresql.conf file parameters.
   Delete "pg_dbms_stats" to the shared_preload_libraries parameter.
4. Restart FUJITSU Enterprise Postgres.

4.7.5 pg_repack

4.7.5.1 Setting Up pg_repack

1. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_repack/* /opt/fsepv<x>server64
```

2. Execute CREATE EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_repack;
CREATE EXTENSION
```

4.7.5.2 Removing pg_repack

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_repack CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_repack
```

4.7.6 pg_rman

4.7.6.1 Setting Up pg_rman

1. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_rman/* /opt/fsepv<x>server64
```

2. Restart FUJITSU Enterprise Postgres.

Information

Before initialization of the backup catalog, it is recommended to set the parameters below in postgresql.conf. Refer to the pg_rman manual (http://ossc-db.github.io/pg_rman/index-ja.html) for details.

- log_directory
- archive_mode
- archive_command

Note

This feature cannot be used on instances created in WebAdmin. It can only be used via server commands.

4.7.6.2 Removing pg_rman

1. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_rman
```

2. Restart FUJITSU Enterprise Postgres.

4.7.7 pg_statsinfo

4.7.7.1 Setting Up pg_statsinfo

1. Set the postgresql.conf file parameters.
   - Add "pg_statsinfo" to the shared_preload_libraries parameter.
   - Specify the log file name for the log_filename parameter.
2. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pg_statsinfo/* /opt/fsepv<x>server64
```

3. Restart FUJITSU Enterprise Postgres.

Information

Note that pg_statsinfo forcibly overwrites the settings below.

- log_destination

  "csvlog" is added and "stderr" is deleted.

- logging_collector

  "on" is set.

Note

This feature cannot be used on instances created in WebAdmin. It can only be used via server commands.

4.7.7.2 Removing pg_statsinfo

1. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

   ### Information

   The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pg_statsinfo
```

2. Set the postgresql.conf file parameters.

   - Delete "pg_statsinfo" to the shared_preload_libraries parameter.
   - Delete the log file name for the log_filename parameter.

3. Restart FUJITSU Enterprise Postgres.

4.7.8 pgBadger

4.7.8.1 Setting Up pgBadger

1. Set the postgresql.conf file parameters.
   Set the parameters so that the information required for analysis is output to the server log.
   Refer to "Documentation" in the pgBadger website (https://pgbadger.darold.net/) for details.
   The pgBadger material is stored under /opt/fsepv<x>server64/OSS/pgbadger.

2. Restart FUJITSU Enterprise Postgres.

4.7.8.2 Removing pgBadger

1. Set the postgresql.conf file parameters.
   Restores information you specified during Setup.

2. Restart FUJITSU Enterprise Postgres.

4.7.9 Pgpool-II

4.7.9.1 Setting Up Pgpool-II

1. As superuser, run the following command:

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/Pgpool-II/* /opt/fsepv<x>server64
```

2. Execute CREATE EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pgpool_recovery;
CREATE EXTENSION
```

3. Set the postgresql.conf file parameters.
   Specify the path to pg_ctl for the pgpool.pg_ctl parameter.

4. Restart FUJITSU Enterprise Postgres.

Note

The online recovery feature of Pgpool-II cannot be used on instances created in WebAdmin. It can only be used via server commands.

4.7.9.2 Removing Pgpool-II

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pgpool_recovery CASCADE;
DROP EXTENSION
```

2. As superuser, run the following command:

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/Pgpool-II
```

3. Set the postgresql.conf file parameters.
   Delete the pg_ctl path for the pgpool.pg_ctl parameter.

4. Restart FUJITSU Enterprise Postgres.

4.7.10 Build with PGXS

Many PostgreSQL extensions are built using a build base for extensions called PGXS. Building with PGXS also generates files related to llvm. Depending on which version of llvm you are using, follow these steps:.

4.7.10.1 Using the Default Version of llvm

The default version of llvm is described in "2.1 Required Operating System". If you want to use the default version of llvm, use the OSS documentation to build and install OSS.

4.7.10.2 Using a Non-Default Version of llvm

1. As superuser, copy the Makefile.global corresponding to the version of llvm you want to use. The following is an example of using version 9 of llvm. Makefile.global is overwritten when an emergency fix is applied or removed from Fujitsu Enterpise Postgres, this procedure should be performed each time a build is performed.

```
$ su -
Password:******
# cp /opt/fsepv<x>server64/lib/pgxs/src/Makefile.global-vsn9 /opt/fsepv<x>server64/lib/pgxs/src/
Makefile.global
```

2. Follow the OSS documentation to build and install OSS.

3. As superuser, run the following command:. The following is an example of using version 9 of llvm:.

```
$ su -
Password:******
# mv /opt/fsepv<x>server64/lib/bitcode/<OSS名>* /opt/fsepv<x>server64/lib/bitcode-vsn9/
```

4.7.10.3 Without llvm

If you do not use llvm, use the with _ llvm = no option when performing the build, as shown below. For other options, follow the OSS documentation.

```
# make USE_PGXS=1 with_llvm=no
```

4.8 Deleting Instances

This section explains how to delete an instance.

- 4.8.1 Using WebAdmin
- 4.8.2 Using Server Commands

Note

- Always use WebAdmin to delete instances that were created or imported using WebAdmin. Because WebAdmin management information cannot be deleted, WebAdmin will determine that the instance is abnormal.
- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

  ```
  systemctl disable nameOfUnitFileThatPerformsAutomaticStartAndStop
  rm /usr/lib/systemd/system/nameOfUnitFileThatPerformsAutomaticStartAndStop
  ```

  Example

  ```
  # systemctl disable fsepsvoi_inst1.service
  # rm /usr/lib/systemd/system/fsepsvoi_inst1.service
  ```

4.8.1 Using WebAdmin

This section explains how to delete an instance using WebAdmin.

Use the following procedure to delete an instance.

1. Stop the instance

   In the [Instances] tab, select the instance to stop and click .

2. Back up files.

   Before deleting the instance, back up any required files under the data storage destination, the backup data storage destination, and the transaction log storage destination.

3. Delete the instance

   In the [Instances] tab, select the instance to delete and click .

Note

Deleting an instance deletes only the following lowest-level directories. If they are not required, delete them manually.

- Data storage destination
- Backup data storage destination
- Transaction log storage destination (if different from the data storage destination)

4.8.2 Using Server Commands

This section explains how to delete an instance using server commands.

Use the following procedure to delete an instance.

1. Stop the instance

   Execute the stop mode of the pg_ctl command.

   An example is shown below:

   Example

   ```
   $ pg_ctl stop -D /data/inst1
   ```

2. Back up files.

   Before deleting the instance, back up any required files under the data storage destination, the backup data storage destination, and the transaction log storage destination.

3. Delete the instance

   Use a standard UNIX tool (the rm command) to delete the following directories:

   - Data storage destination
   - Backup data storage destination
   - Transaction log storage destination (if a directory different from the data storage directory was specified)

Chapter 5 Uninstallation

This chapter describes the procedure for uninstalling FUJITSU Enterprise Postgres.

5.1 Uninstallation in Interactive Mode

Uninstall according to the following procedure:

Note that "*x*SP*z*" in sample windows indicates the version and level of products to uninstall and "<*x*>" in paths indicates the product version.

Note

- All files and directories in the installation directory are deleted during uninstallation. If user files have been placed in the installation directory, back them up before uninstallation if necessary.
- On SLES 12, before uninstallation, ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

- To reinstall FUJITSU Enterprise Postgres after it was uninstalled, and reuse an instance that was already created so that it can be managed from WebAdmin, back up the directory shown below in which the WebAdmin instance management information had been defined before uninstalling FUJITSU Enterprise Postgres, and then restore the backed up directory to its original location once FUJITSU Enterprise Postgres has been reinstalled.

  Follow the procedure below to perform the backup.

  1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
  2. Back up the following directory:

     webAdminInstallDir/data/fepwa

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Delete the operation information

If the FUJITSU Enterprise Postgres operation information has been registered in the operating system or another middleware product, for example, then it must be deleted. Cases in which deletion is required are as follows:

- For a cluster system using failover operation integrated with PRIMECLUSTER, stop the cluster applications and delete the cluster application resources and FUJITSU Enterprise Postgres resources. Refer to the Cluster Operation Guide (PRIMECLUSTER) and PRIMECLUSTER Installation and Administration Guide for details.
- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

  ```
  systemctl disable nameOfUnitFileThatPerformsAutomaticStartAndStop
  rm /usr/lib/systemd/system/nameOfUnitFileThatPerformsAutomaticStartAndStop
  ```

  Example

  ```
  # systemctl disable fsepsvoi_inst1.service
  # rm /usr/lib/systemd/system/fsepsvoi_inst1.service
  ```

2. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- Instance

  Using WebAdmin

  In the [Instances] tab, select the instance to stop and click .

  Using server commands

  Execute the pg_ctl command in stop mode.

```
$ /opt/fsepv<x>server64/bin/pg_ctl stop -D /database/inst1
```

- Web server feature of WebAdmin

  Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

  Example

  If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

```
# cd /opt/fsepv<x>webadmin/sbin
# ./WebAdminStop
```

- Mirroring Controller

  Execute the mc_ctl command with the stop mode option specified and stop the Mirroring Controller.

  Example

```
$ mc_ctl stop -M /mcdir/inst1
```

- pgBadger
- Pgpool-II

3. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

4. Start the Uninstall (middleware)

Execute the following command:

```
# /opt/FJSVcir/cimanager.sh -c
```

5. Select the software

Type the number for the product to be uninstalled, and press Enter.

6. Start the uninstallation

To start the uninstallation, type "y" and press Enter.

To display the list of products again, type "b" and press Enter.

7. Finish the uninstallation

Upon successful completion, the window below is displayed.

The installation directory may remain after uninstallation. If it is not required, delete it.

```
Uninstalling...

productName is being uninstalled now.
```

```
    100% ##############################


The following products have been uninstalled successfully:
    productName

Uninstallation of "productName" has completed successfully.



Exiting Uninstaller.
```

5.2 Uninstallation in Silent Mode

Uninstall according to the following procedure:

Note

- All files and directories in the installation directory are deleted during uninstallation. If user files have been placed in the installation directory, back them up before uninstallation if necessary.
- On SLES 12, before uninstallation, ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

- To reinstall FUJITSU Enterprise Postgres after it was uninstalled, and reuse an instance that was already created so that it can be managed from WebAdmin, back up the directory shown below in which the WebAdmin instance management information had been defined before uninstalling FUJITSU Enterprise Postgres, and then restore the backed up directory to its original location once FUJITSU Enterprise Postgres has been reinstalled.

  Follow the procedure below to perform the backup.

  1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
  2. Back up the following directory:

     webAdminInstallDir/data/fepwa

See

Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Delete the operation information

If the FUJITSU Enterprise Postgres operation information has been registered in the operating system or another middleware product, for example, then it must be deleted. Cases in which deletion is required are as follows:

- For a cluster system using failover operation integrated with PRIMECLUSTER, stop the cluster applications and delete the cluster applications resources and FUJITSU Enterprise Postgres resources. Refer to the Cluster Operation Guide (PRIMECLUSTER) and PRIMECLUSTER Installation and Administration Guide for details.
- If you have set automatic start and stop of the instance, execute the following commands to disable the script and cancel registration.

  ```
  systemctl disable nameOfUnitFileThatPerformsAutomaticStartAndStop
  rm /usr/lib/systemd/system/nameOfUnitFileThatPerformsAutomaticStartAndStop
  ```

  Example

  ```
  # systemctl disable fsepsvoi_inst1.service
  # rm /usr/lib/systemd/system/fsepsvoi_inst1.service
  ```

2. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- Instance

  Using WebAdmin

  In the [Instances] tab, select the instance to stop and click .

  Using server commands

  Execute the pg_ctl command with the stop mode option specified.

  ```
  $ /opt/fsepv<x>server64/bin/pg_ctl stop -D /database/inst1
  ```

- Web server feature of WebAdmin

  Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

  Example

  If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

  ```
  # cd /opt/fsepv<x>webadmin/sbin
  # ./WebAdminStop
  ```

- Mirroring Controller

  Execute the mc_ctl command with the stop mode option specified and stop the Mirroring Controller.

  Example

  ```
  $ mc_ctl stop -M /mcdir/inst1
  ```

- pgBadger
- Pgpool-II

3. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

4. Run the uninstallation

Execute the command below.

The installation directory may remain after uninstallation. If it is not required, delete it.

Example

```
# /opt/fsepv<x>server64/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>server64/setup is the name of the installation directory in which the server product is installed.

```
# /opt/fsepv<x>webadmin/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>webadmin/setup is the name of the installation directory in which the WebAdmin is installed.

```
# /opt/fsepv<x>pgpool-II/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>pgpool-II/setup is the name of the installation directory in which the Pgpool-II is installed.

Appendix A Recommended WebAdmin Environments

This appendix describes the recommended WebAdmin environment. The following explanation is based on the assumption that Internet Explorer 11 or later is used unless otherwise stated.

A.1 Recommended Browser Settings

- Use a display resolution of 1280 x 768 or higher, and 256 colors or more.
- Select [View] >> [Text size] >> [Medium].
- Select [View] >> [Zoom] >> [100%].
- Click [Tools] >> [Internet options] >> [General] >> [Fonts], and then:
  - Set [Webpage font] to [Times New Roman].
  - Set [Plain text font] to [Courier New].

A.2 How to Set Up the Pop-up Blocker

If the Pop-up Blocker is enabled, use the procedure below to configure settings to allow pop-ups from the server where FUJITSU Enterprise Postgres is installed.

1. Click [Tools] >> [Internet options], and then select the [Privacy] tab.
   If [Turn on Pop-up Blocker] is not selected, the Pop-up Blocker feature will not operate, and therefore steps below are not required.
2. Click [Settings].
3. In the [Pop-up Blocker Settings] window, enter in the [Address of website to allow] the URL of the server where FUJITSU Enterprise Postgres is installed, and then click [Add].
4. Click [Close].
5. In the [Internet Options] window, click [OK].

Appendix B Setting Up and Removing WebAdmin

This appendix describes how to set up and remove WebAdmin.

Note that "<*x*>" in paths indicates the product version.

B.1 Setting Up WebAdmin

This section explains how to set up WebAdmin.

B.1.1 Setting Up WebAdmin

Follow the procedure below to set up WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Set up WebAdmin

   Set up WebAdmin.

   Example

   If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

   ```
   # cd /opt/fsepv<x>webadmin/sbin
   # ./WebAdminSetup
   ```

3. Specify the port number

   Specify the following port numbers to be used in WebAdmin.

   Refer to the "/etc/services" file and only change to a different port number if there is overlap with a port number from another service.

   Make a note of the port number for the Web server, because it will be required for starting the WebAdmin window.

Item	Value (recommended value)
Web server port number enter port number of Web Server (default: 27515):	27515
WebAdmin internal port number enter Internal port number for WebAdmin (default: 27516):	27516
WebAdmin automatic start Start WebAdmin automatically when system starting? [y,n] (default: y)	y

Web server port number

Specify a numeric value from 1024 to 32767 for the port number to be used for communication between the Web browser and the Web server.

The Web server port number will be registered as a port number with the following service name in the "/etc/services" file.

fsep_130_WA_64_WebAdmin_Port1

WebAdmin internal port number

Specify a numeric value from 1024 to 32767 for the port number to be used for communication between the Web server and the WebAdmin runtime environment.

The WebAdmin internal port number will be registered as a port number with the following service name in the /etc/services file.

fsep_130_WA_64_WebAdmin_Port2

WebAdmin automatic start

Select whether or not to start WebAdmin when the machine is started.

Note

- Unused port numbers
  Irrespective of the information specified in the "/etc/services" file, unused port numbers in the OS and other products can sometimes be automatically numbered and then used, or port numbers specified in environment files within products may also be used. Check the port numbers used by the OS and other products, and ensure that these are not duplicated.
- Access restrictions
  Prevent unauthorized access and maintain security by using a firewall product, or the packet filtering feature of a router device, to restrict access to the server IP address and the various specified port numbers.
- Port access permissions
  If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
  Consider the security risks carefully when opening ports.
- Changing port numbers
  When using WebAdmin in multiserver mode, it is recommended not to change WebAdmin ports after creating instances. Otherwise, the created instances may not be accessible through WebAdmin after the port is changed.

B.1.2 Starting the Web Server Feature of WebAdmin

Follow the procedure below to start the Web server feature of WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Start the Web server feature of WebAdmin

   Execute the WebAdminStart command to start the Web server feature of WebAdmin.

   Example

   If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

   ```
   # cd /opt/fsepv<x>webadmin/sbin
   # ./WebAdminStart
   ```

B.1.3 Stopping the Web Server Feature of WebAdmin

Follow the procedure below to stop the Web server feature of WebAdmin.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Stop the Web server feature of WebAdmin

   Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

   Example

   If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

```
# cd /opt/fsepv<x>webadmin/sbin
# ./WebAdminStop
```

Note

- For efficient operation of WebAdmin, it is recommended that the Web server feature be stopped only during a scheduled maintenance period.
- When WebAdmin is used to create and manage instances in a multiserver configuration, the Web server feature must be started and running on all servers at the same time.

B.2 Removing WebAdmin

This section explains how to remove WebAdmin.

This removal procedure stops WebAdmin and ensures that it no longer starts automatically when the machine is restarted.

1. Change to the superuser

   Acquire superuser privileges on the system.

   Example

```
$ su -
Password:******
```

2. Remove WebAdmin setup

   Execute the WebAdminSetup command to remove WebAdmin setup.

   Example

   If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

```
# cd /opt/fsepv<x>webadmin/sbin
# ./WebAdminSetup -d
```

B.3 Using an External Repository for WebAdmin

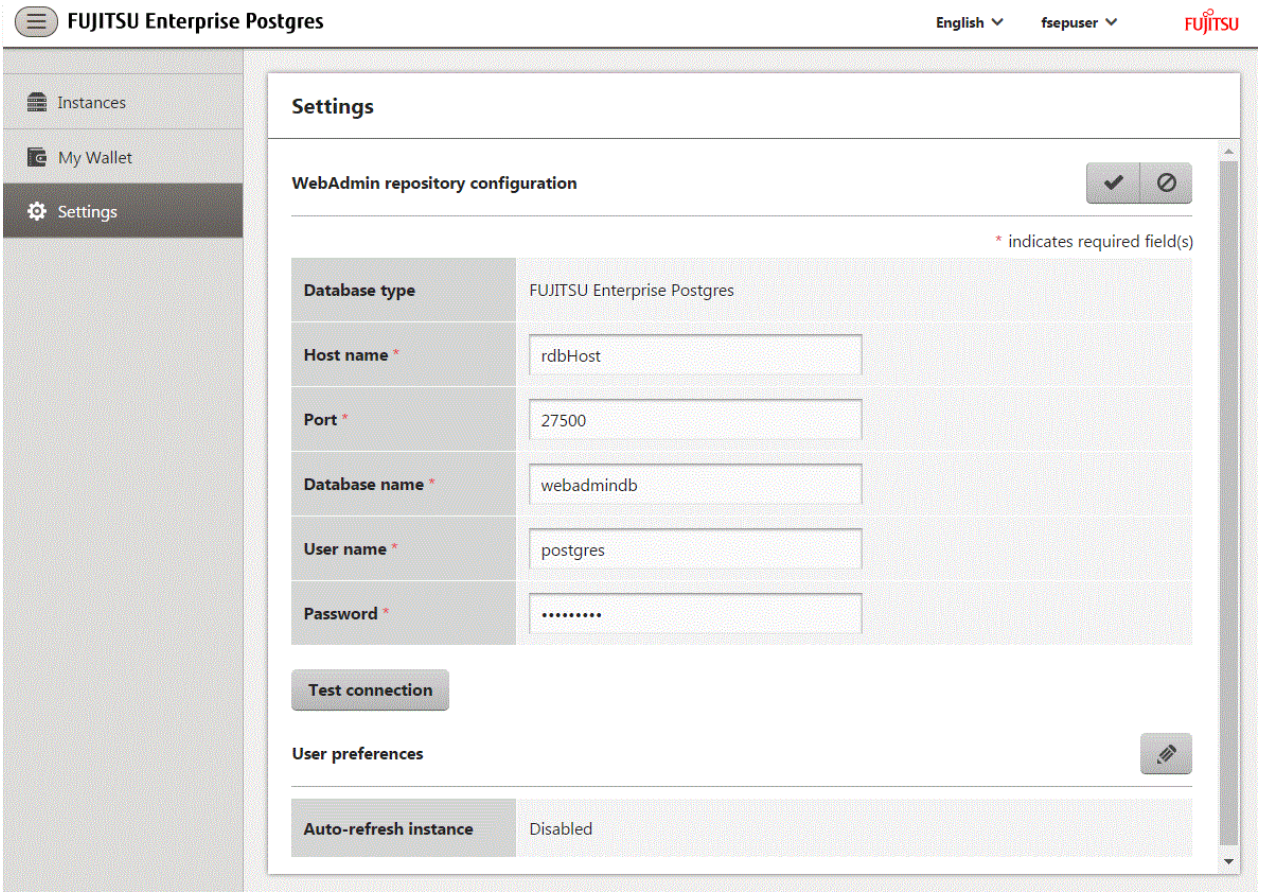
WebAdmin can be configured to use an external database, where it can store the various metadata information it uses. WebAdmin will use this database as a repository to store the information it uses to manage all the created instances. This can be a FUJITSU Enterprise Postgres database or an Open Source PostgreSQL V9.2 or later database.

Using an external database as a WebAdmin repository provides you with more flexibility in managing WebAdmin. This repository can be managed, backed up and restored as needed using pgAdmin or command line tools, allowing users to have greater flexibility and control.

Follow the procedure below to set up the repository.

1. Start WebAdmin, and log in to the database server.

2. Click the [Settings] tab, and then click in the [WebAdmin repository configuration] section.



3. Enter the following items:

   - [Host name]: Host name of the database server
   - [Port]: Port number of the database server
   - [Database name]: Name of the database
   - [User name]: User name to access the database
   - [Password]: Password of the database user

Note

- Database type
  It is recommended to use a FUJITSU Enterprise Postgres database as a repository. A compatible PostgreSQL database can also be used as an alternative.
- It is recommended to click [Test connection] to ensure that the details entered are valid and WebAdmin is able to connect to the target database.
- Host name, Database name, User name, Password should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

4. Click to register the repository details.

Note

- Once the repository is set up, it can be changed any number of times by the user logged into WebAdmin. When a repository is changed:
  - It is recommended to preload the backup into this database.
  - If the data is not preloaded, WebAdmin will create a new repository.
- The database repository can be set up even after WebAdmin was already used to create instances. In that scenario, the instances already created are retained and can continue to be operated on.
- If the instance used as a repository is stopped, WebAdmin will be unusable. For this reason, it is recommended to be familiar with starting an instance from the command line. If the instance is stopped for any reason, start it from the command line and WebAdmin will be usable again.

B.4 Using the WebAdmin Auto-Refresh Feature

The WebAdmin auto-refresh feature automatically refreshes the operating status of all instances in the Instance list at the specified interval. It also refreshes the details of the selected instance.

Follow the procedure below to configure the auto-refresh options.

1. Click the [Settings] tab, and then click in the [User preferences] section.
2. Enter the following items:
   - [Auto-refresh instance]: To use the auto-refresh feature, select "Enabled". The default is "Disabled".
   - [Refresh interval (seconds)]: Number of seconds between each refresh. This is a countdown timer, which is reset every time the instance status is refreshed by any operation. Specify a value from 30 to 3600 (seconds). The default is 30.
3. Click to save the auto-refresh settings.

Note

- Auto-refresh will run only if the [Instances] page is displayed and no user-initiated operation is in progress.
- A text indicator, which is independent of auto-refresh, is displayed at the top of the Instance list. It is dynamically updated to display when the page was last refreshed.

Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix D Configuring Parameters

WebAdmin operates and manages databases according to the contents of the following configuration files:

- postgresql.conf

  Contains various items of information that define the operating environment of FUJITSU Enterprise Postgres.

- pg_hba.conf

  Contains various items of information related to client authentication.

These configuration files are deployed to a data storage destination. Data is written to them when the instance is created by WebAdmin and when settings are changed, and data is read from them when the instance is started and when information from the [Setting] menu is displayed.

Direct editing of each configuration file is possible with a text editor.

See

Refer to "Server Configuration" and "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on the parameters.

Note

WebAdmin checks for port number and backup storage path anomalies when various operations are performed. An anomaly occurs when the value of [Port number] and/or [Backup storage path] in WebAdmin is different from the value of the corresponding parameter in postgresql.conf. Refer to "Anomaly Detection and Resolution" in the Operation Guide for details.

postgresql.conf

Parameters that can be changed in WebAdmin

The postgresql.conf parameters that can be changed in WebAdmin are shown below:

Section	WebAdmin item	postgresql.conf file parameter
Instance Configuration		
Character encoding	Character set	client_encoding
	Message locale	lc_messages
Communication	Max connections	max_connections
SQL options	Transform NULL format	transform_null_equals
	Date output format	DateStyle (*1)
	Interval output format	IntervalStyle
	Number of digits for floating values	extra_float_digits
	Transaction isolation levels	default_transaction_isolation
	Currency format	lc_monetary
	Date and time format	lc_time
	Numerical value format	lc_numeric
Memory	Sort memory (KB)	work_mem
	Shared buffers (KB)	shared_buffers
Streaming replication	WAL level	wal_level

Section	WebAdmin item	postgresql.conf file parameter
	Maximum WAL senders	max_wal_senders
	WAL save size (MB)	wal_keep_size
	Hot standby	hot_standby
	Synchronous standby names	synchronous_standby_names
	WAL receiver timeout (ms)	wal_receiver_timeout
Edit instance		
	Instance name	n/a
	Instance port	port
	Backup storage path	backup_destination

*1: If you specify "Postgres" as the output format, dates will be output in the "12-17-1997" format, not the "Wed Dec 17 1997" format used in the PostgreSQL Documentation.

Information

- Calculate the maximum number of connections using the formula below:

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications + 3 (*1)
```

*1: 3 is the default number of connections required by the system.
Calculate the maximum number of connections using the following formula when changing superuser_reserved_connections (connections reserved for use by the superuser) in postgresql.conf.

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications +
superuser_reserved_connections
```

- Also check if the memory used exceeds the memory installed (refer to "Parameters automatically set by WebAdmin according to the amount of memory").
- When modifying "Shared buffers" or "Max connections", edit the kernel parameter. Refer to "Appendix H Configuring Kernel Parameters", and "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for details.

Parameters set by WebAdmin

The following postgresql.conf parameters are set by WebAdmin during instance startup (they will be ignored even if specified in postgresql.conf):

Parameter	Value
listen_addresses	*
log_destination	'stderr,syslog'
logging_collector	on
log_line_prefix	'%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
log_filename (*1) (*2)	'logfile-%a.log'
log_file_mode	0600
log_truncate_on_rotation	on
log_rotation_age	1d

*1: The server logs are split into files based on the day of the week, and are rotated after each week.

*2: If the date changes while the instance is stopped, old logs are not deleted and continue to exist.
Manually delete old logs that are no longer required to release disk space.

Parameters automatically set by WebAdmin according to the amount of memory

The postgresql.conf parameters automatically set according to the amount of installed memory, during the creation of instances by WebAdmin, are shown below:

Parameter	Value
shared_buffers	30% of the machine's installed memory
work_mem	30% of the machine's installed memory / max_connections / 2
effective_cache_size	75% of the machine's installed memory
maintenance_work_mem	10% of the machine's installed memory / (1 + autovacuum_max_workers) (*1)

*1: The value will be capped at 2097151 KB.

When determining the values to be configured in the above parameters, you must take into account any anticipated increases in access volume or effects on performance during business operations, such as the number of applications and commands that will access the instance, and the content of processes. Also, note that in addition to FUJITSU Enterprise Postgres, other software may be running on the actual database server. You will need to determine the degree of priority for the database and other software, as well as the memory allocation size.

WebAdmin automatically configures complex parameter settings such as those mentioned above, based on the size of the internal memory of the machine. This enables maximum leverage of the machine memory to facilitate resistance against fluctuations during business operations.

Accordingly, the effects of the above-mentioned factors must be estimated and taken into account when determining and configuring parameter values, so that memory resources can be effectively allocated among other software or instances, and so that adverse effects can be mutually avoided. Refer to "Memory" in "Resource Consumption", and "Planner Cost Constants" in "Query Planning", under "Server Administration" in the PostgreSQL Documentation for information on parameter values and required considerations.

Parameter values can be modified using the WebAdmin [Setting] menu, or edited directly using a text editor.

If adding an instance, determine the parameter values, including for existing instances, and make changes accordingly.

See

Kernel parameters need to be tuned according to the parameters being changed. Refer to "Appendix H Configuring Kernel Parameters", and "Managing Kernel Resources" in "Server Administration" in the PostgreSQL Documentation for information on tuning kernel parameters.

Note

- Do not directly edit the following postgresql.conf parameters with a text editor, otherwise WebAdmin may not work properly if you make a mistake):
  - archive_mode
  - archive_command
  - wal_level
  - log_line_prefix
  - log_destination
  - logging_collector
  - log_directory
  - log_file_mode
  - log_filename

    - log_truncate_on_rotation
    - log_rotation_age
- You must take care with the following parameter:
    - superuser_reserved_connections

      Set it to a number that includes the 3 connections required in WebAdmin (the default is 3).

pg_hba.conf

Refer to "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on content that can be configured in pg_hba.conf.

- Configure the instance administrator permissions in the "local" connection format settings. WebAdmin may not work properly if permissions are not configured.
- If you specify an item or value that cannot be set by WebAdmin when editing the pg_hba.conf file with a text editor, it will not be possible to reference that line from WebAdmin.

Appendix E Estimating Database Disk Space Requirements

This appendix describes how to estimate database disk space requirements.

E.1 Estimating Table Size Requirements

The following tables provide the formulas for estimating table size requirements.

Table E.1 Estimation formula when the record length is 2032 bytes or less

Item	Estimation formula (bytes)
(1) Record length	27(*1) + NULL map + OID + column data NULL map: Number of columns / 8 (*2) OID: 4 Column data: Sum of column lengths *1: Record header section *2: Round the result up to the next integer. - Because the column data is placed in boundaries of 8 bytes, you need to make an adjustment so that the sum of the record header section, NULL map and OID is a multiple of 8. For example, if the calculated length is 27 + 1 / 8 (rounded up) + 0 = 28 bytes, add 4 to make the length 32 bytes. - Because the data of each column is placed in boundaries of the defined data type, take the boundary of each data type into account for the length of the column data. For example, the length of the column data in the table below will not be the sum of the data types, which is 37 bytes, but will instead be 64 bytes following boundary adjustment. Definition: create table tb1(c1 char(1), c2 long, c3 int, c4 box) Estimation: CHAR type 1 byte + boundary adjustment of 7 bytes for LONG type 8 bytes + LONG type 8 bytes + INT type 4 bytes + boundary adjustment of 12 bytes for BOX type 32 bytes + BOX type 32 bytes = 64 bytes - Because each record is placed in boundaries of 8 bytes, you need to make an adjustment so that the length of the column data is a multiple of 8. - If the calculated record length exceeds 2,032 bytes, the variable length data in the record might be compressed automatically. If so, use the estimation formulas in "Table E.2 Estimation formula when the record length exceeds 2032 bytes" to estimate the table size.
(2) Page size requirement	8192 (*1) × fillfactor (*2) - 24 (*3) *1: Page length (8192) *2: Value of the fillfactor specified in the table definitions (if omitted, 100%) *3: Page header (24) - The calculated (2) page size requirement will be rounded down to the nearest integer.
(3) Number of records per page	(2) Page size requirement / ((1) record length + 4 (*1)) *1: Pointer length (4) - The result will be rounded down to the nearest integer.

Item	Estimation formula (bytes)
(4) Number of pages required for storing records	Total number of records / (3) number of records per page - The result will be rounded up to the next integer.
(5) Amount of space	(4) Number of pages required for storing records x page length x safety factor (*1) *1: Specify 2.0 or higher. - This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

Table E.2 Estimation formula when the record length exceeds 2032 bytes

Item	Estimation formula (bytes)
(5) Amount of space	Total number of records x (1) record length x safety factor (*1) *1: Specify 2.0 or higher. - This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

E.2 Estimating Index Size Requirements

This section provides the formulas for estimating index size requirements.

FUJITSU Enterprise Postgres provides six index types: B-tree, Hash, GiST, GIN, SP-GiST, and VCI. If you do not specify the index type in the CREATE INDEX statement, a B-tree index is generated.

The following describes how to estimate a B-tree index. Refer to "E.7 Estimating VCI Disk Space Requirements" for information on how to estimate VCI.

A B-tree index is saved as a fixed-size page of 8 KB. The page types are meta, root, leaf, internal, deleted, and empty. Since leaf pages usually account for the highest proportion of space required, you need to calculate the requirements for these only.

Table E.3 Estimation formula when the key data length is 512 bytes or less

Item	Estimation formula (bytes)
(1) Entry length	8 (*1) + key data length (*2) *1: Entry header *2: The key data length depends on its data type (refer to "E.3 Sizes of Data Types" for details). Because each entry is placed in boundaries of 8 bytes, you need to make an adjustment so that the length of the key data is a multiple of 8. For example, if the calculated length is 28 bytes, add 4 to make the length 32 bytes. - If the key data length exceeds 512 bytes, key data may be automatically compressed. In this case, use the estimation formula given in "Table E.4 Estimation formula when the key data length exceeds 512 bytes" to estimate the key data length.
(2) Page size requirement	8192 (*1) × fillfactor (*2) - 24 (*3) - 16 (*4) *1: Page length (8192) *2: Value of the fillfactor specified in the index definitions (if omitted, 90%) In the case of indexes of primary key constraints and unique constraints, the value of the fillfactor specified for each constraint in the table definitions (if omitted, 90%) *3: Page header (24) *4: Special data (16)

Item	Estimation formula (bytes)
	- The calculated (2) page size requirement will be rounded down to the nearest integer.
(3) Number of entries per page	(2) Page size requirement / ((1) entry length + 4 (*1)) *1: Pointer length - Result of (3) number of entries per page will be rounded down to the nearest integer.
(4) Number of pages required for storing indexes	Total number of records / (3) number of entries per page - Result of (4) number of pages required for storing indexes will be rounded up to the nearest integer.
(5) Space requirement	(4) Number of pages required for storing indexes x 8192 (*1) / usage rate (*2) *1: Page length *2: Specify 0.7 or lower.

Table E.4 Estimation formula when the key data length exceeds 512 bytes

Item	Estimation formula (bytes)
(5) Space requirement	Total number of records x key data length x compression ratio (*1) / usage rate (*2) *1: The compression ratio depends on the data value, so specify 1. *2: Specify 0.7 or lower as the usage rate.

E.3 Sizes of Data Types

This section lists the sizes of the data types.

E.3.1 Sizes of Fixed-Length Data Types

The following table lists the sizes of fixed-length data types.

Data type	Size (bytes)
SMALLINT (INT2)	2
INTEGER (INT4)	4
BIGINT (INT8)	8
REAL	4
DOUBLE PRECISION	8
SERIAL (SERIAL4)	4
BIGSERIAL (SERIAL8)	8
MONEY	8
FLOAT	8
FLOAT (1-24)	4
FLOAT (25-53)	8
TIMESTAMP WITHOUT TIME ZONE	8
TIMESTAMP WITH TIME ZONE	8
DATE	4
TIME WITHOUT TIME ZONE	8
TIME WITH TIME ZONE	12

Data type	Size (bytes)
INTERVAL	12
BOOLEAN	1
CIDR	IPv4: 7 IPv6: 19
INET	IPv4: 7 IPv6: 19
MACADDR	6
MACADDR8	8
POINT	16
LINE	32
LSEG	32
BOX	32
CIRCLE	24

E.3.2 Sizes of Variable-Length Data Types

The following table lists the sizes of variable-length data types.

Data type	Size (bytes)	Remarks
path	Length of size portion + 12 + 16 x number of vertices	1) When carrying out division, round to the next integer. 2) If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes. 3) The number of bytes per character depends on the character set (refer to "E.3.4 Number of Bytes per Character" for details).
polygon	Length of size portion + 36 + 16 x number of vertices	
decimal	Length of size portion + 2 + (integer precision / 4 + decimal precision / 4) x 2	
numeric		
bytea	Length of size portion + real data length	
character varying(*n*), varchar(*n*)	Length of size portion + number of characters x number of bytes per character	
character(*n*), char(*n*)	Length of size portion + *n* x number of bytes per character	
text	Length of size portion + number of characters x number of bytes per character	

E.3.3 Sizes of Array Data Types

The following table lists the sizes of array data types.

Data type	Size (bytes)	Remarks
Array	Length of size portion + 12 + 8 x number of dimensions + data size of each item	If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes. - Example of estimation when array data is "ARRAY[[1,2,3],[1,2,3]]" Number of dimensions: 2 INTEGER data size: 4 Total size = 1+12+8x2+6x4 = 53

E.3.4 Number of Bytes per Character

The following table lists the number of bytes per character.

The given values relate to the common character sets EUC-JP and UTF8.

Character type	Character set	Number of bytes per character
ASCII	EUC_JP	1
Halfwidth katakana	EUC_JP	2
JIS X 0208 kanji characters	EUC_JP	2
JIS X 0212 kanji characters	EUC_JP	3
ASCII	UTF8	1
Halfwidth katakana	UTF8	3
JIS X 0208 kanji characters	UTF8	3
JIS X 0212 kanji characters	UTF8	3

E.4 Estimating Transaction Log Space Requirements

This section provides the formula for estimating transaction log space requirements.

```
Transaction log space requirements = max_wal_size
```

However, if the update volume is extremely high (for example, due to a large data load and batch processing), disk writing at a checkpoint may not be able to keep up with the load, and a higher number of transaction logs than indicated here may temporarily be accumulated.

E.5 Estimating Archive Log Space Requirements

This section explains how to estimate archive log space requirements.

The archive log is an archive of the transaction logs from the time of a previous backup to the present, so it fluctuates depending on the backup period and the content of update transactions.

The longer the backup period and the more update transactions, the greater the space required for the archive log.

Therefore, measure the actual archive log space by using a test environment to simulate backup scheduling and database update in a real operating environment.

E.6 Estimating Backup Disk Space Requirements

This section provides the formula for estimating backup disk space requirements.

```
Backup disk space requirements = size of the database cluster x 2 + transaction log space requirements
                               + archive log space requirements
```

If the pgx_dmpall command performs a backup using a user exit, the backup disk size differs according to the database resources targeted for backup and the copy method.

E.7 Estimating VCI Disk Space Requirements

This section provides the formula for estimating VCI disk space requirements.

```
Disk space = (number of rows in tables) x (number of bytes per row) x (compression ratio) + (WOS size)
```

Number of bytes per row

```
Number of bytes per row = (19 + (number of columns specified in CREATE INDEX) / 8
                                  + (number of bytes per single column value)) x 1.1
```

Note: Round up the result to the nearest integer.

Compression ratio

Specify a value between 0 and 1. Since compression ratio depends on the data being compressed, use actual data or test data that simulates it, then compare the value with the estimation result. As a guide, the compression ratio measured with the Fujitsu sample data is shown below:

- Data with high degree of randomness (difficult to compress): Up to approximately 0.9 times.
- Data with high degree of similarity (easy to compress): Up to approximately 0.5 times.

WOS size

```
WOS size = (number of WOS rows) / 185 x 8096
```

One row is added to the number of WOS rows for each INSERT and DELETE, and two rows are added for UPDATE. On the other hand, the number decreases to 520,000 rows or less during conversion to ROS performed by the ROS control daemon.

Note

VCI does not support retrieval of disk space usage using the database object size function pg_indexes_size. To find out the actual total VCI disk space, check the disk space of the storage directory using an OS command or other method.

Appendix F Estimating Memory Requirements

This appendix explains how to estimate the memory.

F.1 FUJITSU Enterprise Postgres Memory Requirements

This section describes the formulas for estimating FUJITSU Enterprise Postgres memory requirements.

Use the following formula to obtain a rough estimate of memory required for FUJITSU Enterprise Postgres:

```
fujitsuEnterprisePostgresRequiredMemory = sharedMemoryAmount + localMemoryAmount
```

Shared memory amount

Refer to "Shared Memory and Semaphores" under "Server Administration" in the PostgreSQL Documentation for information on shared memory. If you enable the Global Meta Cache feature, you must also add the value of pgx_global_metacache. Refer to "Parameters" in the Operation Guide for the setting values.

However, note that if instances have been created using WebAdmin, the parameters below will be configured automatically when the instances are created. Take this into account when calculating the shared memory size.

Parameter name	Set value
shared_buffers	30 percent of the internal memory of the machine.
max_connections	100
max_prepared_transactions	100

Local memory amount

```
localMemoryAmount = processStackArea
                  + memoryUsedInDbSessionsThatUseTempTables
                  + memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
                  + memoryUsedInMaintenanceOperations
                  + baseMemoryUsedInEachProcess
                  + memoryUsedPreparingForDataAccess
```

Process stack area

```
processStackArea
  = max_stack_depth x (max_connections + autovacuum_max_workers + 9)
```

This formula evaluates to the maximum value.
Actually it is used according to the growth of the stack.
In the formula above, 9 is the number of processes that perform roles specific to servers.

Memory used in database sessions that use temporary tables

```
memoryUsedInDbSessionsThatUseTempTables
  = temp_buffers x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as temporary buffers are used, and is released when the session ends.

Memory used in database sessions that perform sort and hash table operations

```
memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
  = work_mem x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as operations such as sort are performed, and is released when the query ends.

Memory used in maintenance operations

```
memoryUsedInMaintenanceOperations
  = maintenance_work_mem x (numOfSessionsPerformingMaintenance + autovacuum_max_workers)
```

Note that 'maintenance operations' are operations such as VACUUM, CREATE INDEX, and ALTER TABLE ADD FOREIGN KEY.

Base memory used in each process

```
baseMemoryUsedInEachProcess
  = baseMemoryUsedInOneProcess x (max_connections + autovacuum_max_workers + 9)
```

Use the result of the following formula for memory consumed per process. This formula evaluates to the memory used when server processes are running.
In the formula above, 9 is the number of processes that perform roles specific to servers.

The amount of memory consumed per process is determined by the number of tables, indexes, and all columns of all tables that the process accesses. If your system has about 100 tables, you can estimate it to be 3 MB, but otherwise use the following estimate:

```
baseMemoryUsedInOneProcess
  = (1.9KB x All user tables + 2.9KB x All user indexes + 1.0KB x All user columns) x 1.5(*1)

If you enable the Global Meta Cache feature, use the following formula:
baseMemoryUsedInOneProcess
 = (All user tables + All user indexes + All user columns) x 1.0KB x 1.5 (*1)
    + (All user tables x 1.4KB + All user indexes x 2.4KB)
```

*1) Safety Factor (1.5)
There are variable length information. This value takes that into account.

Memory used preparing for data access

```
memoryUsedPreparingForDataAccess
 = variationAmount x (max_connections + autovacuum_max_workers + 4)

  where variationAmount = shared_buffers / 8KB x 4 bytes
      (note that 8KB is the page length, and 4 bytes is the size of page management data)
```

This formula evaluates to the memory required to access the database cache in the shared memory.
In the formula above, among the processes that perform roles specific to servers, 4 is the number of processes that access the database.

F.2 Database Multiplexing Memory Requirements

This section describes the formula for estimating database multiplexing memory requirements for the database server.

Use the following formula to obtain a rough estimate of memory required for database multiplexing:

```
Memory usage of the database multiplexing feature for the database server
           = Peak memory usage of the Mirroring Controller processes
           + Peak memory usage of the Mirroring Controller commands

Peak memory usage of the Mirroring Controller processes=150 MB

Peak memory usage of the Mirroring Controller commands=50 MB x Number of commands executed
simultaneously
```

F.3 VCI Memory Requirements

This section describes the formula for estimating VCI memory requirements.

Use the following formula to obtain a rough estimate of memory requirements:

```
memUsedByVci = memForData + memForEachProcess
```

Memory required to store data in memory

Secure the space estimated using the formula below on the stable buffer (part of shared_buffers).

```
memForData = (numOfRowsInTables) x (numOfBytesPerRow) + (wosSize)
```

Number of bytes per row

```
numOfBytesPerRow
 = (19 + (numOfColsInCreateIndexStatement) / 8 + (numOfBytesPerSingleColValue)) x 1.1
```

Note: Round up the result to the nearest integer.

WOS size

```
wosSize = (numOfWosRows) / 185 x 8096
```

One row is added to the number of WOS rows for each INSERT and DELETE, and two rows are added for UPDATE. On the other hand, the number decreases to 520,000 rows or less during conversion to ROS performed by the ROS control daemon.

Memory required for each process

```
memForEachProcess
 = memUsedPerScanning
 + memUsedForVciMaintenace
 + memUsedByCreateIndexStatement
```

Memory used per scanning

- Parallel scan

```
memUsedPerScanning
 = vci.shared_work_mem + (numOfParallelWorkers + 1) x vci.maintenance_work_mem
```

Note: The number of parallel workers used by VCI simultaneously in the entire instance is equal to or less than vci.max_parallel_degree.

- Non-parallel scan

```
memUsedPerScanning = vci.max_local_ros + vci.maintenance_work_mem
```

Note

- vci.shared_work_mem, and vci.max_local_ros are used to create local ROS. If local ROS exceeds these sizes, execute a query without using VCI according to the conventional plan.
- vci.maintenance_work_mem specifies the memory size to be secured dynamically. If it exceeds the specified value, a disk temporary file is used for operation.

Memory used for VCI maintenance

```
memUsedForVciMaintenace = vci.maintenance_work_mem x vci.control_max_workers
```

Memory used by CREATE INDEX

```
memUsedByCreateIndexStatement = vci.maintenance_work_mem
```

Note

vci.maintenance_work_mem specifies the memory to be secured dynamically. If it exceeds the specified value, a disk temporary file is used for operation.

F.4 High-Speed Data Load Memory Requirements

This section describes the formula for estimating memory requirements for the high-speed data load feature.

Use the following formula to obtain a rough estimate of memory requirements:

```
Memory usage of high speed data load
 = (Peak memory usage of pgx_loader processes + Peak memory usage of the pgx_loader commands)
 x Number of commands executed simultaneously

Peak memory usage of pgx_loader processes
 = Peak memory usage of the backend process   (6 MB)
 + Peak memory usage of parallel workers       (6 MB x number of parallel workers)
 + Peak memory usage of dynamic shared memory (80 MB x number of parallel workers)

Peak memory usage of the pgx_loader commands=9 MB
```

Point

In addition to the size calculated using the formula above, the database cache on the shared memory estimated using the shared_buffers parameter is consumed according to the size of the data (table and index keys) loaded using this feature. Refer to "E.1 Estimating Table Size Requirements" and "E.2 Estimating Index Size Requirements" for information on estimating an appropriate shared buffers value.

F.5 Global Meta Cache Memory Requirements

This section describes the formula for estimating Global Meta Cache memory requirements.

The memory calculated by "Size of the GMC area" is allocated to the shared memory. The memory calculated by the per-process meta cache management information is allocated to the local memory. Refer to the graphic in "Architecture of Global Meta Cache Feature" in the "Memory usage reduction by Global Meta Cache" in the General Description for more information.

Use the following formula to obtain a rough estimate of memory requirements:

```
Amount of memory used by the Global Meta Cache feature
  = Size of GMC area + Per-process meta cache management information

Size of GMC area = (All user tables x 0.4 KB
     + All user indexes x 0.3 KB
     + All user columns x 0.8 KB) x 1.5 (*1)

Per-process meta cache management information
  = (All user tables + All user indexes + All user columns) x 0.1KB x max_connections x 1.5 (*1)
```

*1) Safety Factor (1.5)
This value takes into account the case where both GMC before and after the change temporarily exist at the same time in shared memory when the table definition is changed or the row of the system catalog is changed.

Appendix G Quantitative Limits

This appendix lists the quantitative limits of FUJITSU Enterprise Postgres.

Table G.1 Length of identifier

Item	Limit
Database name	Up to 63 bytes (*1) (*2)
Schema name	Up to 63 bytes (*1) (*2)
Table name	Up to 63 bytes (*1) (*2)
View name	Up to 63 bytes (*1) (*2)
Index name	Up to 63 bytes (*1) (*2)
Tablespace name	Up to 63 bytes (*1) (*2)
Cursor name	Up to 63 bytes (*1) (*2)
Function name	Up to 63 bytes (*1) (*2)
Aggregate function name	Up to 63 bytes (*1) (*2)
Trigger name	Up to 63 bytes (*1) (*2)
Constraint name	Up to 63 bytes (*1) (*2)
Conversion name	Up to 63 bytes (*1) (*2)
Role name	Up to 63 bytes (*1) (*2)
Cast name	Up to 63 bytes (*1) (*2)
Collation sequence name	Up to 63 bytes (*1) (*2)
Encoding method conversion name	Up to 63 bytes (*1) (*2)
Domain name	Up to 63 bytes (*1) (*2)
Extension name	Up to 63 bytes (*1) (*2)
Operator name	Up to 63 bytes (*1) (*2)
Operator class name	Up to 63 bytes (*1) (*2)
Operator family name	Up to 63 bytes (*1) (*2)
Rewrite rule name	Up to 63 bytes (*1) (*2)
Sequence name	Up to 63 bytes (*1) (*2)
Text search settings name	Up to 63 bytes (*1) (*2)
Text search dictionary name	Up to 63 bytes (*1) (*2)
Text search parser name	Up to 63 bytes (*1) (*2)
Text search template name	Up to 63 bytes (*1) (*2)
Data type name	Up to 63 bytes (*1) (*2)
Enumerator type label	Up to 63 bytes (*1) (*2)

*1: This is the character string byte length when converted by the server character set character code.

*2: If an identifier that exceeds 63 bytes in length is specified, the excess characters are truncated and it is processed.

Table G.2 Database object

Item	Limit
Number of databases	Less than 4,294,967,296 (*1)

Item	Limit
Number of schemas	Less than 4,294,967,296 (*1)
Number of tables	Less than 4,294,967,296 (*1)
Number of views	Less than 4,294,967,296 (*1)
Number of indexes	Less than 4,294,967,296 (*1)
Number of tablespaces	Less than 4,294,967,296 (*1)
Number of functions	Less than 4,294,967,296 (*1)
Number of aggregate functions	Less than 4,294,967,296 (*1)
Number of triggers	Less than 4,294,967,296 (*1)
Number of constraints	Less than 4,294,967,296 (*1)
Number of conversion	Less than 4,294,967,296 (*1)
Number of roles	Less than 4,294,967,296 (*1)
Number of casts	Less than 4,294,967,296 (*1)
Number of collation sequences	Less than 4,294,967,296 (*1)
Number of encoding method conversions	Less than 4,294,967,296 (*1)
Number of domains	Less than 4,294,967,296 (*1)
Number of extensions	Less than 4,294,967,296 (*1)
Number of operators	Less than 4,294,967,296 (*1)
Number of operator classes	Less than 4,294,967,296 (*1)
Number of operator families	Less than 4,294,967,296 (*1)
Number of rewrite rules	Less than 4,294,967,296 (*1)
Number of sequences	Less than 4,294,967,296 (*1)
Number of text search settings	Less than 4,294,967,296 (*1)
Number of text search dictionaries	Less than 4,294,967,296 (*1)
Number of text search parsers	Less than 4,294,967,296 (*1)
Number of text search templates	Less than 4,294,967,296 (*1)
Number of data types	Less than 4,294,967,296 (*1)
Number of enumerator type labels	Less than 4,294,967,296 (*1)
Number of default access privileges defined in the ALTER DEFAULT PRIVILEGES statement	Less than 4,294,967,296 (*1)
Number of large objects	Less than 4,294,967,296 (*1)
Number of index access methods	Less than 4,294,967,296 (*1)

*1: The total number of all database objects must be less than 4,294,967,296.

Table G.3 Schema element

Item	Limit
Number of columns that can be defined in one table	From 250 to 1600 (according to the data type)
Table row length	Up to 400 gigabytes
Number of columns comprising a unique constraint	Up to 32 columns
Data length comprising a unique constraint	Less than 2,000 bytes (*1) (*2)

Item	Limit
Table size	Up to 32 terabyte
Search condition character string length in a trigger definition statement	Up to 800 megabytes (*1) (*2)
Item size	Up to 1 gigabyte

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: This is the character string byte length when converted by the server character set character code.

Table G.4 Index

Item	Limit
Number of columns comprising a key (including VCI)	Up to 32 columns
Key length (other than VCI)	Less than 2,000 bytes (*1)

*1: This is the character string byte length when converted by the server character set character code.

Table G.5 Data types and attributes that can be handled

Item			Limit
Character	Data length		Data types and attributes that can be handled (*1)
	Specification length (n)		Up to 10,485,760 characters (*1)
Numeric	External decimal expression		Up to 131,072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Internal binary expression	2 bytes	From -32,768 to 32,767
		4 bytes	From -2,147,483,648 to 2,147,483,647
		8 bytes	From -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
	Internal decimal expression		Up to 13,1072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Floating point expression	4 bytes	From -3.4E+38 to -7.1E-46, 0, or from 7.1E-46 to 3.4E+38
		8 bytes	From -1.7E+308 to -2.5E-324, 0, or from 2.5E-324 to 1.7E+308
bytea			Up to one gigabyte minus 53 bytes
Large object			Up to 4 terabyte

*1: This is the character string byte length when converted by the server character set character code.

Table G.6 Function definition

Item	Limit
Number of arguments that can be specified	Up to 100
Number of variable names that can be specified in the declarations section	No limit
Number of SQL statements or control statements that can be specified in a function processing implementation	No limit

Table G.7 Data operation statement

Item	Limit
Maximum number of connections for one process in an application (remote access)	4,000 connections
Number of expressions that can be specified in a selection list	Up to 1,664
Number of tables that can be specified in a FROM clause	No limit
Number of unique expressions that can be specified in a selection list/ DISTINCT clause/ORDER BY clause/GROUP BY clause within one SELECT statement	Up to 1,664
Number of expressions that can be specified in a GROUP BY clause	No limit
Number of expressions that can be specified in an ORDER BY clause	No limit
Number of SELECT statements that can be specified in a UNION clause/INTERSECT clause/EXCEPT clause	Up to 4,000 (*1)
Number of nestings in joined tables that can be specified in one view	Up to 4,000 (*1)
Number of functions or operator expressions that can be specified in one expression	Up to 4,000 (*1)
Number of expressions that can be specified in one row constructor	Up to 1,664
Number of expressions that can be specified in an UPDATE statement SET clause	Up to 1,664
Number of expressions that can be specified in one row of a VALUES list	Up to 1,664
Number of expressions that can be specified in a RETURNING clause	Up to 1,664
Total expression length that can be specified in the argument list of one function specification	Up to 800 megabytes (*2)
Number of cursors that can be processed simultaneously by one session	No limit
Character string length of one SQL statement	Up to 800 megabytes (*1) (*3)
Number of input parameter specifications that can be specified in one dynamic SQL statement	No limit
Number of tokens that can be specified in one SQL statement	Up to 10,000
Number of values that can be specified as a list in a WHERE clause IN syntax	No limit
Number of expressions that can be specified in a USING clause	No limit
Number of JOINs that can be specified in a joined table	Up to 4,000 (*1)
Number of expressions that can be specified in COALESCE	No limit
Number of WHEN clauses that can be specified for CASE in a simple format or a searched format	No limit
Data size per record that can be updated or inserted by one SQL statement	Up to one gigabyte minus 53 bytes
Number of objects that can share a lock simultaneously	Up to 256,000 (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: The total number of all database objects must be less than 4,294,967,296.

*3: This is the character string byte length when converted by the server character set character code.

Table G.8 Data size

Item	Limit
Data size per record for input data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)
Data size per record for output data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

Appendix H Configuring Kernel Parameters

Use the "System V IPC Parameters" table in "Managing Kernel Resources" in the PostgreSQL Documentation for the relationship between configuration parameters and kernel parameters, as well as calculation formulas.
Refer to the "Managing Kernel Resources" in the PostgreSQL Documentation to calculate shared memory usage.

For multiple instances, the kernel parameters should be evaluated for all instances. For example, in the case of the maximum number of shared memory segments for the entire system (SHMMNI), the total number of segments obtained by all instances should be added to the kernel parameters. In the case of the maximum number of semaphores for each process (SEMMSL), the largest of all sizes obtained by all instances should be compared to the current value prior to configuring the settings.

Note

If there is insufficient shared memory due to miscalculation of SHMMAX, a message will be output indicating that the shmget system call failed at "errno=22 (EINVAL)". Review the calculation, and reconfigure.

The relationship between System V IPC parameters and kernel parameters in various operating systems is shown below.

System	V IPC parameter	Kernel parameter action
SHMMAX	kernel.shmmax	If *currentValue* < *calculatedValue*, configure the calculated value
SHMMIN	No compatible parameter	
SHMALL	kernel.shmall	Specify *currentValue* + *calculatedValue*
SHMSEG	No compatible parameter	
SHMMNI	kernel.shmmni	Specify *currentValue* + *calculatedValue*
SEMMNI	Fourth parameter of kernel.sem	Specify *currentValue* + *calculatedValue*
SEMMNS	Second parameter of kernel.sem	Specify *currentValue* + *calculatedValue*
SEMMSL	First parameter of kernel.sem	If *currentValue* < *calculatedValue*, configure the calculated value
SEMMAP	No compatible parameter	
SEMVMX	No compatible parameter	

Remark 1: kernel.shmall specifies the number of pages.
Remark 2: Specify all four parameters for kernel.sem. At this time, the value specified in the third parameter should be the same value as before configuration.

Appendix I Determining the Preferred WebAdmin Configuration

This appendix describes the two different configurations in which WebAdmin can be used and how to select the most suitable configuration.

I.1 WebAdmin Configurations

WebAdmin can be installed in two configurations:

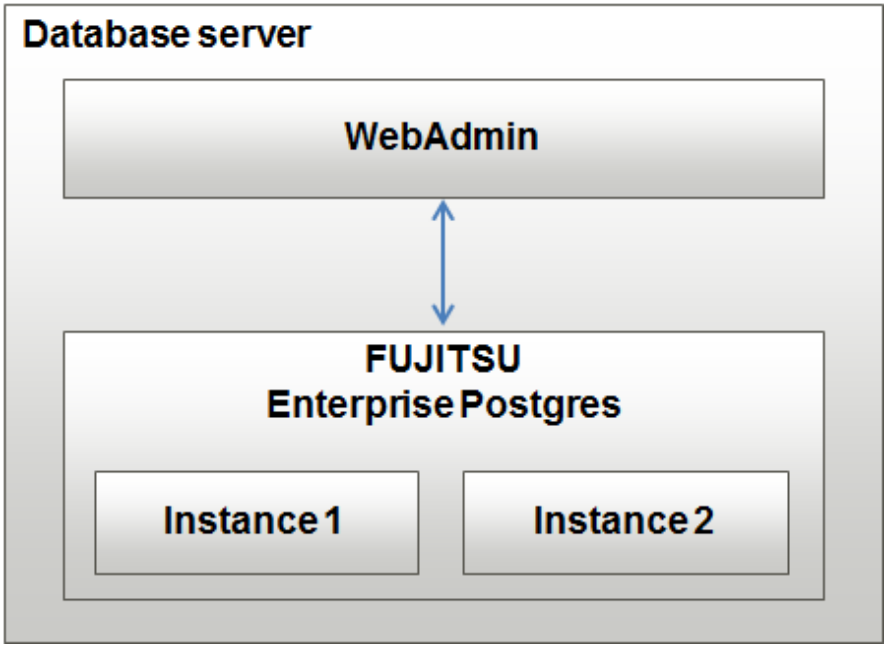
- Single-server
- Multiserver

WebAdmin does not support encrypted communication between browser and server or between servers. Therefore, when using WebAdmin in either configuration, build the communication path with the browser or each server on a network that cannot be accessed externally.

I.1.1 Single-Server Configuration

A single-server configuration enables you to create and operate instances on a single server. In this configuration, WebAdmin must be installed on the same database server as the FUJITSU Enterprise Postgres Server component.

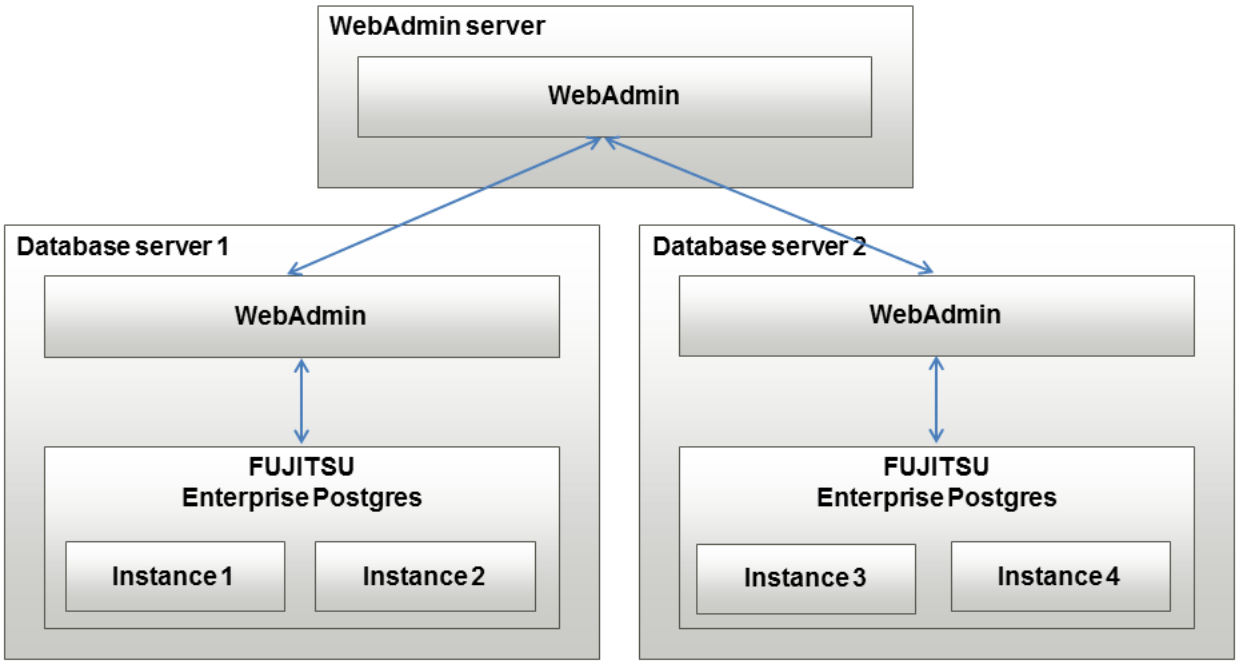
Single-server configuration



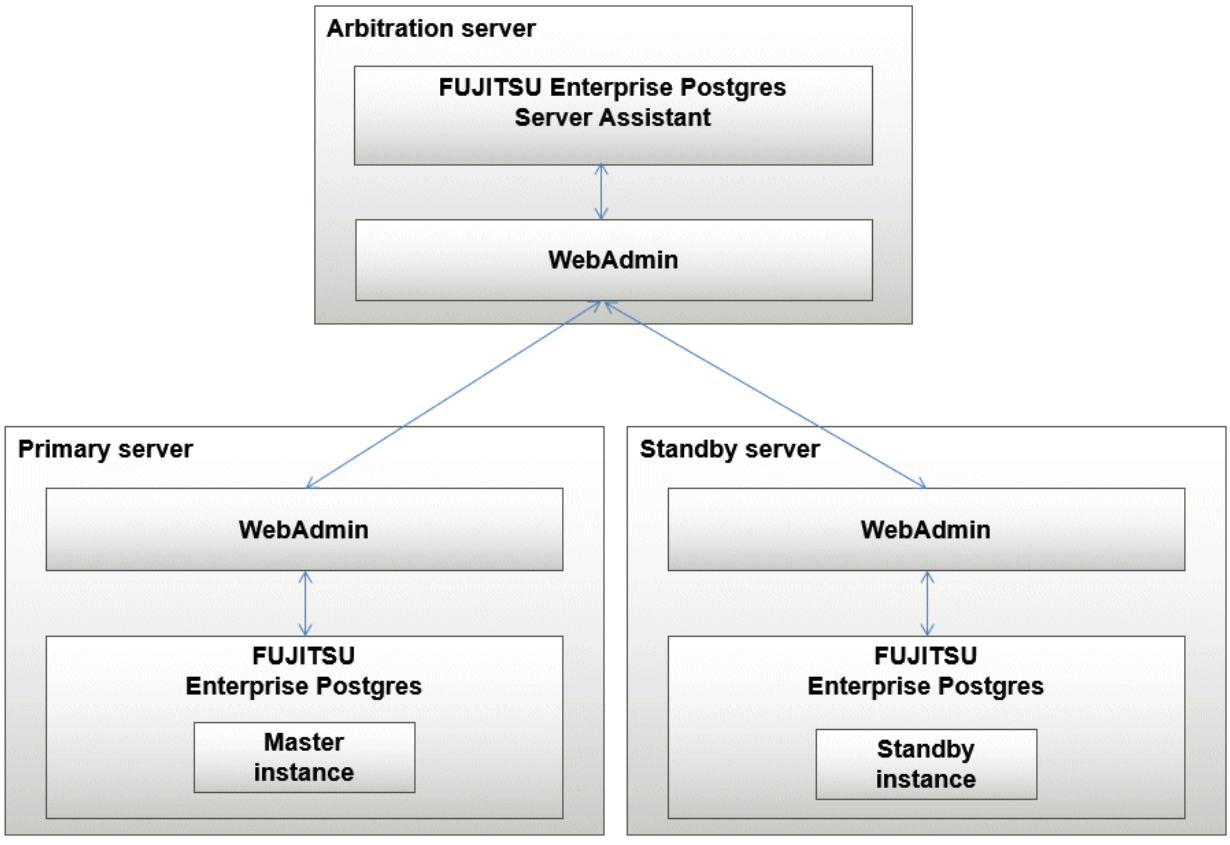
I.1.2 Multiserver Configuration

A multiserver configuration enables you to create and operate instances stored on multiple database servers. As shown in the figure below, WebAdmin can be installed on a dedicated WebAdmin server and used to collectively manage the instances stored on the database servers.

Multiserver configuration



Also, when setting up the arbitration server by WebAdmin during database multiplexing mode, install WebAdmin on the arbitration server.



I.2 Installing WebAdmin in a Single-Server Configuration

To install WebAdmin in a single-server configuration, the FUJITSU Enterprise Postgres Server component and WebAdmin must be installed on the same machine.

Select the following items when installing FUJITSU Enterprise Postgres in a single-server configuration:

- FUJITSU Enterprise Postgres Advanced Edition or FUJITSU Enterprise Postgres Standard Edition
- WebAdmin

I.3 Installing WebAdmin in a Multiserver Configuration

In a multiserver configuration, install WebAdmin on one server, and both WebAdmin and the FUJITSU Enterprise Postgres Server component on any number of database servers.

Select the following items when installing FUJITSU Enterprise Postgres in a multiserver configuration:

- WebAdmin server:
  - WebAdmin
- Database server:
  - FUJITSU Enterprise Postgres Advanced Edition or FUJITSU Enterprise Postgres Standard Edition
  - WebAdmin

Also, when setting up the arbitration server by WebAdmin during database multiplexing mode, select the following when installing FUJITSU Enterprise Postgres.

- Arbitration server
  - FUJITSU Enterprise Postgres Server Assistant
  - WebAdmin

See

Refer to the Installation and Setup Guide for Server Assistant for details on how to install the Server Assistant.

Appendix J System Configuration when using Pgpool-II

Describes the system configuration when using Pgpool-II.

The system configuration when using Pgpool-II is as follows:

Place on database server

System configuration to coexist the database server with Pgpool-II.

Place on application server

System configuration to coexist the application server with Pgpool-II.

Place on dedicated server

System configuration in which Pgpool-II resides on a dedicated server (Pgpool-II Server) that is separate from the database and application servers.

Select the system configuration that best meets your operational requirements.

J.1 Pgpool-II Configuration

In this example, Pgpool-II is deployed on a different Pgpool-II server than the database and application servers.

There are three configurations of Pgpool-II:

- Single-machine configuration
- Two-machine configuration
- Three-machine configuration

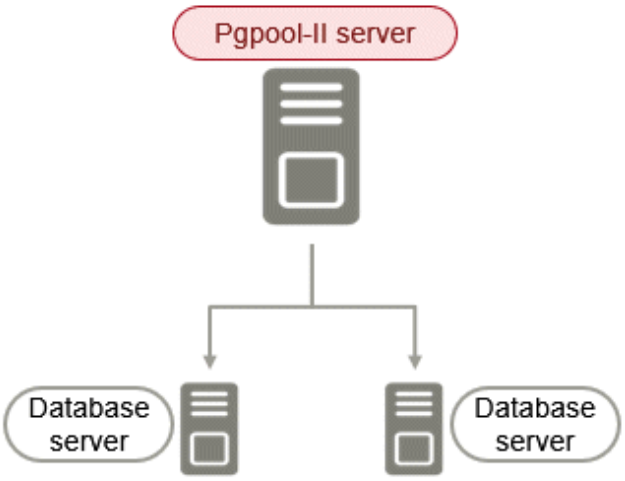
Although the Pgpool-II server can be operated on a single machine, to ensure business continuity, it is recommended to operate the Pgpool-II server using a three-machine configuration in FUJITSU Enterprise Postgres.

If employing a configuration of three or more machines, use an odd number of machines in the configuration.

J.1.1 Single-Machine Configuration

This is the basic configuration when running Pgpool-II.

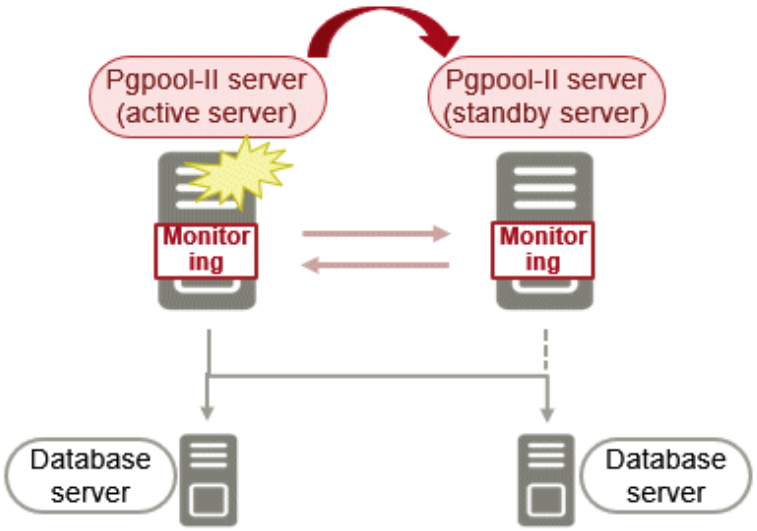
Although the database server has redundancy, if an error occurs on the Pgpool-II server that accesses the database server, the job will stop.



J.1.2 Two-Machine Configuration

When an error occurs on the active server, the Pgpool-II monitoring feature that mutually monitors the status of the Pgpool-II servers enables jobs to continue uninterrupted by switching to the standby server.

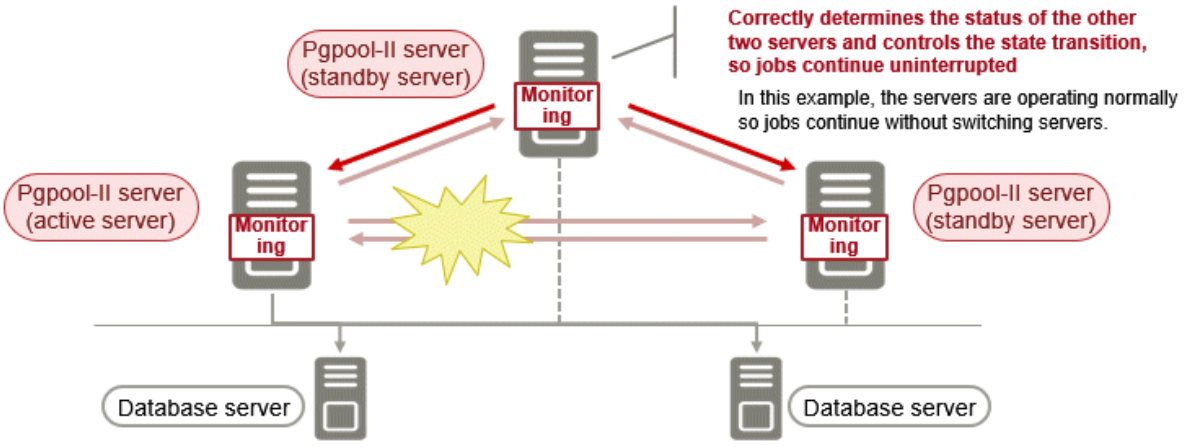
If the network between Pgpool-II servers is disconnected, even if the Pgpool-II servers are running correctly, which may lead to stoppage of jobs.



J.1.3 Three-Machine Configuration

The Pgpool-II monitoring feature enables a Pgpool-II server to monitor the other two Pgpool-II servers.

Even if any of the networks monitoring the Pgpool-II servers are disconnected, the status of servers on a network that is operating normally can be checked correctly, enabling accurate continuation of jobs.



J.2 Installing Pgpool-II

Pgpool-II is bundled with the server program and the client program. To use Pgpool-II, use the server program or the client program to install and set up Pgpool-II.

Depending on where Pgpool-II is installed, select the appropriate DVD for deployment:

Installing on Database Server (coexist)

Install the Pgpool-II program along with the server program from the server program DVD.

Installing on Application Server (coexist)

Install the Pgpool-II program along with the client program from the client program DVD.

Installing on Dedicated server different from the above (Pgpool-II server)

Install the Pgpool-II program along with the client program from the client program DVD.

Appendix K Supported contrib Modules and Extensions Provided by External Projects

FUJITSU Enterprise Postgres supports PostgreSQL contrib modules, and extensions provided by external projects.

Refer to the following for details on the supported contrib modules:

- "Additional Supplied Modules" in the PostgreSQL Documentation
- "Additional Supplied Programs" in the PostgreSQL Documentation

Information

You can also check the list of available extensions using the pg_available_extensions view.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for information on supported extensions provided by external projects.

Appendix L Procedure when Modifying the JRE Installation

This appendix describes the procedures to follow when modifying the JRE installation.

The JRE, of which the installation destination is specified in the JAVA_HOME environment variable when installing FUJITSU Enterprise Postgres, is used by features such as WebAdmin and database multiplexing.

Therefore, when updating or reinstalling JRE after installing FUJITSU Enterprise Postgres, the procedures below must be performed.

L.1 When Using WebAdmin

WebAdmin must be set up again.

Follow the procedure below to modify the JRE installation:

1. Stop the Web server feature of WebAdmin

   Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.

2. Remove WebAdmin

   Refer to "B.2 Removing WebAdmin" for details.

3. Modify the JRE installation

4. Set the JAVA_HOME environment variable

   Set the JAVA_HOME environment variable to the installation destination of JRE 8.

   Example

   ```
   # export JAVA_HOME="Jre8InstallDir"
   ```

5. Set up WebAdmin

   Refer to "B.1.1 Setting Up WebAdmin" for details.

6. Start the Web server feature of WebAdmin

   Refer to "B.1.2 Starting the Web Server Feature of WebAdmin" for details.

L.2 When Performing Database Multiplexing

Mirroring Controller must be restarted.

Follow the procedure below to modify the JRE installation:

1. Stop Mirroring Controller

   Refer to the Cluster Operation Guide (Database Multiplexing) for details.

2. Modify the JRE installation

3. Change the installation environment to be used by Mirroring Controller

   If database multiplexing is performed using WebAdmin, perform the procedure described in this procedure after performing step 4 "Set the JAVA_HOME environment variable" in "When Using WebAdmin".

   Set the JAVA_HOME environment variable to the installation destination of JRE 8, and use the mc_update_jre_env command to change the installation environment to be used by Mirroring Controller.
   This procedure must be executed by the superuser.

Example

/opt/fsepv<*x*>server64/bin is the installation directory where the server product is installed.

```
$ su -
Password:******
# export JAVA_HOME="Jre8InstallDir"
# /opt/fsepv<x>server64/bin/mc_update_jre_env
```

4. Start Mirroring Controller

   Refer to the Cluster Operation Guide (Database Multiplexing) for details.

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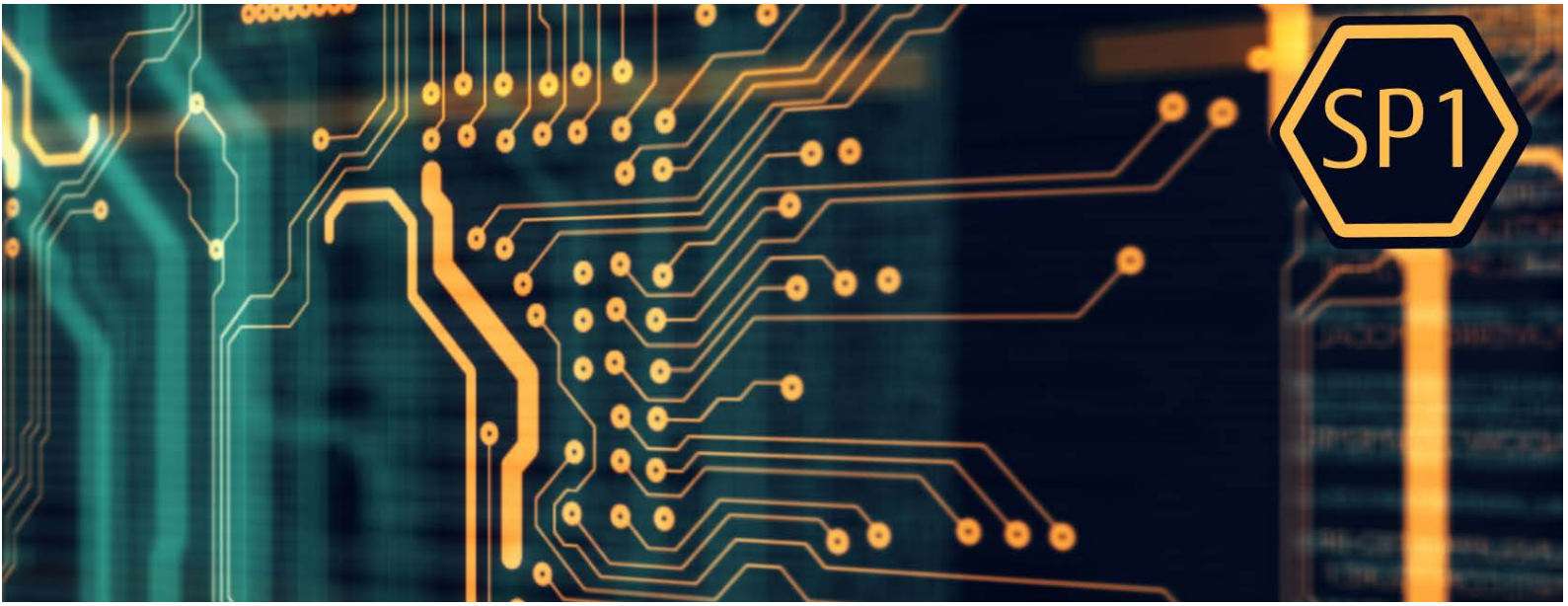

Installation and Setup Guide for Server

(Windows)

Windows

B1WS-1483-02ENZ0(00)
August 2021

Preface

Purpose of this document

The FUJITSU Enterprise Postgres database system extends the PostgreSQL features and runs on the Windows platform.

This document describes how to install and set up "FUJITSU Enterprise Postgres".

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

- PostgreSQL
- SQL
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Installation

Describes the installation types and procedures

Chapter 2 Operating Environment

Describes the operating environment required to use FUJITSU Enterprise Postgres

Chapter 3 Installation

Describes how to perform a new installation of FUJITSU Enterprise Postgres

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Describes how to uninstall FUJITSU Enterprise Postgres

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Describes the recommended WebAdmin environment

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Describes how to set up and remove WebAdmin

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Appendix G Quantitative Limits

Describes the quantity range

Appendix H Determining the Preferred WebAdmin Configuration

Describes the two different configurations in which WebAdmin can be used and how to select the most suitable configuration

Appendix I Supported contrib Modules and Extensions Provided by External Projects

Lists the PostgreSQL contrib modules and the extensions provided by external projects supported by FUJITSU Enterprise Postgres.

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Chapter 1 Overview of Installation

This chapter provides an overview of FUJITSU Enterprise Postgres installation.

1.1 Features that can be Installed

Each FUJITSU Enterprise Postgres feature is installed on the machine that was used to build the database environment.

The following table shows the relationship between the product to be installed and the features that can be installed.

Feature that can be installed	Product name	
	AE	SE
Basic feature (server feature, client feature)	Y	Y

Y: Can be installed

1.2 Installation Types

The following installation types are available for FUJITSU Enterprise Postgres:

- New installation
- Reinstallation
- Multi-version installation

1.2.1 New Installation

In initial installation, FUJITSU Enterprise Postgres is installed for the first time.

1.2.2 Reinstallation

Perform reinstallation to repair installed program files that have become unusable for any reason.

1.2.3 Multi-Version Installation

FUJITSU Enterprise Postgres products can be installed on the same server if the product version (indicated by "*x*" in "*x* SP*z*") is different from that of any version of the product that is already installed.

1.3 Installation Procedure

The following installation procedures are available for FUJITSU Enterprise Postgres:

- Installation in interactive mode
- Installation in silent mode

Select the installation procedure that corresponds to your environment.

Note

If you have antivirus software installed, the server may crash, fail to start, or stop responding, during installation or when starting up after installation. Set scan exception settings for the installation directory and resource allocation directory so that the files in these directories are not scanned for viruses.

1.3.1 Installation in Interactive Mode

Interactive mode enables installation to be performed while the required information is entered interactively.

In the interactive mode installation, the installation state of FUJITSU Enterprise Postgres is determined automatically. Install FUJITSU Enterprise Postgres using one of the following installation types in accordance with the installation state:

- New installation
- Reinstallation
- Multi-version installation

1.3.2 Installation in Silent Mode

Silent mode enables installation to be performed without the need to enter any information interactively.

New installations and multi-version installations can be performed in silent mode.

1.4 Uninstallation

Uninstallation removes the system files of the installed FUJITSU Enterprise Postgres.

Chapter 2 Operating Environment

This chapter describes the operating environment required to use FUJITSU Enterprise Postgres.

See

Refer to "Operating Environment" in the Installation and Setup Guide for Client when installing the FUJITSU Enterprise Postgres client feature at the same time.

2.1 Required Operating System

One of the operating systems shown below is required in order to use FUJITSU Enterprise Postgres.

Table 2.1 Operating systems

Operating system name
- Microsoft(R) Windows Server(R) 2016 Datacenter - Microsoft(R) Windows Server(R) 2016 Standard - Microsoft(R) Windows Server(R) 2016 Essentials
- Microsoft(R) Windows Server(R) 2019 Datacenter - Microsoft(R) Windows Server(R) 2019 Standard - Microsoft(R) Windows Server(R) 2019 Essentials

Note

- The following components of Windows Server(R) 2016 and Windows Server(R) 2019 are not supported:
  - Server Core
  - Nano Server
  - Windows Server Container
- The TCP/IP protocol must be installed.

2.2 Related Software

The following table lists the software required to use FUJITSU Enterprise Postgres.

Table 2.2 Related software

No.	Software name	Version	Product name of FUJITSU Enterprise Postgres		Remarks
			AE	SE	
1	Visual Studio	2015 2017 2019	Y	Y	Required when using applications that are developed in Visual Studio.
2	.NET Framework	4.6.1 or later 4.7/4.7.x 4.8	Y	Y	
3	Perl	5.26	Y	Y	Required when using PL/Perl.

No.	Software name	Version	Product name of FUJITSU Enterprise Postgres		Remarks
			AE	SE	
4	Python	3.9.x	Y	Y	Required when using PL/Python based on Python 3.
5	Tcl	8.6	Y	Y	Required when using PL/Tcl.

Y: Can be used

Note

- The following programs are installed during installation of FUJITSU Enterprise Postgres:
  - Microsoft Visual C++ 2015-2019 Redistributable version 14.24.28127.4

  Do not uninstall the above programs as they are required for running FUJITSU Enterprise Postgres.

The following table lists servers that can be connected to the FUJITSU Enterprise Postgres client feature.

Table 2.3 Connectable servers

OS	Product name
Windows Linux	- FUJITSU Software Enterprise Postgres Advanced Edition 9.5 or later - FUJITSU Software Enterprise Postgres Standard Edition 9.4 or later
Solaris	- FUJITSU Software Enterprise Postgres Standard Edition 9.6 or later

2.3 Excluded Software

This section describes excluded software.

FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres cannot be installed if all the following conditions are met:

- The product version (indicated by "*x*" in "*x* SP*z*") of the product to be installed is the same as that of the installed product
- The editions are different

Example

In the following cases, FUJITSU Enterprise Postgres cannot be installed as an exclusive product:

- The installed product is FUJITSU Software Enterprise Postgres Standard Edition (64bit) 13
- The product to be installed is FUJITSU Software Enterprise Postgres Advanced Edition (64bit) 13

Other products

There are no exclusive products.

2.4 Required Patches

There are no required patches.

2.5 Hardware Environment

The following hardware is required to use FUJITSU Enterprise Postgres.

Memory

256 MB or more is recommended (at least 128 MB is required).

2.6 Disk Space Required for Installation

The following table shows the disk space requirements for new installation of FUJITSU Enterprise Postgres. If necessary, increase the size of the file system.

Table 2.4 Disk space required for installation

Directory	Required disk space (Unit: MB)
Windows system drive	7 + 266 (*1) + 18 (*2)
Installation destination of the Server	705
Installation destination of the WebAdmin	700
Installation destination of the Client (32bit)	467
Installation destination of the Client (64 bit)	485

*1: Required for the installation of the Uninstall (middleware) tool.

*2: Required for the installation of FJQSS.

2.7 Supported System Environment

This section describes the supported system environment.

2.7.1 TCP/IP Protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

2.7.2 File System

You can install FUJITSU Enterprise Postgres only if the system folder is an NTFS volume.

2.8 PostgreSQL Version Used for FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres is based on PostgreSQL 13.3.

2.9 Notes on Using Streaming Replication

To use streaming replication, build the primary server and all standby servers using the same FUJITSU Enterprise Postgres version (*1).

*1: The product version is indicated by "*x*" in the notation "*x* SP*z*".

Note

Streaming replication cannot be used in combination with Open Source PostgreSQL.

Chapter 3 Installation

This chapter describes the procedures for the installation of FUJITSU Enterprise Postgres.

Note

- The installation must be performed by a user with administrator privileges (a user ID that belongs to the Administrators group).
- Stop all applications before starting the installation.
- The Windows Installer service must be running.
- The remote desktop service is installed in application server mode, it is necessary to switch to install mode by executing the command shown below before installation. Also, after the installation is completed, execute the command shown below to switch back to execute mode.

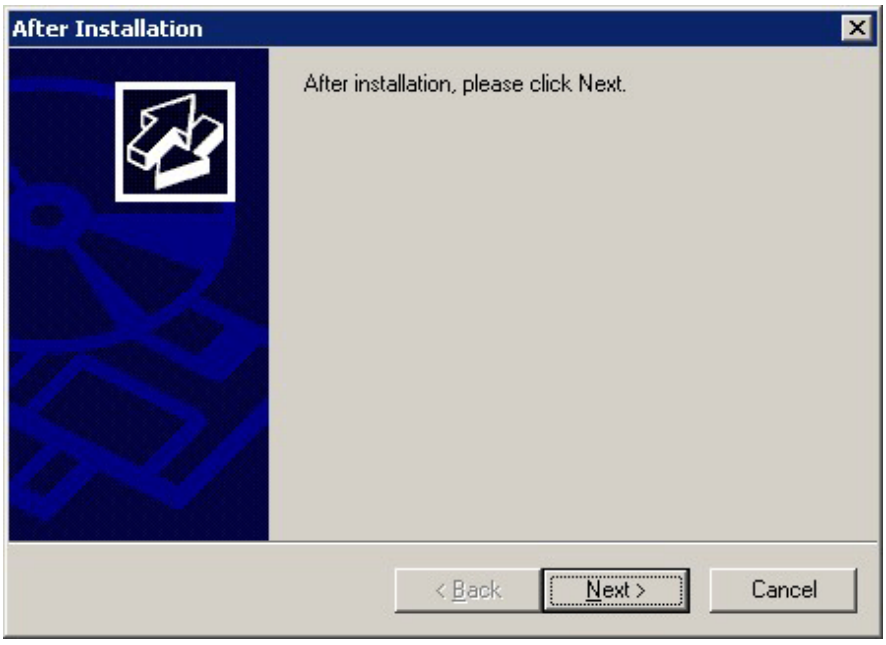
  [Before the installation]

```
CHANGE USER /INSTALL
```

  [After the installation]

```
CHANGE USER /EXECUTE
```

- When installing the Fujitsu Enterprise Postgres Client (32 bit), do not specify a destination folder under the environment ProgramFiles variable.
- The following window may be displayed when executing the installation program:



If this window is displayed, perform the following operations:

1. Perform the installation steps until the [InstallShield Wizard Complete] window is displayed.
2. At the window shown above, click [Next].

3. The window shown below is displayed. Click [Finish].

Information

- If a [User Account Control] dialog box is displayed at the start of the installation, click [Yes] to continue processing:

  If [No] is clicked, permission to continue is denied and an [Error] dialog box will be displayed.
  To continue the installation, click [Retry] at the [Error] dialog box. To end the installation, click [Cancel].

- If installation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed. Click [This program installed correctly] and continue operation.

3.1 Pre-installation Tasks

Check the system environment below before installing FUJITSU Enterprise Postgres.

Check the disk space

Ensure that there is sufficient disk space to install FUJITSU Enterprise Postgres.

Refer to "2.6 Disk Space Required for Installation" for information on the required disk space.

Check the installed products and determine the installation method

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)]. In the displayed window, check the installed products.

If FUJITSU Enterprise Postgres is already installed, determine which installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation as the installation method, remove applied updates using the procedure shown below.

Note

If a product is installed without removing applied updates, the following problems will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
C:\>uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
C:\>uam remove -i update-number
```

Determine the preferred WebAdmin configuration

Starting with FUJITSU Enterprise Postgres 9.5, WebAdmin can be installed in two configurations:

- Single-server
- Multiserver

See

Refer to "Appendix H Determining the Preferred WebAdmin Configuration" for details.

3.2 Installation in Interactive Mode

The installation must be performed by a user with administrator privileges (a user ID that belongs to the Administrators group).

Note

When reinstalling the product, back up the following folder in which the WebAdmin instance management information is stored:

webAdminInstallFolder\data\fepwa

Follow the procedure below to perform the backup.

1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
2. Back up the following folder:

   webAdminInstallFolder\data\fepwa

Replace the above folder with the backed up folder when the reinstallation is complete.

Point

For installation in interactive mode, default values are set for the installation information. The following settings can be changed for a new installation or a multi-version installation:

- Installation destination
  - It is necessary to specify a local disk as the installation destination of FUJITSU Enterprise Postgres.
  - If using WebAdmin, do not use fullwidth characters or halfwidth katakana characters in [Installation destination folder].
- WebAdmin setup information, if WebAdmin is selected
  To change the port number, confirm that it is an unused port number between 1024 and 49151. Additionally, take note of the Web server port number for the Windows Firewall settings.

The installation procedure is described below.

1. Stop applications and programs

When reinstalling the product, all applications and programs that use the product must be stopped.

Before starting the installation, stop the following:

- Applications that use the product
- Instance
- Web server feature of WebAdmin

  If you are using WebAdmin, stop WebAdmin.

  Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
- Mirroring Controller

  Execute the mc_ctl command with the stop mode option specified and stop the Mirroring Controller.

  Example

  ```
  > mc_ctl stop -M D:\mcdir\inst1
  ```
- pgAdmin

2. Inserting the DVD

Insert the FUJITSU Enterprise Postgres DVD into the drive.

3. Run the installation

The installation menu will be displayed. Click [Installation].

Note

If the Autorun feature of Windows is disabled, or a remote desktop service (terminal service) is used, the installation program is not automatically started. Execute the following file using [Run] or Windows Explorer.

```
Z:\autorun.exe
```

Z: The drive into which the DVD is inserted.

4. Select the products to install

The [Installation product] window will be displayed.

Select the products to install, and then click [Next].

If a selected product can only be reinstalled, refer to "6. Check the settings".

Information

- To develop or execute a 32-bit application in a 64-bit environment, FUJITSU Enterprise Postgres Client (32bit) is required.
- The FUJITSU Enterprise Postgres server component and WebAdmin can be installed on the same machine by selecting the "FUJITSU Enterprise Postgres server component" and the "WebAdmin component".
- If the selected product has been installed, the [Select installation method] window is displayed for each product. To perform a multi-version installation, click [Next].

5. Checking the installation content

The [Confirm installation] window will be displayed.

Click [Next] to start the installation.

To modify the settings, select [Modify], and then click [Next]. Follow the on-screen instructions.

If you have not set up WebAdmin during installation, refer to "Appendix B Setting Up and Removing WebAdmin for details.

Note

If using WebAdmin for operation, make a note of the Web server port number displayed in the settings, for use in the Windows firewall settings.

6. Check the settings

The [Confirm installation] window is displayed for reinstallation, or if the installation information is modified.

Click [Install] to start the installation.

To change any settings, click [Back].

7. Completing installation

The [Installation complete] window is displayed. Click [Finish].

From [All Programs] or [All apps], click [Fujitsu] >> [Uninstall (middleware)]. If the installed product names have been added under [Software Name], installation is complete.

3.3 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

The installation procedure is described below.

1. Insert the DVD

Insert the "server program" DVD in the DVD drive.

The [Install Menu] window will be displayed automatically. Click [Finish].

2. Create an installation parameters CSV file

Consider the features that will be required for system operations, and then create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
    :
```

Note

If using WebAdmin for operation, make a note of the Web server port number displayed in the settings (the port number defined in WebPortNumber1), for use in the Windows firewall settings.

Information

The template for the installation parameters CSV file is "*Z*:\sample\sample.csv" (*Z* is the drive into which the DVD is insered).

3. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

4. Run the installation

Execute the command below.

```
Z:\>silent.bat c:\temp\inspara.csv
```

Z: The drive into which the DVD is inserted.

Also in the example above, c:\temp\inspara.csv is the installation parameter CSV file name.

If the installer ends in an error, a message is output to the log file and return values are returned.

Chapter 4 Setup

This chapter describes the setup procedures to be performed after installation completes.

4.1 Operating Method Types and Selection

This section describes how to operate FUJITSU Enterprise Postgres.

There are two methods of managing FUJITSU Enterprise Postgres operations - select one that suits your purposes:

The Operation Guide describes the operating method using WebAdmin, and the equivalent operating method using the server commands.

Simple operation management using a web-based GUI tool (WebAdmin)

Suitable when using frequently used basic settings and operations for operation management.

This method allows you to perform simple daily tasks such as starting the system before beginning business, and stopping the system when business is over, using an intuitive operation.

Usage method

Usage is started by using WebAdmin to create the instance.

By using an external scheduler and the pgx_dmpall command, periodic backups can be performed, which can then be used in recovery using WebAdmin.

Note

Do not use a server command other than pgx_dmpall and pgx_keystore or a server application. Operation modes that use server commands and server applications cannot be used in conjunction with WebAdmin. If used, WebAdmin will not be able to manage the instances correctly.
In addition, to perform a backup by copy command from the pgx_dmpall command, select the operating method using the server commands.
Refer to Reference and the PostgreSQL Documentation for information on server commands and server applications.

Advanced operation management using server commands

When operating in a system that is automated by operation management middleware (Systemwalker Centric Manager, for example), this method allows you to use more detailed settings and operations and perform higher level operation management.

An overview of the operating method using the GUI, and its relationship with the operating method using the server commands, are shown below.

Refer to the Operation Guide for details.

Operation		Operation with the GUI	Operation with commands
Setup	Creating an instance	WebAdmin is used. The server machine capacity, and the optimum parameter for operations using WebAdmin, are set automatically.	The configuration file is edited directly using the initdb command.
	Creating a standby instance	WebAdmin is used. WebAdmin performs a base backup of the source instance and creates a standby instance.	A standby instance is created using the pg_basebackup command.
	Changing the configuration files	WebAdmin is used.	The configuration file is edited directly.

Operation		Operation with the GUI	Operation with commands
Starting and stopping an instance		WebAdmin is used.	The net command or sc command of the operating system is used.
Creating a database		This is defined using pgAdmin of the GUI tool, or using the psql command or the application after specifying the DDL statement.	
Backing up the database		WebAdmin, or the pgx_dmpall command, is used.	It is recommended that the pgx_dmpall command be used. Recovery to the latest database can be performed.
Database recovery		WebAdmin is used.	To use the backup that was performed using the pgx_dmpall command, the pgx_rcvall command is used.
Monitoring	Database errors	The status in the WebAdmin window can be checked. (*1)	The messages that are output to the database server log are monitored (*1)
	Disk space	The status in the WebAdmin window can be checked. A warning will be displayed if the free space falls below 20%. (*1)	This is monitored using the fsutil command (check free space), and the dir command (check used space), of the operating system, for example. (*1)
	Connection status	This can be checked using pgAdmin of the GUI tool, or referencing pg_stat_activity of the standard statistics view from psql or the application.	

*1: This can be used together with system log monitoring using operations management middleware (Systemwalker Centric Manager, for example).

Refer to "Periodic Operations" and "Actions when an Error Occurs" in the Operation Guide for information on monitoring and database recovery.

4.2 Preparations for Setup

This section describes the preparation required before setting up FUJITSU Enterprise Postgres.

4.2.1 Creating an Instance Administrator

Decide the OS user account that will become the instance administrator. Use either a new user, or a user that already exists.

To create a user in Windows, select [Administrative Tools], [Computer Management], and then create the user in [Local Users and Groups]. Refer to "Help and Support" for details.

The following characters can be used for user names:

- - (hyphen)
- _ (underscore)
- Space
- A-Z, a-z, 0-9 (alphanumeric)

Note

The following notes apply if using WebAdmin for operations:

- The instance administrator must have a local OS user account.
- After creating the user account of the instance administrator, log in to the operating system. A profile directory is created for the user when logging in to the operating system for the first time. This directory will be used by WebAdmin.
- If changing the password for the user account of the instance administrator, always ensure to stop the instance and log out of WebAdmin before making the change. If you mistakenly change the password while logged in to WebAdmin or while the instance is running, log out from WebAdmin, and then log in again, and stop and start the instance.
- If the password is changed for the user account of the instance administrator, set the changed password using ALTER ROLE WITH ENCRYPTED PASSWORD. This will encrypt the password with the default md5 algorithm. To encrypt the password with the scram-sha-256 algorithm, set the password encryption parameter to "scram-sha-256" using SET password_encryption = 'scram-sha-256' prior to using the ALTER ROLE function.

4.2.1.1 Security policy settings

If using commands for operation, security settings that allow logon as a service are required for the operating system user account of the instance administrator in order to start and stop an instance using a Windows service.

Information

If using WebAdmin for operation, these settings are not required as WebAdmin performs the settings automatically for the user ID (operating system user account) that logged in to the database server.

The following explains how to perform the security settings to allow logon as a service:

1. Displaying the Local Security Policy window

   In Windows, select [Administrative Tools], and then click [Local Security Policy].

2. Setting up security

   1. In the [Local Security Policy] window, select [Security Settings], select [Local Policies], and then click [User Rights Assignment].
   2. Under [Policy] in the [User Rights Assignment] window, double-click [Log on as a service].
   3. In the [Log on as a service Properties] window, set the following:
      a. Select the [Local Security Setting] tab.
      b. On the [Local Security Setting] tab, click [Add User or Group].
      c. In the [Select Users or Groups] window, enter the operating system user account of the instance administrator in [Enter the object names to select].
      d. Click [OK].
   4. In the [Log on as a service Properties] window, click [OK].

4.2.2 Preparing Directories for Resource Deployment

Prepare the directories required when creating instances.

Considerations when deploying resources

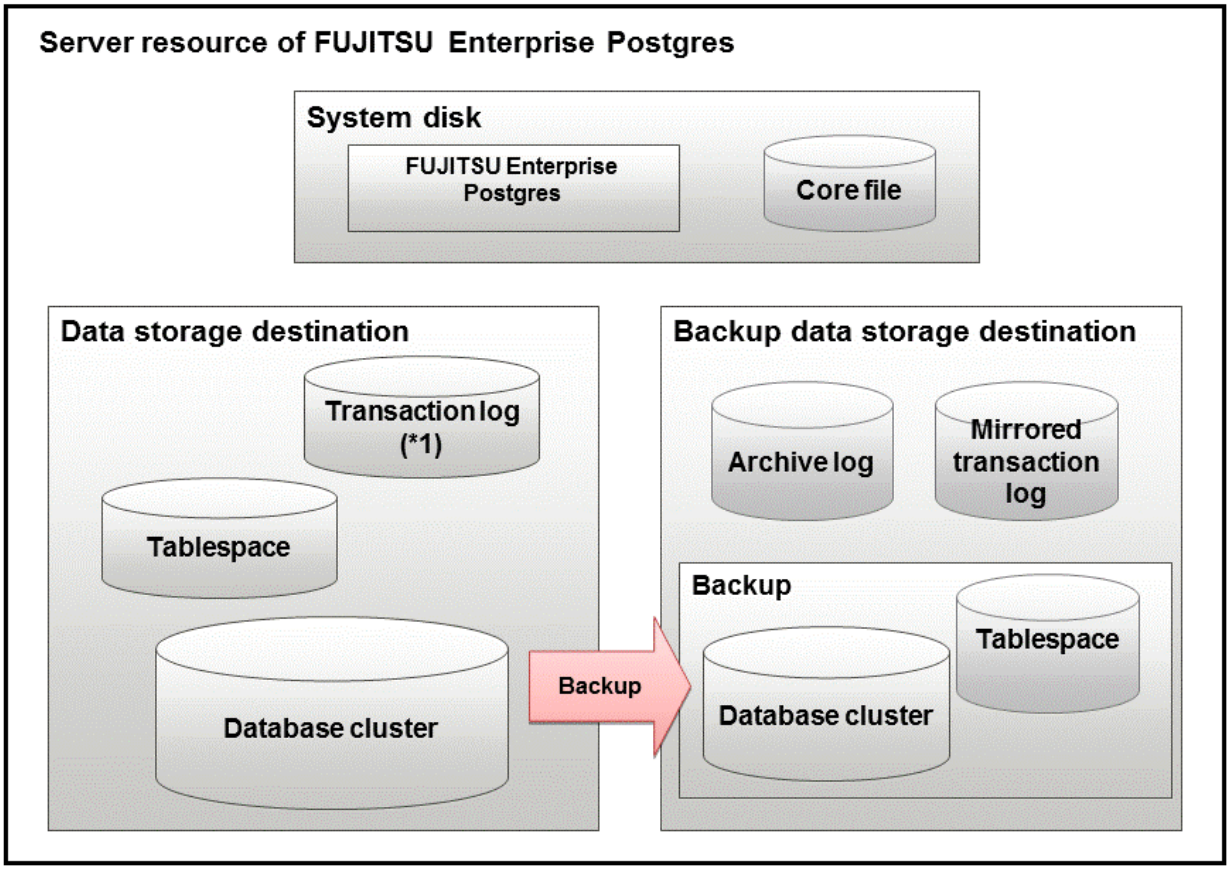
The disk configuration on the resource deployment destination is important, because it affects not only recovery following disk corruption, but normal operation as well. The points for determining the disk configuration are as follows:

1. If the backup data storage destination and the data storage destination are both lost, it will not be possible to recover the data, so deploy them to separate disks.

2. To shorten the recovery time following a single disk fault, deploy the system disk and data storage destination to separate disks.
3. The backup data storage destination requires at least double the capacity of the data storage destination, so deploy it to the disk with the most space available.
4. When large amounts of data are updated, the write-to load for the data storage destination, transaction log storage destination, and backup data storage destination (mirrored transaction log) will also be great. For this reason, deploy them to separate disks, out of consideration for performance.

Note

- When using the volume manager provided by the operating system, be aware of which physical disk the file system has been created on, for example, by deploying the data storage destination and the backup data storage destination to separate disks.
- If using WebAdmin, specify an NTFS volume for the data storage destination and backup data storage destination. A network drive cannot be specified.



*1: To distribute the I/O load, place the transaction log on a different disk from the data storage destination.

Resource	Role
Database cluster	The area where the database is stored. It is a collection of databases managed by an instance.
Tablespace	Stores table files and index files in a separate area from the database cluster. Specify a space other than that under the database cluster.
Transaction log	Stores log information in preparation for a crash recovery or rollback. This is the same as the WAL (Write Ahead Log).

Resource	Role
Archive log	Stores log information for recovery
Mirrored transaction log (mirrored WAL)	Enables a database cluster to be restored to the state immediately before an error even if both the database cluster and transaction log fail when performing backup/recovery operations using the pgx_dmpall command or WebAdmin.
Corefile	FUJITSU Enterprise Postgres process corefile output when an error occurs with a FUJITSU Enterprise Postgres process.

Examples of disk deployment

The following are examples of disk deployment:

Number of disks	Disk	Deployment
3	System disk	FUJITSU Enterprise Postgres program
		Corefile
	Connected physical disk	Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination
2	System disk	FUJITSU Enterprise Postgres program
		Corefile
		Data storage destination, transaction log storage destination
	Connected physical disk	Backup data storage destination

Proposal for disk deployment using WebAdmin

To generate an instance using WebAdmin, we recommend an optimum deployment that takes into account the status of all disks at the time of instance generation, and items 1 to 3 in the "Considerations when deploying resources" subheading above, based on the limitations below (note that a different deployment can also be specified).

- The instance administrator has read and write privileges for the volumes.

Preparing directories

The directories to be prepared depend on the way that you create the instances.

The following shows the directories that need to be prepared:

Directory to be prepared	Using WebAdmin	Using the initdb command
Data storage destination	Y (*1)	Y
Backup data storage destination	O (*1) (*4)	O
Transaction log storage destination	O (*1) (*2)	O
Corefile output destination	N (*3)	O

Y: Required
O: Optional
N: Not required

*1: WebAdmin automatically creates a directory

*2: The default is to create in a directory in the data storage destination. When it is necessary to distribute the I/O load for the database data and the transaction log, consider putting the transaction log storage destination on a different disk from the data storage destination

*3: The corefile path is as follows:

*userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceNamePortNumber*\core

version: product version_WA_architecture

Note: The product version is normally the version of WebAdmin used to create the instance. For example, WebAdmin 13 allows a user to create a FUJITSU Enterprise Postgres 9.6 instance on a database server having WebAdmin 9.6. In this case, because WebAdmin 9.6 is used to create the instance, the product version will be "96".

PortNumber: port number specified when creating the instance

Example

C:\Users\naomi\AppData\Local\Fujitsu\fsep_130_WA_64\myinst27599\core

To change the output destination, specify in the core_directory parameter and core_contents parameter in postgresql.conf. Refer to "Parameters" in the Operation Guide for information on the settings for these parameters.

*4: This directory is required when instance backup is enabled.

- The directories must meet the following conditions:
  - The directory owner must be the OS user account that you want to be the instance administrator
  - The directory must have write permission
  - The directory must be empty
- If using WebAdmin, network drives cannot be used.
- If using WebAdmin, the following halfwidth characters can be used for directory names:
  - \(backslash)
  - - (hyphen)
  - _ (underscore)
  - : (colon)
  - Space
  - A-Z, a-z, 0-9 (alphanumeric)
- If anti-virus software is used, set scan exception settings for folders so that none of the server resources that comprise FUJITSU Enterprise Postgres are scanned for viruses. Alternatively, if the server resources that comprise FUJITSU Enterprise Postgres are to be scanned for viruses, stop the instance and perform the scan when tasks that use FUJITSU Enterprise Postgres are not operating.

Confirm and configure directory access permissions

If the instance administrator user has "Administrator" permissions (user ID belonging to the Administrators group), it is necessary to configure the settings so that each directory inherits the file and directory access permissions for the instance administrator user.

Therefore, ensure that the setting to inherit permissions has been configured.

The following is an explanation on how to confirm and configure the settings.

How to confirm access permissions

Perform the following operations in Windows Explorer on the directories to be prepared in advance:

1. Right-click on the applicable directory, and then click [Properties] from the menu that is displayed.
2. In the [*applicableDir* Properties] window, select [Security] >> [Advanced].
3. In the [Advanced Security Settings for *applicableDir*] window, and in the [Permission entries] list under the [Permissions] tab, confirm that [Applies to] for the instance administrator user is "This folder, subfolders and files".

4. Click [OK].

How to configure the access permissions

Perform the following operations in Windows Explorer if there are any directories that have not been configured for the access permissions to be inherited.

1. Right-click on the applicable directory, and then click [Properties] from the menu that is displayed.
2. In the [*applicableDir* Properties] window, select [Security] >> [Advanced].
3. In the [Advanced Security Settings for *applicableDir*] window, click [Add].
4. In the [Permission Entry for *applicableDir*] window, click [Select a principal].
5. In the [Select User or Group] window, enter the instance administrator user name as the object name to select, and then click [OK].
6. In the [Permission Entry for *applicableDir*] window, set [This folder, subfolders and files] for [Apply to:] ([Applies to:] for Windows Server(R) 2016 and Windows Server(R) 2019), and under [Basic permissions], allow read and write permissions, and then click [OK].
7. In the [Advanced Security Settings for *applicableDir*] window, confirm that the instance administrator user has been added, with [This folder, subfolders and files] set for [Apply to] ([Applies to] for Windows Server(R) 2016 and Windows Server(R) 2019) in the [Permission entries] list.
8. Click [OK].

Information

The access permissions can also be configured using the icacls command provided by the operating system.

The following is an execution example in which the application destination is set to "(OI)(CI)" and the access permissions are set to "(F) (Full access permissions)" when the data storage destination is "D:\database\inst1" and the instance administrator user is "fsepuser":

```
>icacls D:\database\inst1 /grant fsepuser:(OI)(CI)(F)
processed file: D:\database\inst1
Successfully processed 1 files; Failed processing 0 files
```

4.2.3 Estimating Resources

Estimate the resources to be used on the FUJITSU Enterprise Postgres.

Refer to "Appendix E Estimating Database Disk Space Requirements" for information on estimating database disk space requirements.

Refer to "Parameters automatically set by WebAdmin according to the amount of memory" when creating multiple instances with WebAdmin.

Refer to "Appendix F Estimating Memory Requirements" when creating instances with the initdb command, to estimate memory usage.

4.2.4 Windows Firewall Settings

This section explains the Windows firewall settings required if using WebAdmin for operation.

These settings are not required if using server commands for operation.

If the Windows firewall feature is to be enabled, you should enable a port number on the Web server. The following explains how to enable a port number:

Windows Server(R) 2019:

1. Select [Systems and Security] from [Control Panel] and click [Windows Defender Firewall].
2. In the [Windows Defender Firewall] window, click [Advanced settings].
3. In the [Windows Defender Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
4. Click [New Rule] on the right side of the window.

5. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
6. Select [TCP] and [Specific local ports], then specify the Web server port number specified during the WebAdmin setup, and then click [Next].
7. Select [Allow the connection], and then click [Next].
8. Select the profiles for which this rule applies, and then click [Next].
9. In [Name], specify the desired name, and then click [Finish].
10. In the [Windows Defender Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

In cases other than the above:

1. Select [Systems and Security] from [Control Panel] and click [Windows Firewall].
2. In the [Windows Firewall] window, click [Advanced settings].
3. In the [Windows Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
4. Click [New Rule] on the right side of the window.
5. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
6. Select [TCP] and [Specific local ports], then specify the Web server port number specified during the WebAdmin setup, and then click [Next].
7. Select [Allow the connection], and then click [Next].
8. Select the profiles for which this rule applies, and then click [Next].
9. In [Name], specify the desired name, and then click [Finish].
10. In the [Windows Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

4.2.5 Preparing for Output to the Event Log

This section provides an explanation on the preparation to be carried out if you are outputting error logs to the event log.

If outputting error logs to the event log, you should register an event source name beforehand.

If you do not register an event source name, the message content output to the event log may be incomplete.

Due to the default event source name "FUJITSU Enterprise Postgres Server" being output to the event log when using the following commands, you should register this default event source name beforehand:

- pg_ctl command
- pgx_dmpall command
- pgx_rcvall command

The following is an example in which the DLL of a 64-bit product is registered under the default event source name:

```
> regsvr32  "C:\Program Files\Fujitsu\fsepv<x>server64\lib\pgevent.dll"
```

Note that this step is not required if using WebAdmin to create an instance.

If using multiple instances

You can output messages corresponding to the event source name assigned by the user, so that messages output to the event log can be identified by instance.

The following is an example in which the DLL of a 64-bit product is registered under the event source name "FUJITSU Enterprise Postgres inst1":

```
> regsvr32 /n /i:"FUJITSU Enterprise Postgres inst1" "C:\Program Files\Fujitsu\fsepv<x>server64\lib
\pgevent.dll"
```

You will need to edit the parameters for each instance, therefore, after creating an instance, refer to "4.5.1 Error Log Settings" when performing this setting.

If installing multiple versions

If FUJITSU Enterprise Postgres is already installed on the same machine, search for the key below in Registry Editor, and make a note of the path of the registered DLL. Afterwards, register a new DLL under the default event source name.

Use the DLL path that you made a note of in the above step when re-registering the default event source name during an uninstall.

FUJITSU Enterprise Postgres Server

See

Refer to "Registering Event Log on Windows" in "Server Setup and Operation" in the PostgreSQL Documentation for information on how to register event source names.

4.3 Creating Instances

There are two methods that can be used to create an instance:

- 4.3.1 Using WebAdmin
- 4.3.2 Using the initdb Command

Creating multiple instances

Multiple instances can be created.

The memory allocated needs to be adjusted when multiple instances are created with WebAdmin (refer to "Parameters automatically set by WebAdmin according to the amount of memory" for details).

Features that cannot be set up using WebAdmin

The "Storage data protection using transparent data encryption" feature cannot be set up using WebAdmin.

To set up this feature in an instance created by WebAdmin, perform the additional setup tasks detailed in "Storage Data Protection using Transparent Data Encryption" in the Operation Guide.

Note

- Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin. Refer to "4.3.1.4 Importing Instances" for details.
- Always use WebAdmin to delete instances that were created or imported using WebAdmin. Because WebAdmin management information cannot be deleted, WebAdmin will determine that the instance is abnormal.
- Databases with the names 'template0' and 'template1' are automatically created when an instance is created.
  These databases are used as the templates for databases created later. Furthermore, a default database with the name 'postgres' is automatically created, which will be used with FUJITSU Enterprise Postgres commands. It is important that you do not delete these databases created by default.
- When an instance that uses WebAdmin is created successfully, the following Windows service is registered:

  `fsep_version_WA_architecture_userName_instanceNamePortNumber`

  The account and password of the instance administrator are registered in the Windows service.
  If the password for this account is changed, you must also change the password registered in the service.
  Change this at the Properties window registered in the Windows service.

Note: The product version is normally the version of WebAdmin used to create the instance. In addition, WebAdmin 13 also allows a user to create a FUJITSU Enterprise Postgres 9.6 instance on a database server having WebAdmin 9.6. In this case the product version will be "96".

- Refer to "4.5.2 Configuring Automatic Start and Stop of an Instance" for information on how to start and stop the operating system of the database server, and how to start and stop linked instances.

4.3.1 Using WebAdmin

This section describes how to create an instance using WebAdmin.

WebAdmin must be set up correctly before it can be used. Refer to "B.1 Setting Up WebAdmin" for details. Additionally, if WebAdmin needs to be configured to use an external repository database, refer to "B.3 Using an External Repository for WebAdmin" for details.

It is recommended to use the following browsers with WebAdmin:

- Internet Explorer 11
- Microsoft Edge (Build41 or later)

WebAdmin will work with other browsers, such as Firefox and Chrome, however, the look and feel may be slightly different.

Configure your browser to allow cookies and pop-up requests from the server on which FUJITSU Enterprise Postgres is installed.

Refer to "Appendix A Recommended WebAdmin Environments" for information on how to change the pop-up request settings and other recommended settings.

Note

- WebAdmin does not run in Windows(R) safe mode.
- If the same instance is operated from multiple WebAdmin windows, it will not work correctly.
- If the same instance is operated from multiple WebAdmin versions, it will not work correctly. Always use the latest version of WebAdmin for instance operations.
- For efficient use of WebAdmin, it is recommended not to use the browser [Back] and [Forward] navigation buttons, the [Refresh] button, and context-sensitive menus, including equivalent keyboard shortcuts.
- Copying and pasting the WebAdmin URLs are not supported. Additionally, bookmarking of WebAdmin URLs is not supported.
- It is recommended to match the language between the instance server locale and WebAdmin.
- WebAdmin supports only two languages: English and Japanese.
- It is recommended to change the WebAdmin language setting from the instance details page only.
- It is recommended to operate WebAdmin using the WebAdmin launcher.
- WebAdmin uses the labels "Data storage path", "Backup storage path" and "Transaction log path" to indicate "data storage destination", "backup data storage destination" and "transaction log storage destination" respectively. In this manual these terms are used interchangeably.
- If the browser was not operated for a fixed period (about 30 minutes), the session will time out and the login page will be displayed again for the next operation.
- Port access permissions
  If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
  Consider the security risks carefully when opening ports.
- When creating or importing an instance in WebAdmin, set the log_directory parameter in postgresql.conf in the following format:
  log_directory='*userProfileFolder**localSettingsFolder*\\Fujitsu\\fsep_*version**instanceNamePortNumber*\\log'

  Example: *userProfileFolder**localSettingsFolder* will be C:\\Users*userName*\\AppData\\Local.

4.3.1.1 Logging in to WebAdmin

This section describes how to log in to WebAdmin.

Startup URL for WebAdmin

In the browser address bar, type the startup URL of the WebAdmin window in the following format:

```
http://hostNameOrIpAddress:portNumber/
```

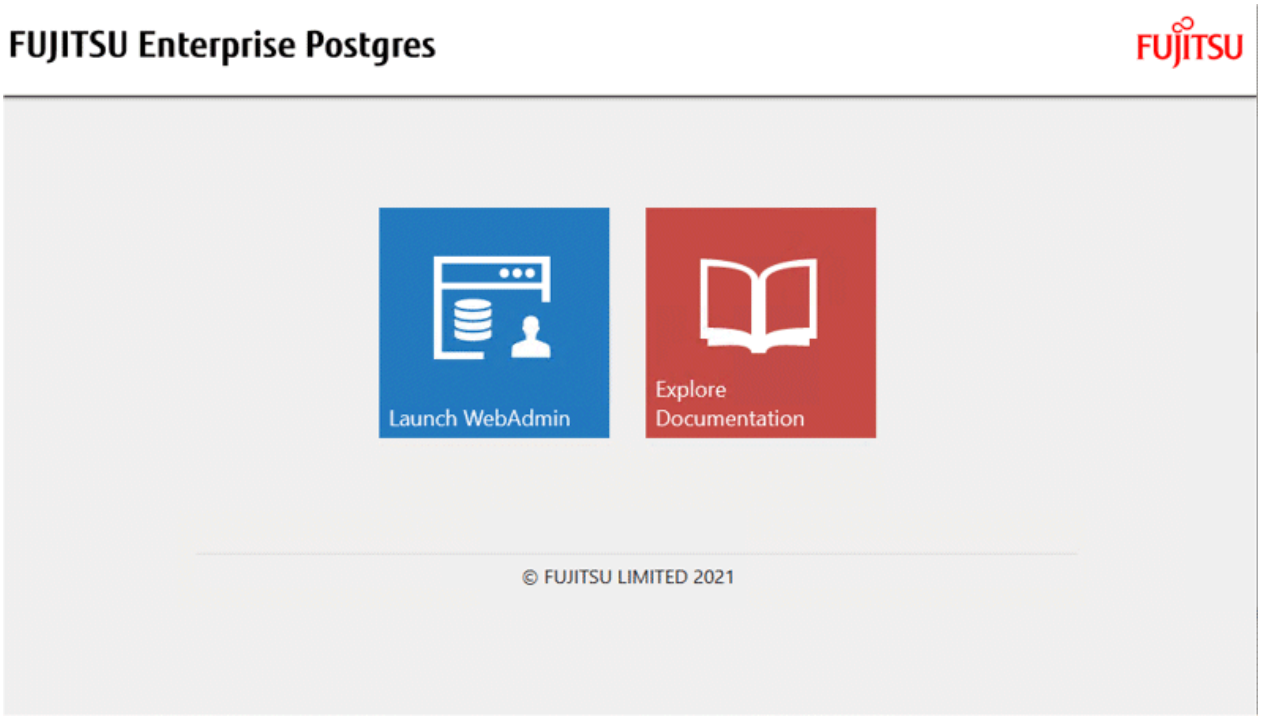
- *hostNameOrIpAddress*: Host name or IP address of the server where WebAdmin is installed
- *portNumber*: Port number of WebAdmin. The default port number is 27515.

Example

For a server with IP address "192.0.2.0" and port number "27515":

```
http://192.0.2.0:27515/
```

The startup URL window shown below is displayed. From this window you can log in to WebAdmin or access the product documentation.



Logging in to WebAdmin

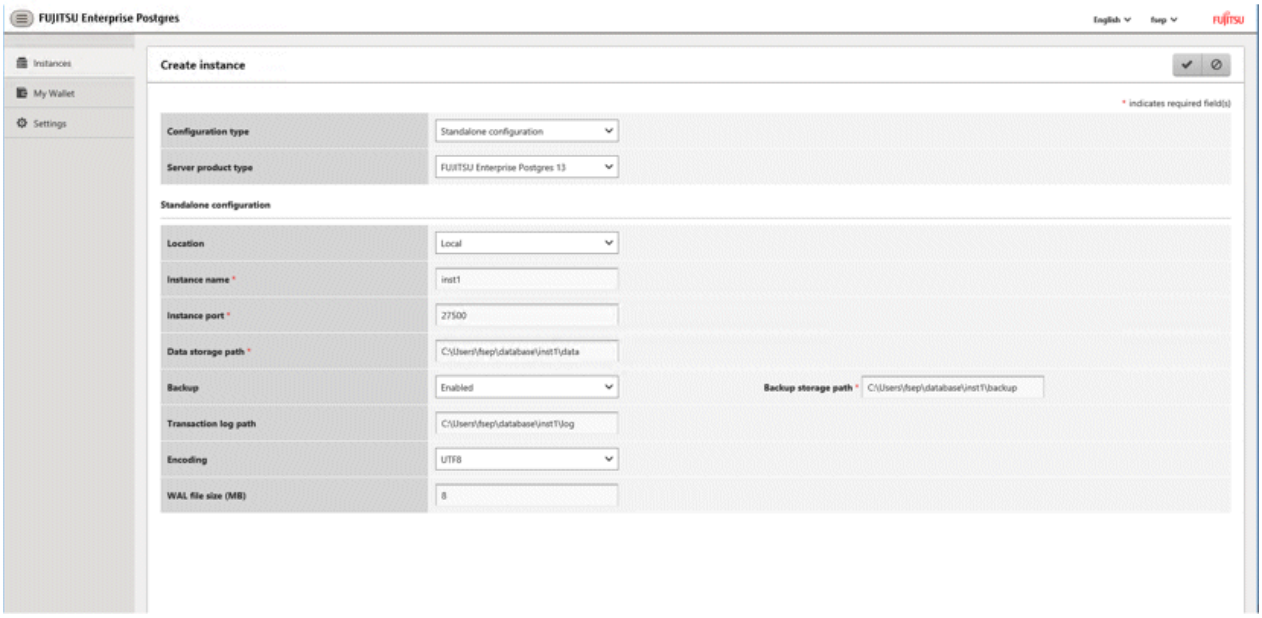
Click [Launch WebAdmin] in the startup URL window to start WebAdmin and display the login window. Enter the instance administrator user name (operating system user account name) and password, and log in to WebAdmin. User credential (instance administrator user ID and password) should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

4.3.1.2 Creating an Instance

This section describes how to create an instance.

1. Start WebAdmin, and log in to the database server.
2. In the [Instances] tab, click .

3. Enter the information for the instance to be created.



Enter the following items:

- [Configuration type]: Whether to create a standalone instance or an instance that is part of a cluster.
- [Server product type]: Sets which of the following instances to create:
  - FUJITSU Enterprise Postgres 9.5 Instances
  - FUJITSU Enterprise Postgres 9.6 Instances
  - FUJITSU Enterprise Postgres 10 Instances
  - FUJITSU Enterprise Postgres 11 Instances
  - FUJITSU Enterprise Postgres 12 Instances
  - FUJITSU Enterprise Postgres 13 Instances

  The default is "FUJITSU Enterprise Postgres 13".
  WebAdmin can create and manage instances compatible with the following, but new functionality in FUJITSU Enterprise Postgres 13 may not support the instance or it may be disabled.
  - FUJITSU Enterprise Postgres 9.5
  - FUJITSU Enterprise Postgres 9.6
  - FUJITSU Enterprise Postgres 10
  - FUJITSU Enterprise Postgres 11
  - FUJITSU Enterprise Postgres 12
- [Location]: Whether to create the instance in the server that the current user is logged into, or in a remote server. The default is "Local", which will create the instance in the server machine where WebAdmin is currently running.
- [Instance name]: Name of the database instance to manage

  The name must meet the conditions below:
  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters
- [Instance port]: Port number of the database server

- [Data storage path]: Directory where the database data will be stored
- [Backup]: Whether to enable or disable the WebAdmin backup feature. The default is "Enabled". Select "Disabled" to disable all backup and restore functionality for the instance. If "Enabled" is selected, enter the following item:
  - [Backup storage path]: Directory where the database backup will be stored
- [Transaction log path]: Directory where the transaction log will be stored
- [Encoding]: Database encoding system
- [WAL file size]: Allow the WAL file size to be set when creating an instance. The default is 16 MB if the field is blank. The size specified must be a power of 2 between 1 and 1024. This option is not available for standby instances.

If "Remote" is selected for [Location], enter the following additional items:

- [Host name]: Name of the host where the instance is to be created
- [Operating system credential]: Operating system user name and password for the remote machine where the instance is to be created
- [Remote WebAdmin port for standalone]: Port in which WebAdmin is accessible in the remote machine

Note

- Refer to "4.2.2 Preparing Directories for Resource Deployment" - "**Considerations when deploying resources**" for information on points to consider when determining the data storage path, backup storage path, and transaction log path.
- The following items can be modified after the instance has been created. These items cannot be modified on instances that have compatibility with FUJITSU Enterprise Postgres 9.5.
  - Instance name
  - Port number
  - Backup storage path

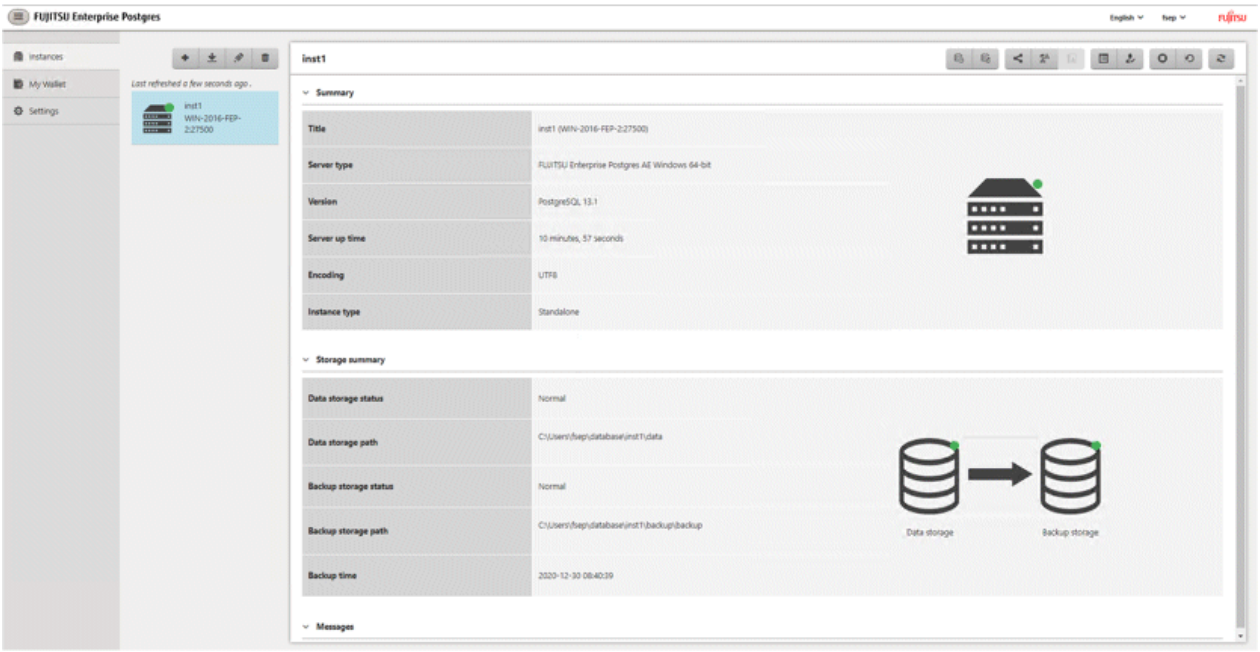
  Refer to "Editing instance information" for details.
- Do not specify shortcuts for the data storage path, backup storage path, or transaction log path.
- In the instance that is created using WebAdmin, the locale of the character set to be used in the database, and the locale of the collating sequence, are fixed using C.
- The following characters can be used for the data storage path, backup storage path, and transaction log path:
  - \ (backslash)
  - - (hyphen)
  - _ (underscore)
  - : (colon)
  - Space
  - A-Z, a-z, 0-9 (alphanumeric)
- Instance administrator read and write permissions are required for the data storage path, backup storage path, and transaction log path.
- For the port number, specify an unused port number in the following range:
  - 1024 to 49151
- Make a note of the port number for use in the Windows firewall settings.
- Refer to "4.5.2 Configuring Automatic Start and Stop of an Instance" for information on configuring the automatic start and stop of instances.

- For enhanced security, WebAdmin encrypts the superuser password using SCRAM-SHA-256 authentication for all FUJITSU Enterprise Postgres 10 or later instances. The client/driver must therefore support SCRAM-SHA-256 authentication if they need to connect to FUJITSU Enterprise Postgres 10 or later instances created by WebAdmin with superuser credentials.
- Host name and Operating system credential (Operating system user name and password) should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

4. Click ✔ to create the instance.

   If the instance is created successfully, a message indicating the same will be displayed.

5. The instance will be started when it is created successfully.



6. Back up the basic information that was set

   Back up the WebAdmin management information periodically to ensure operational continuity when a fault occurs on the system disk. Follow the procedure below to perform the backup.

   a. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.

   b. Back up the following directory:

      webAdminInstallDir\data\fepwa

Note

The following message is output during startup of an instance when the startup process is operating normally, therefore, the user does not need to be aware of this message.

```
FATAL:  the database system is starting up (XXXXX)
```

4.3.1.3 Changing Instance Settings

You can change the information that is set when an instance is created.

Change the following settings to suit the operating and management environment for FUJITSU Enterprise Postgres.

- Instance configuration
  - Character encoding

  - Communication
  - SQL options
  - Memory
  - Streaming replication
- Changing client authentication information
- Editing instance information

Information

These settings are the same as the parameters that can be set in the files shown below. Refer to "Appendix D Configuring Parameters" for information on the equivalence relationship between the item name and the parameter.

- postgresql.conf
- pg_hba.conf

Note

The files shown below can also be modified directly, however if a parameter not described in "Appendix D Configuring Parameters" was edited by mistake, WebAdmin may not run correctly.

- postgresql.conf
- pg_hba.conf

Instance configuration

1. Start WebAdmin and log in to the database server.
2. In the [Instances] tab, click .
3. Click to change the configuration.
4. Click to save your changes.

See

Select a client-side encoding system that can be converted to/from the database encoding system. Refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the "PostgreSQL Documentation" for information on the encoding system combinations that can be converted.

Changing client authentication information

1. Start WebAdmin and log in to the database server.
2. In the [Instances] tab, click .

   Click to register new authentication information.

   To change authentication information, select the information, and then click .

   To delete authentication information, select the information, and then click .

Note

When creating the instance, do not delete the entry below, because it is a connection required for WebAdmin to monitor the operational status of the database:
Type= host, Database=all, User=all, and Method=md5

Editing instance information

Use the [Edit instance] page to modify the following items for an instance:

- Instance name
- Port number
- Backup storage path

1. In the [Instances] tab, click . The [Edit instance] page is displayed.
2. Modify the relevant items.

   If [Backup storage path] is changed, [Backup management] is enabled. Select the required option:

   Retain existing backup: Create a backup in [Backup storage path] and retain the existing backup in its original location.

   Copy existing backup to new path: Copy the existing backup to [Backup storage path]. A new backup will not be created. The existing backup will be retained in its original location.

   Move existing backup to new path: Move the existing backup to [Backup storage path]. A new backup will not be created.

   Remove existing backup: Create a backup in [Backup storage path]. The existing backup will be removed.
3. Click to save your changes.

Note

- The [Edit instance] page is also displayed when the user selects 'Navigate to the "Edit instance" page' from the [Anomaly Error] dialog box. Refer to "Anomaly Detection and Resolution" in the Operation Guide for information on what takes place when an anomaly is detected.
- When [Instance name] or [Instance port] is modified, the log_directory and core_directory parameters in postgresql.conf are updated. Also, the specified directories are created if they do not exist.

  Refer to “4.3.1.4 Importing Instances” for information on the format of these directories.

4.3.1.4 Importing Instances

Instances can be created using WebAdmin, or via the command line using the initdb command. Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin.

This section explains how to import command line instances into WebAdmin.

1. In the [Instances] tab, click . The [Import instance] page is displayed.
2. Enter the information for the instance being imported. Refer to "4.3.1.2 Creating an Instance" for information on the items that need to be entered.
3. Click to import the instance.

Note

- Importing neither starts nor stops the instance.

- A Windows service is automatically registered when an instance is imported into WebAdmin. If a Windows service was registered by the user prior to importing the instance, that service will not be deleted. After importing the instance into WebAdmin, it is recommended to discontinue the use of the user-created service.
- The following restrictions apply to instance import:
  - Any instance already managed by WebAdmin cannot be imported again.
  - The postgresql.conf file must be located in the same directory as [Data storage path].
  - Read/write permissions are required for [Data storage path].
  - The location specified in postgresql.conf for the following files must not have been changed:
    - hba_file
    - ident_file
  - If the instance is part of a cluster that is monitored by Mirroring Controller, WebAdmin will be unable to detect the Mirroring Controller settings.
  - Instances making use of Mirroring Controller functionality should not be imported, because subsequent operations on those instances may cause unexpected and undesirable side-effects.
  - It is not possible to import and operate an instance that uses a directory mounted by Network File System (NFS).
  - You must make the following changes to the parameters in postgresql.conf prior to importing the instance in WebAdmin.

Parameter	Requirements
port	The port parameter should be uncommented.

    The log_directory and core_directory parameters in postgresql.conf are updated during import. Also, the specified directories are created if they do not exist.

    The format of these directories is as follows:

    log_directory: '*userProfileFolder**localSettingsFolder*\\Fujitsu\\fsep_*version**instanceNamePortNumber*\\log'

    core_directory: '*userProfileFolder**localSettingsFolder*\\Fujitsu\\fsep_*version**instanceNamePortNumber*\\core'

    version: product version_WA_architecture

    PortNumber: port number specified when creating the instance

    Examples:

    log_directory: 'C:\\Users\\naomi\\AppData\\Local\\Fujitsu\\fsep_130_WA_64\\myinst27599\\log'

    core_directory: 'C:\\Users\\naomi\\AppData\\Local\\Fujitsu\\fsep_130_WA_64\\myinst27599\\core'
  - When a standby instance is imported, a valid entry, using the IP address of the standby instance, must exist in the pg_hba.conf file of the master instance to allow the standby instance to connect to the master instance.
  - When a standby instance is imported, the value for "host" in the primary_conninfo parameter of postgresql.auto.conf should match the host name of the master instance.
  - When a standby instance is imported, you cannot specify "passfile" in the primary_conninfo parameter of postgresql.auto.conf. Be sure to specify "password".
  - Instances created by other operating systems cannot be imported.
  - If a FUJITSU Enterprise Postgres 10 or later instance is being imported while it is running, WebAdmin will encrypt the superuser password using SCRAM-SHA-256 authentication.

4.3.2 Using the initdb Command

This section describes the procedure to create an instance using the initdb command.

Note

If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
Consider the security risks carefully when opening ports.

4.3.2.1 Creating an Instance

Create an instance, with the database cluster storage destination specified in the PGDATA environment variable or in the -D option. Furthermore, the user that executed the initdb command becomes the instance administrator.

Note

- Instances created using the initdb command (command line instances) can be managed using WebAdmin, however, they must first be imported into WebAdmin. Refer to "4.3.1.4 Importing Instances" for details.
- If creating multiple instances, ensure that there is no duplication of port numbers or the directories that store database clusters.

See

Refer to "initdb" in "Reference" in the PostgreSQL Documentation for information on the initdb command.

The procedure to create an instance is described below.

1. Use the OS user account that you want as the instance administrator.

   Connect with the server using the OS user account that you want as the instance administrator.

2. Configure the environment variables

   Configure the environment variables in the server with the newly created instance.

   Set the following environment variables:

   - PATH environment variables

     Add installDir\bin and installDir\lib.

   Example

   The following is a setting example for environment variables in which "C:\Program Files\Fujitsu\fsepv<*x*>server64" is used as the installation folder:

   Note that "<*x*>" indicates the product version.

   ```
   > SET PATH=C:\Program Files\Fujitsu\fsepv<x>server64\bin;C:\Program Files\Fujitsu
   \fsepv<x>server64\lib;%PATH%
   ```

3. Create a database cluster

   Create the database cluster with the initdb command, specifying the storage destination directory.

   Specify the transaction log storage destination and the locale setting option as required.

   Example

   ```
   > initdb -D D:\database\inst1 --waldir=E:\transaction\inst1 --lc-collate="C" --lc-ctype="C" --
   encoding=UTF8
   ```

Point

In some features, instance names are requested, and those names are required to uniquely identify the instance within the system. These features allow names that conform to WebAdmin naming conventions, so refer to the following points when determining the names:

- Maximum of 16 characters
- The first character must be ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

Note

- To balance I/O load, consider deploying the transaction log storage destination to a disk device other than the database cluster storage destination and the backup data storage destination.
- Messages may not display correctly if a value other than "C" is specified as the display language for messages.
- Specify "C" for collation and character category. Performance deteriorates if you specify a value other than "C" , although the behavior will follow the rules for particular languages, countries and regions. Furthermore, this may need to be revised when running applications on systems with different locales.
  For example, specify as follows:

  ```
  initdb --locale="C" --lc-messages="C"
  initdb --lc-collate="C" --lc-ctype="C"
  ```

- Specify an encoding system other than SQL_ASCII for the database. If SQL_ASCII is used, there is no guarantee that the encryption system for data in the database will be consistent, depending on the application used to insert the data.

See

Refer to "Locale Support" in "Localization" in "Server Administration" in the PostgreSQL Documentation for information on locales.

4. Set port number.

   Specify a port number in the port parameter of postgresql.conf. Ensure that the specified port number is not already used for other software. If a port number is not specified, "27500" is selected.

   Register the specified port numbers in the C:\Windows\System32\drivers\etc\services file if WebAdmin is used to create other instances. WebAdmin uses the services file to check if port numbers specified as available candidates have been duplicated.

   Register any name as the service name.

   ### Note

   Make a note of the port number for use in the Windows firewall settings.

5. Set the corefile output destination.

   Specify the output destination of the corefile, which can later be used to collect information for investigation, by setting the core_directory and core_contents parameters of postgresql.conf.

   ### See

   Refer to "Parameters" in the Operation Guide for information on the settings for these parameters.

6. Set the backup storage destination.

   Specify the backup data storage destination and other backup settings when backup is to be performed as a provision against database errors.

   See

   Refer to "Backup Methods" in the Operation Guide for information on specifying backup settings.

7. Register an instance in the Windows service

   Use the register mode of the pg_ctl command to register an instance in the Windows service.

   Specify the service name, user name, password and path to the instance in the pg_ctl command, and register the instance in the Windows service.

   Example

   The following is a setting example, in which the service name to register is "inst1", the user name is "fepuser", and the storage destination directory of the database cluster is "D:\database\inst1":

   ```
   > pg_ctl register -N "inst1" -U fepuser -P ******** -D D:\database\inst1
   ```

   Note

   - This command must be executed by an instance administrator user with administrator privileges. Execute the command from the [Administrator: Command Prompt] window. Right-click [Command Prompt], and then select [Run as administrator] from the menu to display the [Administrator: Command Prompt] window.
   - For the following reasons, a user name and password must always be specified:

     Because the Windows service is started up by the Network Service account, all user resources are created as resources of that account. This can result in error events such as failing to access database resources and not being able to perform backups/recovery.
     Note that if not specifying a user name and password for security reasons, you should specify the account from the Windows services list immediately after registering the instance in Windows services.
   - When entering the password that is specified in the pg_ctl command, for security reasons, you should be careful not to allow other users to access it.

   Commands such as sc query can be used to check the registration status.

8. Start an instance

   Use the following procedure to start the service:

   a. Display the [Services] window.

      In Windows, select [Administrative Tools], and then click [Services].

   b. Start the service

      From the services list, select the instance name that you wish to start, and click [Start Service].

If using commands to start the service, specify the service name using either the net start command or sc start command from the command prompt.

4.4 Configuring Remote Connections

This section describes the settings required when connecting remotely to FUJITSU Enterprise Postgres from a database application or a client command.

4.4.1 When an Instance was Created with WebAdmin

Settings related to connection

The default is to accept connections from remote computers to the database.

Change "listen_addresses" in postgresql.conf to modify the default behavior.

Refer to "Appendix D Configuring Parameters" for information on postgresql.conf.

Client Authentication Information settings

The following content is set by default when WebAdmin is used to create an instance.

- Authentication of remote connections from local machines is performed.

When changing Client Authentication Information, select [Client Authentication] from [Setting], and then change the settings.

4.4.2 When an Instance was Created with the initdb Command

Connection settings

The default setting only permits local connections from the client to the database. Remote connections are not accepted.

Change "listen_addresses" in postgresql.conf to perform remote connection.

All remote connections will be allowed when changed as shown below.

Example

```
listen_addresses = '*'
```

Also, configure the parameters shown below in accordance with the applications and number of client command connections.

Parameter name	Parameter description
superuser_reserved_connections	Number of connections reserved for database maintenance, for example backup or index rebuilding. If you need to simultaneously perform a large number of processes that exceed the default value, change this value accordingly.
max_connections	Set the value as: *numberOfSimultaneousConnectionsToInstance* + superuser_reserved_connections

Client authentication information settings

When trying to connect from a client to a database, settings are required to determine whether the instance permits connections from the client - if it does, then it is possible to make settings to determine if authentication is required.

See

Refer to "The pg_hba.conf File" in "Server Administration" in the PostgreSQL Documentation for details.

4.4.3 Windows Firewall Settings

If the Windows firewall feature is to be enabled, you should enable a port number on the database server. The following explains how to enable a port number:

Windows Server(R) 2019:

1. Select [Systems and Security] from [Control Panel] and click [Windows Defender Firewall].
2. In the [Windows Defender Firewall] window, click [Advanced settings].

3. In the [Windows Defender Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
4. Click [New Rule] on the right side of the window.
5. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
6. Select [TCP] and [Specific local ports], then specify the Web server port number specified during the WebAdmin setup, and then click [Next].
7. Select [Allow the connection], and then click [Next].
8. Select the profiles for which this rule applies, and then click [Next].
9. In [Name], specify the desired name, and then click [Finish].
10. In the [Windows Defender Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

In cases other than the above:

1. Select [Systems and Security] from [Control Panel] and click [Windows Firewall].
2. In the [Windows Firewall] window, click [Advanced settings].
3. In the [Windows Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
4. Click [New Rule] on the right side of the window.
5. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
6. Select [TCP] and [Specific local ports], then specify the Web server port number specified during the WebAdmin setup, and then click [Next].
7. Select [Allow the connection], and then click [Next].
8. Select the profiles for which this rule applies, and then click [Next].
9. In [Name], specify the desired name, and then click [Finish].
10. In the [Windows Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

4.5 Other Settings

This section describes settings that are useful for operations.

4.5.1 Error Log Settings

This section explains the settings necessary to monitor errors in applications and operations, and to make discovering the causes easier.

Make error log settings only when instances are created with the initdb command.

When creating instances with WebAdmin, these settings are already made and hence do not need to be set. Furthermore, some parameters are used by WebAdmin, and if changed, may cause WebAdmin to no longer work properly. Refer to "Appendix D Configuring Parameters" for details.

Edit the following parameters in postgresql.conf:

Parameter name	Parameter description	How to enable the settings
event_source	Specify the event source name to be attached to messages, for identifying messages output to the event log when using multiple instances.	- Restart services from the Windows services window. - Use the net command or sc command to stop and start services.

Parameter name	Parameter description	How to enable the settings
logging_collector	Specify "on" to ensure that messages are output by FUJITSU Enterprise Postgres to the server log file. The server log file is created in the log directory in the database cluster.	- Restart services from the Windows services window. - Use the net command or sc command to stop and start services.
log_destination	Specify " stderr, eventlog" to output messages from FUJITSU Enterprise Postgres to the screen and either the system log or the event log.	reload option of the pg_ctl mode
log_line_prefix	Specify information to be added at the start of messages output by an instance. This information is useful for automatic monitoring of messages. You can output the SQLSTATE value, output time, executing host, application name, and user ID. Refer to "What To Log" in the PostgreSQL Documentation for details. Example: log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '	reload option of the pg_ctl mode

Point

- If you want fewer application errors being output to the eventlog, refer to "When To Log" and "What To Log" in the PostgreSQL Documentation for information on how to reduce the output messages.
- If you want to separate errors output from other software, refer to "Where To Log" in the PostgreSQL Documentation to change the output destination to the server log file rather than the system log.

4.5.2 Configuring Automatic Start and Stop of an Instance

You can automatically start or stop an instance when the operating system on the database server is started or stopped.

Use the following procedure to configure automatic start and stop of an instance.

Note that, if an instance is started in a failover operation, the cluster system will control the start or stop, therefore this feature should not be used. Also, when performing database multiplexing, refer to "Enabling Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" in the Cluster Operation Guide (Database Multiplexing).

When an instance was created with WebAdmin

When an instance is created with WebAdmin, the instance is registered in the Windows service and automatic start and stop is set for the instance.

To change the automatic start and stop setting for an instance, select the service for the applicable instance in the Windows services window, and in [Startup Type], select [Automatic] or [Manual].

When an instance was created with the initdb command

When the startup type of the service is set to [Manual], change it to [Automatic]. By setting the startup type to [Automatic], the service will start up automatically when the Windows(R) system is started up, and will stop automatically when the Windows(R) system is shut down.

Note

The settings should be performed by a user with administrator privileges.

Use the following procedure to switch the service:

1. Display the [Services] window.

   In Windows, select [Administrative Tools], and then click [Services].

2. Switch the startup type

   Select the FUJITSU Enterprise Postgres service name, display the [Properties] dialog box, and then switch the startup type from [Manual] to [Automatic].

The above setting can also be changed using the sc config command.

4.5.3 Settings when Using the Features Compatible with Oracle Databases

To use the features compatible with Oracle databases, create a new instance and execute the following command for the "postgres" and "template1" databases:

```
CREATE EXTENSION oracle_compatible;
```

Features compatible with Oracle databases are defined as user-defined functions in the "public" schema created by default when database clusters are created, so they can be available for all users without the need for special settings.

For this reason, ensure that "public" (without the double quotation marks) is included in the list of schema search paths specified in the search_path parameter.

There are also considerations for use the features compatible with Oracle databases. Refer to " Precautions when Using the Features Compatible with Oracle Databases" in the Application Development Guide for details.

4.6 Integration with Message-Monitoring Software

To monitor messages output by FUJITSU Enterprise Postgres using software, configure the product to monitor SQLSTATE, instead of the message text - this is because the latter may change when FUJITSU Enterprise Postgres is upgraded.

Configure FUJITSU Enterprise Postgres to output messages in a format that can be read by the message-monitoring software by specifying "%e" in the log_line_prefix parameter of postgresql.conf to output the SQLSTATE value.

A setting example is shown below - it outputs the output time, executing host, application name, and user ID, in addition to the SQLSTATE value.

Example

```
log_line_prefix = '%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
```

See

Refer to "What To Log" in the PostgreSQL Documentation for information on how to configure the settings.

4.7 Setting Up and Removing OSS

This section explains how to set up OSS supported by FUJITSU Enterprise Postgres.

If you want to use OSS supported by FUJITSU Enterprise Postgres, follow the setup procedure.

If you decide not to use the OSS supported by FUJITSU Enterprise Postgres, follow the removing procedure.

Information

- In this section, the applicable database that enables the features of each OSS is described as "postgres".
- Execute CREATE EXTENSION for the "template1" database also, so that each OSS can be used by default when creating a new database.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for information on OSS other than those described below.

4.7.1 oracle_fdw

4.7.1.1 Setting Up oracle_fdw

1. Add the path of the OCI library to the environment variable. The available version of the OCI library is 11.2 or later.
   Add the installation path of the OCI library to the PATH environment variable.
2. Open a command prompt with administrator privileges and run the following command:

```
> xcopy /E "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\oracle_fdw\*"
        "c:\Program Files\Fujitsu\fsepv<x>server64"
```

3. Restart FUJITSU Enterprise Postgres.
4. Execute CREATE EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION oracle_fdw;
CREATE EXTENSION
```

Information

- If the OCI library is not installed on the server, install it using the Oracle client or Oracle Instant Client.
  Refer to the relevant Oracle manual for information on the installation procedure.
- If the version of the OCI library is updated, change the path of the OCI library in the PATH environment variable to the updated path.

Note

This feature cannot be used on instances created in WebAdmin. It can only be used via server commands.

4.7.1.2 Removing oracle_fdw

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION oracle_fdw CASCADE;
DROP EXTENSION
```

2. Open a command prompt with administrator privileges and run the following command:

```
> del "c:\Program Files\Fujitsu\fsepv<x>server64\filesCopiedDuringSetup"
```

Information

The files copied during setup can be checked below.

```
> dir /b /s "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\oracle_fdw"
```

4.7.2 pg_hint_plan

4.7.2.1 Setting Up pg_hint_plan

1. Set the postgresql.conf file parameters.
   Add "pg_hint_plan" to the "shared_preload_libraries" parameter.

2. Open a command prompt with administrator privileges and run the following command:

```
> xcopy /E "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pg_hint_plan\*"
       "c:\Program Files\Fujitsu\fsepv<x>server64"
```

3. Restart FUJITSU Enterprise Postgres.

4. Run CREATE EXTENSION for the database that uses this feature.
   The target database is described as "postgres" here.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_hint_plan;
CREATE EXTENSION
```

See

Refer to " Optimizer Hints" in the Application Development Guide for details.

4.7.2.2 Removing pg_hint_plan

Note

Unsetting pg_hint_plan will cause hints registered in the hint_plan.hints table to be lost. Therefore, it is recommended that pg_dump back up the hint_plan.hints table for each database if it is likely that pg_hint_plan will be used again later.

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_hint_plan CASCADE;
DROP EXTENSION
```

2. Open a command prompt with administrator privileges and run the following command:

```
> del "c:\Program Files\Fujitsu\fsepv<x>server64\filesCopiedDuringSetup"
```

Information

The files copied during setup can be checked below.

```
> dir /b /s "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pg_hint_plan"
```

3. Set the postgresql.conf file parameters.
   Delete "pg_hint_plan" to the shared_preload_libraries parameter.

4. Restart FUJITSU Enterprise Postgres.

4.7.3 pg_dbms_stats

4.7.3.1 Setting Up pg_dbms_stats

1. Set the postgresql.conf file parameter.
   Add "pg_dbms_stats" to the "shared_preload_libraries" parameter.

2. Open a command prompt with administrator privileges and run the following command:

```
> xcopy /E "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pg_dbms_stats\*"
       "c:\Program Files\Fujitsu\fsepv<x>server64"
```

3. Restart FUJITSU Enterprise Postgres.

4. Run CREATE EXTENSION for the database that will use this feature.
   The target database is described as "postgres" here.
   Use the psql command to connect to the "postgres" database.

```
postgres=# CREATE EXTENSION pg_dbms_stats;
CREATE EXTENSION
```

See

Refer to "Optimizer Hints" in the Application Development Guide for details.

4.7.3.2 Removing pg_dbms_stats

Note

Unsetting pg_dbms_stats causes statistics managed by pg_dbms_stats to be lost. Therefore, it is recommended that you back up each table in the dbms_stats folder of each database in binary format if you may want to use pg_dbms_stats again later.

```
postgres > # COPY <dbms_stats Schema's table name> TO '<Filename>' FORMAT binary;
```

1. Execute DROP EXTENSION for the database that will use this feature.
   Use the psql command to connect to the "postgres" database.

```
postgres=# DROP EXTENSION pg_dbms_stats CASCADE;
DROP EXTENSION
```

2. Open a command prompt with administrator privileges and run the following command:

```
> del "c:\Program Files\Fujitsu\fsepv<x>server64\filesCopiedDuringSetup"
```

Information

The files copied during setup can be checked below.

```
> dir /b /s "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pg_dbms_stats"
```

3. Set the postgresql.conf file parameters.
   Delete "pg_dbms_stats" to the shared_preload_libraries parameter.

4. Restart FUJITSU Enterprise Postgres.

4.8 Deleting Instances

This section explains how to delete an instance.

- 4.8.1 Using WebAdmin
- 4.8.2 Using Server Commands

Note

- Always use WebAdmin to delete instances that were created or imported using WebAdmin. Because WebAdmin management information cannot be deleted, WebAdmin will determine that the instance is abnormal.

4.8.1 Using WebAdmin

This section explains how to delete an instance using WebAdmin.

Use the following procedure to delete an instance.

1. Stop the instance

   In the [Instances] tab, select the instance to stop and click .

2. Back up files.

   Before deleting the instance, back up any required files under the data storage destination, the backup data storage destination, and the transaction log storage destination.

3. Delete the instance

   In the [Instances] tab, select the instance to delete and click .

Note

Deleting an instance deletes only the following lowest-level directories. If they are not required, delete them manually.

- Data storage destination
- Backup data storage destination
- Transaction log storage destination (if different from the data storage destination)

4.8.2 Using Server Commands

This section explains how to delete an instance using server commands.

Use the following procedure to delete an instance.

1. Stop the instance

   Stop the instance in Windows services, or use the pg_ctl command stop mode.

   Use the following procedure to stop a service in Windows services:

   a. Display the [Services] window.

      In Windows, select [Administrative Tools], and then click [Services].

   b. Stop the service

      Select the instance name that you wish to stop from the services list, and click [Stop Service]. If you stop a service while applications and commands are running, FUJITSU Enterprise Postgres will force those applications and commands to close and will stop normally.

   You can also stop a service by specifying the service name in the net stop command or sc stop command.

2. Back up files

   Before deleting the instance, you should back up all necessary files contained in the data storage destination, backup data storage destination, and transaction log storage destination.

3. Delete the instance

   Use a command such as rmdir to delete the following directories:

   - Data storage destination directory
   - Backup data storage destination directory
   - Transaction log storage destination directory (if a different directory to the data storage destination directory was specified)

Chapter 5 Uninstallation

This chapter explains the uninstallation of FUJITSU Enterprise Postgres.

Note that "*x* SP*z*" indicates the version and level of the installed product and "<*x*>" in paths indicates the product version.

Information

- If a [User Account Control] dialog box is displayed at the start of the uninstallation, click [Yes] to continue processing.

  If [No] is clicked, permission to continue is denied and an [Error] dialog box will be displayed.
  To continue the uninstallation, click [Retry] in the [Error] dialog box. To end the operation, click [Cancel].

- If uninstallation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed. Click [This program uninstalled correctly] and continue operation.

5.1 Uninstallation in Interactive Mode

The uninstallation procedure is described below.

Note

- Uninstalling removes all files and directories under the installation directory.If you have placed user files in the installation directory, you may need to save them before uninstalling.

- If performing operation with WebAdmin, back up the following folder before uninstallation.
  Instances will not be recognized by WebAdmin even if FUJITSU Enterprise Postgres is reinstalled after uninstallation.
  If performing operation with WebAdmin after reinstalling FUJITSU Enterprise Postgres, replace the following backed up file after installation.

  Follow the procedure below to perform the backup.

  1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
  2. Back up the following folder:

     webAdminInstallFolder\data\fepwa

  By replacing the above folder in the installation folder after installation, the instance will be recognized by WebAdmin, and the recognized instance will be set to automatically start and stop.
  To disable the automatic start and stop setting for an instance, select the service for the applicable instance in the Windows services window, and in [Startup Type], select [Manual].

- If using database multiplexing mode, refer to "Uninstalling in Database Multiplexing Mode" in the FUJITSU Enterprise Postgres Cluster Operation Guide (Database Multiplexing) before performing the uninstallation.

See

Refer to the Installation and Setup Guide for Client when uninstalling the FUJITSU Enterprise Postgres client feature.

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgAdmin

2. Stop instances

Stop all instances that are using the product to be uninstalled.

Stopping of instances should be performed by the appropriate instance administrator.

When an instance was created with WebAdmin

In the [Instances] tab, select the instance to stop and click .

When an instance was created with the initdb command

Use the following procedure to stop a service:

a. Display the [Services] window

   In Windows, select [Administrative Tools], and then click [Services].

b. Stop the service

   Select the instance name that you wish to stop from the services list, and click [Stop Service]. If you stop a service while applications and commands are running, FUJITSU Enterprise Postgres will force those applications and commands to close and will stop normally.

You can also stop a service by specifying the service name in the net stop command or sc stop command.

3. Stop WebAdmin

If you are using WebAdmin, stop WebAdmin.

Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.

4. Unregister Windows services

Perform this step if the instance was created with the initdb command.

Unregister the instance registered in Windows services.

Use the unregister mode of the pg_ctl command to specify the registered service name and unregister the instance from Windows services.

Example

The following is an example showing execution of this command on the registered service name "inst1".

```
> pg_ctl unregister -N "inst1"
```

Note

You should unregister services before uninstalling FUJITSU Enterprise Postgres. If you uninstall FUJITSU Enterprise Postgres while services are running, several files will remain after the uninstallation.

If you have carried out the uninstallation without unregistering services beforehand, use the server command sc delete to unregister the services.

This command must be executed by an instance administrator user with administrator privileges. Execute the command from the [Administrator: Command Prompt] window. Right-click [Command Prompt], and then select [Run as administrator] from the menu to display the [Administrator: Command Prompt] window.

5. Delete registrations related to the event log

If you are outputting to the event log, a DLL registration mentioned in "4.2.5 Preparing for Output to the Event Log" has been performed.

To prevent unnecessary issues from occurring, you should delete this registration. Refer to "Server Setup and Operation", "Registering Event Log on Windows" in the PostgreSQL Documentation for details.

The following is an example showing deletion of the DLL registration for a 64-bit product under the default event source name.

```
> regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>server64\lib\pgevent.dll"
```

If using multiple instances

DLL registration is performed so that you can output messages corresponding to the event source name assigned by the user, allowing you to identify messages output to the event log by instance.

Since it is necessary to delete the DLL registration for each instance, delete the DLL registration by event source name.

The following is an example showing deletion of the DLL of a 64-bit product registered under the event source name "Enterprise Postgres inst1".

```
> regsvr32 /u /i:"Enterprise Postgres inst1" "C:\Program Files\Fujitsu\fsepv<x>server64\lib
\pgevent.dll"
```

Note that this step is not required if the instance was created with WebAdmin.

If installing multiple versions

If the instances you created using this package have been set to output error logs to the event log, use the DLL path name that you took note of previously as explained in "4.2.5 Preparing for Output to the Event Log" to reregister the default event source name.

Note

Ensure to delete DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

6. Start Uninstall (middleware)

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

7. Select the software

Select the product to be uninstalled from [Software Name], and then click [Remove].

8. Start the uninstallation

Click [Uninstall].

9. Finish the uninstallation

The uninstallation completion window will be displayed. Click [Finish].

The installation folder may remain after uninstallation. If it is not required, delete it.

10. Stop Uninstall (middleware)

In Uninstall (middleware), click [Close].

5.2 Uninstallation in Silent Mode

The uninstallation procedure is described below.

Note

- Uninstalling removes all files and directories under the installation directory.If you have placed user files in the installation directory, you may need to save them before uninstalling.

- If performing operation with WebAdmin, back up the following folder before uninstallation.
  Instances will not be recognized by WebAdmin even if FUJITSU Enterprise Postgres is reinstalled after uninstallation.
  If performing operation with WebAdmin after reinstalling FUJITSU Enterprise Postgres, replace the following backed up file after installation.

  Follow the procedure below to perform the backup.

  1. Stop the WebAdmin server. Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.
  2. Back up the following folder:

     webAdminInstallFolder\data\fepwa

  By replacing the above folder in the installation folder after installation, the instance will be recognized by WebAdmin, and the recognized instance will be set to automatically start and stop.
  To disable the automatic start and stop setting for an instance, select the service for the applicable instance in the Windows services window, and in [Startup Type], select [Manual].

- If using database multiplexing mode, refer to "Uninstalling in Database Multiplexing Mode" in the FUJITSU Enterprise Postgres Cluster Operation Guide (Database Multiplexing) before performing the uninstallation.

See

- Refer to the Installation and Setup Guide for Client when uninstalling the FUJITSU Enterprise Postgres client feature.
- Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgAdmin

2. Stop all instances

Stop all instances that are using the product to be uninstalled.

When an instance was created with WebAdmin

In the [Instances] tab, select the instance to stop and click .

When an instance was created with the initdb command

Use the following procedure to stop a service:

a. Display the [Services] window.

   In Windows, select [Administrative Tools], and then click [Services].

b. Stop the service

   Select the instance name that you wish to stop from the services list, and click [Stop Service]. If you stop a service while applications and commands are running, FUJITSU Enterprise Postgres will force those applications and commands to close and will stop normally.

You can also stop a service by specifying the service name in the net stop command or sc stop command.

3. Stop WebAdmin

If you are using WebAdmin, stop WebAdmin.

Refer to "B.1.3 Stopping the Web Server Feature of WebAdmin" for details.

4. Unregister Windows services

Perform this step if the instance was created with the initdb command.

Unregister the instance registered in Windows services.

Use the unregister mode of the pg_ctl command to specify the registered service name and unregister the instance from Windows services.

Example

The following is an example showing execution of this command for the registered service name "inst1".

```
> pg_ctl unregister -N "inst1"
```

Note

You should unregister services before uninstalling FUJITSU Enterprise Postgres. If you uninstall FUJITSU Enterprise Postgres while services are running, several files will remain after the uninstallation.

If you have carried out the uninstallation without unregistering services beforehand, use the server command sc delete to unregister the services.

This command must be executed by an instance administrator user with administrator privileges. Execute the command from the [Administrator: Command Prompt] window. Right-click [Command Prompt], and then select [Run as administrator] from the menu to display the [Administrator: Command Prompt] window.

5. Delete registrations related to the event log

If you are outputting to the event log, a DLL registration mentioned in "4.2.5 Preparing for Output to the Event Log" has been performed.

To prevent unnecessary issues from occurring, you should delete this registration. Refer to "Server Setup and Operation", "Registering Event Log on Windows" in the PostgreSQL Documentation for details.

The following is an example showing deletion of the DLL registration for a 64-bit product under the default event source name.

```
> regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>server64\lib\pgevent.dll"
```

If using multiple instances

DLL registration is performed so that you can output messages corresponding to the event source name assigned by the user, allowing you to identify messages output to the event log by instance.

Since it is necessary to delete the DLL registration for each instance, delete the DLL registration by event source name.

The following is an example showing deletion of the DLL of a 64-bit product registered under the event source name "Enterprise Postgres inst1".

```
> regsvr32 /u /i:"Enterprise Postgres inst1" "c:\Program Files\Fujitsu\fsepv<x>server64\lib
\pgevent.dll"
```

Note that this step is not required if the instance was created with WebAdmin.

If installing multiple versions

If the instances you created using this package have been set to output error logs to the event log, use the DLL path name that you took note of previously as explained in "4.2.5 Preparing for Output to the Event Log" to reregister the default event source name.

Note

Ensure to delete DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

6. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

7. Run the uninstaller

Execute the command below.

The installation folder may remain after uninstallation. If it is not required, delete it.

Example

```
X:> installFolder\suninst.bat
```

X: Drive on which the product is installed

Appendix A Recommended WebAdmin Environments

This appendix describes the recommended WebAdmin environment. The following explanation is based on the assumption that Internet Explorer 11 or later is used unless otherwise stated.

A.1 Recommended Browser Settings

- Use a display resolution of 1280 x 768 or higher, and 256 colors or more.
- Select [View] >> [Text size] >> [Medium].
- Select [View] >> [Zoom] >> [100%].
- Click [Tools] >> [Internet options] >> [General] >> [Fonts], and then:
  - Set [Webpage font] to [Times New Roman].
  - Set [Plain text font] to [Courier New].

A.2 How to Set Up the Pop-up Blocker

If the Pop-up Blocker is enabled, use the procedure below to configure settings to allow pop-ups from the server where FUJITSU Enterprise Postgres is installed.

1. Click [Tools] >> [Internet options], and then select the [Privacy] tab.
   If [Turn on Pop-up Blocker] is not selected, the Pop-up Blocker feature will not operate, and therefore steps below are not required.
2. Click [Settings].
3. In the [Pop-up Blocker Settings] window, enter in the [Address of website to allow] the URL of the server where FUJITSU Enterprise Postgres is installed, and then click [Add].
4. Click [Close].
5. In the [Internet Options] window, click [OK].

Appendix B Setting Up and Removing WebAdmin

This appendix describes how to set up and remove WebAdmin.

Note that "<*x*>" in paths indicates the product version.

B.1 Setting Up WebAdmin

This section explains how to set up WebAdmin.

B.1.1 Setting Up WebAdmin

Follow the procedure below to set up WebAdmin.

1. Log in

   Log in as a user that belongs to the Administrators group.

2. Display the setup window

   In Windows, click [All Programs] or [All apps], then [Product name], and then [WebAdmin Setup].

   Note

   If the same [User Account Control] dialog box as that shown below is displayed, click [Yes] to continue processing.

3. Specify the port number

   Specify the following port numbers to be used in WebAdmin.

   Refer to the services file. Only change to a different port number if the same port number is being used by another service.

   Make a note of the Web server port number, because it will be required for starting the WebAdmin window.

Item	Value (recommended value)
Web server port number	27515
WebAdmin internal port number	27516
WebAdmin automatic start	Selected

   Web server port number

   Specify an unused port number in the following range for the port number used for communication between the Web browser and Web server:

   - 1024 to 49151

   The Web server port number is registered as a port number of the following service name in the services file.

   fep_130_WA_64_WebAdmin_Port1

   WebAdmin internal port number

   Specify an unused port number in the following range for the port number used for communication between the Web server and WebAdmin runtime environment:

   - 1024 to 49151

   The WebAdmin internal port number is registered as a port number of the following service name in the services file.

   fep_130_WA_64_WebAdmin_Port2

   WebAdmin automatic start

   Select whether or not to start WebAdmin when the machine is started.

Note

- Make a note of the Web server port number for use in the Windows firewall settings.
- Unused port numbers
  In the operating system and other products, regardless of the information in the service file, unused port numbers may be automatically numbered and then used, or port numbers specified in environment files within products may also be used. Check the port numbers used by the OS and other products, and ensure that these are not duplicated.
- Access restrictions
  Prevent unauthorized access and maintain security by using a firewall product, or the packet filtering feature of a router device, to restrict access to the server IP address and the various specified port numbers.
- Port access permissions
  If a port is blocked (access permissions have not been granted) by a firewall, enable use of the port by granting access. Refer to the vendor document for information on how to grant port access permissions.
  Consider the security risks carefully when opening ports.
- Changing port numbers
  When using WebAdmin in multiserver mode, it is recommended not to change WebAdmin ports after creating instances. Otherwise, the created instances may not be accessible through WebAdmin after the port is changed.

4. Prepare for setup

Click [OK] in the setup window, and after completing the WebAdmin setup, refer to "4.2 Preparations for Setup" and perform the required preparations for setting up FUJITSU Enterprise Postgres if using WebAdmin for operation.

B.1.2 Starting the Web Server Feature of WebAdmin

Follow the procedure below to start the Web server feature of WebAdmin.

1. Display the Services window

   In Windows, select [Administrative Tools], and then click [Services].

2. Start the service

   Select the displayed name "FUJITSU Enterprise Postgres WebAdmin *version*", and then click [Start Service].

   You can also start the service by specifying the service name of the Web server feature of WebAdmin in the net start command or sc start command.

B.1.3 Stopping the Web Server Feature of WebAdmin

Follow the procedure below to stop the Web server feature of WebAdmin.

1. Display the Services window

   In Windows, select [Administrative Tools], and then click [Services].

2. Stop the service

   Select the displayed name "FUJITSU Enterprise Postgres WebAdmin *version*", and then click [Stop Service].

   You can also stop the service by specifying the service name of the Web server feature of WebAdmin in the net stop command or sc stop command.

Note

- For efficient operation of WebAdmin, it is recommended to stop the Web server feature only during a scheduled maintenance period.
- When WebAdmin is used to create and manage instances in a multiserver configuration, the Web server feature must be started and running on all servers at the same time.

B.2 Removing WebAdmin

This section explains how to remove WebAdmin.

This removal procedure stops WebAdmin and ensures that it no longer starts automatically when the machine is restarted.

To remove the setup, execute the command shown below.

Example

When WebAdmin is installed in "C:\Program Files\Fujitsu\fsepv<*x*>webadmin":

```
> C:
> cd C:\Program Files\Fujitsu\fsepv<x>webadmin\sbin
> WebAdminSetup --delete
```

Note

- The removal of the WebAdmin setup must be performed by a user with administrator privileges (a user ID that belongs to the Administrators group).
- Commands that require administrator privileges must be executed from the [Administrator: Command Prompt] window. Right-click [Command Prompt], and then select [Run as administrator] from the menu to display the [Administrator: Command Prompt] window.

B.3 Using an External Repository for WebAdmin

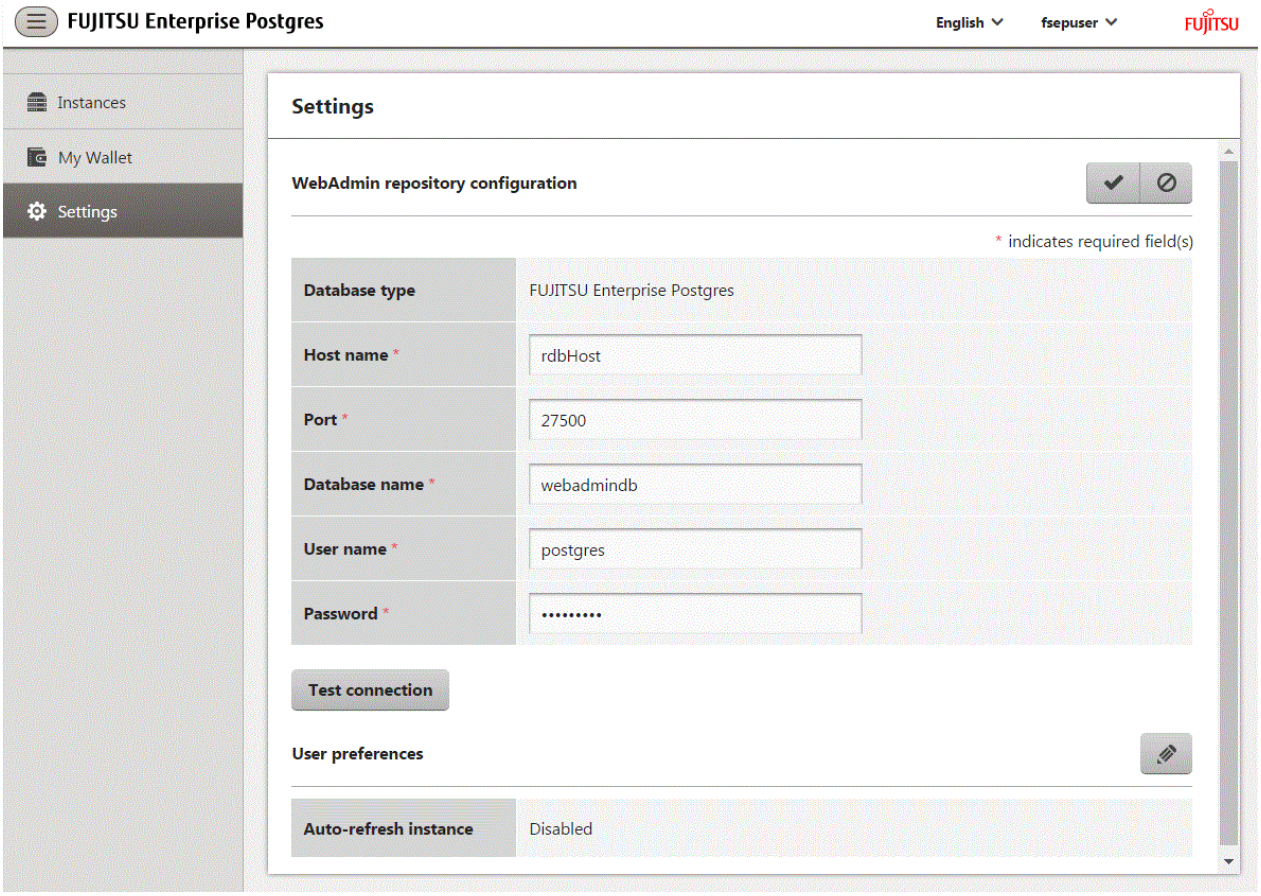
WebAdmin can be configured to use an external database, where it can store the various metadata information it uses. WebAdmin will use this database as a repository to store the information it uses to manage all the created instances. This can be a FUJITSU Enterprise Postgres database or an Open Source PostgreSQL V9.2 or later database.

Using an external database as a WebAdmin repository provides you with more flexibility in managing WebAdmin. This repository can be managed, backed up and restored as needed using pgAdmin or command line tools, allowing users to have greater flexibility and control.

Follow the procedure below to set up the repository.

1. Start WebAdmin, and log in to the database server.

2. Click the [Settings] tab, and then click in the [WebAdmin repository configuration] section.



Enter the following items:

- [Host name]: Host name of the database server
- [Port]: Port number of the database server
- [Database name]: Name of the database
- [User name]: User name to access the database
- [Password]: Password of the database user

Note

- Database type
  It is recommended to use a FUJITSU Enterprise Postgres database as a repository. A compatible PostgreSQL database can also be used as an alternative.
- It is recommended to click [Test connection] to ensure that the details entered are valid and WebAdmin is able to connect to the target database.
- Host name, Database name, User name, Password should not contain hazardous characters. Refer to "Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters".

3. Click to register the repository details.

Note

- Once the repository is set up, it can be changed any number of times by the user logged into WebAdmin. When a repository is changed:
  - It is recommended to preload the backup into this database.
  - If the data is not preloaded, WebAdmin will create a new repository.
- The database repository can be set up even after WebAdmin was already used to create instances. In that scenario, the instances already created are retained and can continue to be operated on.
- If the instance used as a repository is stopped, WebAdmin will be unusable. For this reason, it is recommended to be familiar with starting an instance from the command line. If the instance is stopped for any reason, start it from the command line and WebAdmin will be usable again.

B.4 Using the WebAdmin Auto-Refresh Feature

The WebAdmin auto-refresh feature automatically refreshes the operating status of all instances in the Instance list at the specified interval. It also refreshes the details of the selected instance.

Follow the procedure below to configure the auto-refresh options.

1. Click the [Settings] tab, and then click in the [User preferences] section.
2. Enter the following items:
   - [Auto-refresh instance]: To use the auto-refresh feature, select "Enabled". The default is "Disabled".
   - [Refresh interval (seconds)]: Number of seconds between each refresh. This is a countdown timer, which is reset every time the instance status is refreshed by any operation. Specify a value from 30 to 3600 (seconds). The default is 30.
3. Click to save the auto-refresh settings.

Note

- Auto-refresh will run only if the [Instances] page is displayed and no user-initiated operation is in progress.
- A text indicator, which is independent of auto-refresh, is displayed at the top of the Instance list. It is dynamically updated to display when the page was last refreshed.

Appendix C WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix D Configuring Parameters

WebAdmin operates and manages databases according to the contents of the following configuration files:

- postgresql.conf

  Contains various items of information that define the operating environment of FUJITSU Enterprise Postgres.

- pg_hba.conf

  Contains various items of information related to client authentication.

These configuration files are deployed to a data storage destination. Data is written to them when the instance is created by WebAdmin and when settings are changed, and data is read from them when the instance is started and when information from the [Setting] menu is displayed.

Direct editing of each configuration file is possible with a text editor.

See

Refer to "Server Configuration" and "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on the parameters.

Note

WebAdmin checks for port number and backup storage path anomalies when various operations are performed. An anomaly occurs when the value of [Port number] and/or [Backup storage path] in WebAdmin is different from the value of the corresponding parameter in postgresql.conf. Refer to "Anomaly Detection and Resolution" in the Operation Guide for details.

postgresql.conf

Parameters that can be changed in WebAdmin

The postgresql.conf parameters that can be changed in WebAdmin are shown below:

Section	WebAdmin item	postgresql.conf file parameter
Instance Configuration		
Character encoding	Character set	client_encoding
	Message locale	lc_messages
Communication	Max connections	max_connections
SQL options	Transform NULL format	transform_null_equals
	Date output format	DateStyle (*1)
	Interval output format	IntervalStyle
	Number of digits for floating values	extra_float_digits
	Transaction isolation levels	default_transaction_isolation
	Currency format	lc_monetary
	Date and time format	lc_time
	Numerical value format	lc_numeric
Memory	Sort memory (KB)	work_mem
	Shared buffers (KB)	shared_buffers
Streaming replication	WAL level	wal_level

Section	WebAdmin item	postgresql.conf file parameter
	Maximum WAL senders	max_wal_senders
	WAL save size (MB)	wal_keep_size
	Hot standby	hot_standby
	Synchronous standby names	synchronous_standby_names
	WAL receiver timeout (ms)	wal_receiver_timeout
Edit instance		
	Instance name	n/a
	Instance port	port
	Backup storage path	backup_destination

*1: If you specify "Postgres" as the output format, dates will be output in the "12-17-1997" format, not the "Wed Dec 17 1997" format used in the PostgreSQL Documentation.

Information

- Calculate the maximum number of connections using the formula below:

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications + 3 (*1)
```

*1: 3 is the default number of connections required by the system.
Calculate the maximum number of connections using the following formula when changing superuser_reserved_connections (connections reserved for use by the superuser) in postgresql.conf.

```
maximumNumberOfConnections = maximumNumberOfConnectionsFromApplications +
superuser_reserved_connections
```

- Also check if the memory used exceeds the memory installed (refer to "Parameters automatically set by WebAdmin according to the amount of memory").

Parameters set by WebAdmin

The following postgresql.conf parameters are set by WebAdmin during instance startup (they will be ignored even if specified in postgresql.conf):

Parameter	Value
event_source (*1)	'fsep_*version_userName_instanceNamePortNumber*'
listen_addresses	*
log_destination	'stderr,eventlog'
logging_collector	on
log_line_prefix	'%e: %t [%p]: [%l-1] user = %u,db = %d,remote = %r app = %a '
log_filename (*2) (*3)	'logfile-%a.log'
log_truncate_on_rotation	on
log_rotation_age	1d

*1: *PortNumber* is the port number of the database server specified when creating the instance.

*2: The server logs are split into files based on the day of the week, and are rotated after each week.

*3: If the date changes while the instance is stopped, old logs are not deleted and continue to exist.
Manually delete old logs that are no longer required to release disk space.

Parameters automatically set by WebAdmin according to the amount of memory

The postgresql.conf parameters automatically set according to the amount of installed memory, during the creation of instances by WebAdmin, are shown below:

Parameter	Value
shared_buffers	30% of the machine's installed memory
work_mem	30% of the machine's installed memory / max_connections / 2
effective_cache_size	75% of the machine's installed memory
maintenance_work_mem	10% of the machine's installed memory / (1 + autovacuum_max_workers) (*1)

*1: The value will be capped at 2097151 KB.

When determining the values to be configured in the above parameters, you must take into account any anticipated increases in access volume or effects on performance during business operations, such as the number of applications and commands that will access the instance, and the content of processes. Also, note that in addition to FUJITSU Enterprise Postgres, other software may be running on the actual database server. You will need to determine the degree of priority for the database and other software, as well as the memory allocation size.

WebAdmin automatically configures complex parameter settings such as those mentioned above, based on the size of the internal memory of the machine. This enables maximum leverage of the machine memory to facilitate resistance against fluctuations during business operations.

Accordingly, the effects of the above-mentioned factors must be estimated and taken into account when determining and configuring parameter values, so that memory resources can be effectively allocated among other software or instances, and so that adverse effects can be mutually avoided. Refer to "Memory" in "Resource Consumption", and "Planner Cost Constants" in "Query Planning", under "Server Administration" in the PostgreSQL Documentation for information on parameter values and required considerations.

Parameter values can be modified using the WebAdmin [Setting] menu, or edited directly using a text editor.

If adding an instance, determine the parameter values, including for existing instances, and make changes accordingly.

Note

- Do not directly edit the following postgresql.conf parameters with a text editor, otherwise WebAdmin may not work properly if you make a mistake):
  - archive_mode
  - archive_command
  - wal_level
  - wal_sync_method
  - log_line_prefix
  - log_destination
  - logging_collector
  - log_directory
  - log_file_mode
  - log_filename
  - log_truncate_on_rotation
  - log_rotation_age
  - event_source

- You must take care with the following parameter:
  - superuser_reserved_connections

    Set it to a number that includes the 3 connections required in WebAdmin (the default is 3).

pg_hba.conf

Refer to "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for information on content that can be configured in pg_hba.conf.

- Use the following client authentication settings to allow the instance administrator to connect to the database using WebAdmin:
  - The connection type: "host"
  - The IP address is a loopback address ("127.0.0.1/32")
- If you specify an item or value that cannot be set by WebAdmin when editing the pg_hba.conf file with a text editor, it will not be possible to reference that line from WebAdmin.

Appendix E Estimating Database Disk Space Requirements

This appendix describes how to estimate database disk space requirements.

E.1 Estimating Table Size Requirements

The following tables provide the formulas for estimating table size requirements.

Table E.1 Estimation formula when the record length is 2032 bytes or less

Item	Estimation formula (bytes)
(1) Record length	27(*1) + NULL map + OID + column data NULL map: Number of columns / 8 (*2) OID: 4 Column data: Sum of column lengths *1: Record header section *2: Round the result up to the next integer. - Because the column data is placed in boundaries of 8 bytes, you need to make an adjustment so that the sum of the record header section, NULL map and OID is a multiple of 8. For example, if the calculated length is 27 + 1 / 8 (rounded up) + 0 = 28 bytes, add 4 to make the length 32 bytes. - Because the data of each column is placed in boundaries of the defined data type, take the boundary of each data type into account for the length of the column data. For example, the length of the column data in the table below will not be the sum of the data types, which is 37 bytes, but will instead be 64 bytes following boundary adjustment. Definition: create table tb1(c1 char(1), c2 long, c3 int, c4 box) Estimation: CHAR type 1 byte + boundary adjustment of 7 bytes for LONG type 8 bytes + LONG type 8 bytes + INT type 4 bytes + boundary adjustment of 12 bytes for BOX type 32 bytes + BOX type 32 bytes = 64 bytes - Because each record is placed in boundaries of 8 bytes, you need to make an adjustment so that the length of the column data is a multiple of 8. - If the calculated record length exceeds 2,032 bytes, the variable length data in the record might be compressed automatically. If so, use the estimation formulas in "Table E.2 Estimation formula when the record length exceeds 2032 bytes" to estimate the table size.
(2) Page size requirement	8192 (*1) × fillfactor (*2) - 24 (*3) *1: Page length (8192) *2: Value of the fillfactor specified in the table definitions (if omitted, 100%) *3: Page header (24) - The calculated (2) page size requirement will be rounded down to the nearest integer.
(3) Number of records per page	(2) Page size requirement / ((1) record length + 4 (*1)) *1: Pointer length (4) - The result will be rounded down to the nearest integer.

Item	Estimation formula (bytes)
(4) Number of pages required for storing records	Total number of records / (3) number of records per page - The result will be rounded up to the next integer.
(5) Amount of space	(4) Number of pages required for storing records x page length x safety factor (*1) *1: Specify 2.0 or higher. - This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

Table E.2 Estimation formula when the record length exceeds 2032 bytes

Item	Estimation formula (bytes)
(5) Amount of space	Total number of records x (1) record length x safety factor (*1) *1: Specify 2.0 or higher. - This is the safety factor assumed if vacuuming is performed for garbage collection in tables and indexes.

E.2 Estimating Index Size Requirements

This section provides the formulas for estimating index size requirements.

FUJITSU Enterprise Postgres provides six index types: B-tree, Hash, GiST, GIN, SP-GiST, and VCI. If you do not specify the index type in the CREATE INDEX statement, a B-tree index is generated.

The following describes how to estimate a B-tree index. Refer to "E.7 Estimating VCI Disk Space Requirements" for information on how to estimate VCI.

A B-tree index is saved as a fixed-size page of 8 KB. The page types are meta, root, leaf, internal, deleted, and empty. Since leaf pages usually account for the highest proportion of space required, you need to calculate the requirements for these only.

Table E.3 Estimation formula when the key data length is 512 bytes or less

Item	Estimation formula (bytes)
(1) Entry length	8 (*1) + key data length (*2) *1: Entry header *2: The key data length depends on its data type (refer to "E.3 Sizes of Data Types" for details). Because each entry is placed in boundaries of 8 bytes, you need to make an adjustment so that the length of the key data is a multiple of 8. For example, if the calculated length is 28 bytes, add 4 to make the length 32 bytes. - If the key data length exceeds 512 bytes, key data may be automatically compressed. In this case, use the estimation formula given in "Table E.4 Estimation formula when the key data length exceeds 512 bytes" to estimate the key data length.
(2) Page size requirement	8192 (*1) × fillfactor (*2) - 24 (*3) - 16 (*4) *1: Page length (8192) *2: Value of the fillfactor specified in the index definitions (if omitted, 90%) In the case of indexes of primary key constraints and unique constraints, the value of the fillfactor specified for each constraint in the table definitions (if omitted, 90%) *3: Page header (24) *4: Special data (16)

Item	Estimation formula (bytes)
	- The calculated (2) page size requirement will be rounded down to the nearest integer.
(3) Number of entries per page	(2) Page size requirement / ((1) entry length + 4 (*1)) *1: Pointer length - Result of (3) number of entries per page will be rounded down to the nearest integer.
(4) Number of pages required for storing indexes	Total number of records / (3) number of entries per page - Result of (4) number of pages required for storing indexes will be rounded up to the nearest integer.
(5) Space requirement	(4) Number of pages required for storing indexes x 8192 (*1) / usage rate (*2) *1: Page length *2: Specify 0.7 or lower.

Table E.4 Estimation formula when the key data length exceeds 512 bytes

Item	Estimation formula (bytes)
(5) Space requirement	Total number of records x key data length x compression ratio (*1) / usage rate (*2) *1: The compression ratio depends on the data value, so specify 1. *2: Specify 0.7 or lower as the usage rate.

E.3 Sizes of Data Types

This section lists the sizes of the data types.

E.3.1 Sizes of Fixed-Length Data Types

The following table lists the sizes of fixed-length data types.

Data type	Size (bytes)
SMALLINT (INT2)	2
INTEGER (INT4)	4
BIGINT (INT8)	8
REAL	4
DOUBLE PRECISION	8
SERIAL (SERIAL4)	4
BIGSERIAL (SERIAL8)	8
MONEY	8
FLOAT	8
FLOAT (1-24)	4
FLOAT (25-53)	8
TIMESTAMP WITHOUT TIME ZONE	8
TIMESTAMP WITH TIME ZONE	8
DATE	4
TIME WITHOUT TIME ZONE	8
TIME WITH TIME ZONE	12

Data type	Size (bytes)
INTERVAL	12
BOOLEAN	1
CIDR	IPv4: 7 IPv6: 19
INET	IPv4: 7 IPv6: 19
MACADDR	6
MACADDR8	8
POINT	16
LINE	32
LSEG	32
BOX	32
CIRCLE	24

E.3.2 Sizes of Variable-Length Data Types

The following table lists the sizes of variable-length data types.

Data type	Size (bytes)	Remarks
path	Length of size portion + 12 + 16 x number of vertices	1) When carrying out division, round to the next integer. 2) If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes. 3) The number of bytes per character depends on the character set (refer to "E.3.4 Number of Bytes per Character" for details).
polygon	Length of size portion + 36 + 16 x number of vertices	
decimal	Length of size portion + 2 + (integer precision / 4 + decimal precision / 4) x 2	
numeric		
bytea	Length of size portion + real data length	
character varying(*n*), varchar(*n*)	Length of size portion + number of characters x number of bytes per character	
character(*n*), char(*n*)	Length of size portion + *n* x number of bytes per character	
text	Length of size portion + number of characters x number of bytes per character	

E.3.3 Sizes of Array Data Types

The following table lists the sizes of array data types.

Data type	Size (bytes)	Remarks
Array	Length of size portion + 12 + 8 x number of dimensions + data size of each item	If the real data length is less than 127, then the length of the size portion is 1 byte, otherwise it is 4 bytes. - Example of estimation when array data is "ARRAY[[1,2,3],[1,2,3]]" Number of dimensions: 2 INTEGER data size: 4 Total size = 1+12+8x2+6x4 = 53

E.3.4 Number of Bytes per Character

The following table lists the number of bytes per character.

The given values relate to the common character sets EUC-JP and UTF8.

Character type	Character set	Number of bytes per character
ASCII	EUC_JP	1
Halfwidth katakana	EUC_JP	2
JIS X 0208 kanji characters	EUC_JP	2
JIS X 0212 kanji characters	EUC_JP	3
ASCII	UTF8	1
Halfwidth katakana	UTF8	3
JIS X 0208 kanji characters	UTF8	3
JIS X 0212 kanji characters	UTF8	3

E.4 Estimating Transaction Log Space Requirements

This section provides the formula for estimating transaction log space requirements.

```
Transaction log space requirements = max_wal_size
```

However, if the update volume is extremely high (for example, due to a large data load and batch processing), disk writing at a checkpoint may not be able to keep up with the load, and a higher number of transaction logs than indicated here may temporarily be accumulated.

E.5 Estimating Archive Log Space Requirements

This section explains how to estimate archive log space requirements.

The archive log is an archive of the transaction logs from the time of a previous backup to the present, so it fluctuates depending on the backup period and the content of update transactions.

The longer the backup period and the more update transactions, the greater the space required for the archive log.

Therefore, measure the actual archive log space by using a test environment to simulate backup scheduling and database update in a real operating environment.

E.6 Estimating Backup Disk Space Requirements

This section provides the formula for estimating backup disk space requirements.

```
Backup disk space requirements = size of the database cluster x 2 + transaction log space requirements
                               + archive log space requirements
```

If the pgx_dmpall command performs a backup using a user exit, the backup disk size differs according to the database resources targeted for backup and the copy method.

E.7 Estimating VCI Disk Space Requirements

This section provides the formula for estimating VCI disk space requirements.

```
Disk space = (number of rows in tables) x (number of bytes per row) x (compression ratio) + (WOS size)
```

Number of bytes per row

```
Number of bytes per row = (19 + (number of columns specified in CREATE INDEX) / 8
                                  + (number of bytes per single column value)) x 1.1
```

Note: Round up the result to the nearest integer.

Compression ratio

Specify a value between 0 and 1. Since compression ratio depends on the data being compressed, use actual data or test data that simulates it, then compare the value with the estimation result. As a guide, the compression ratio measured with the Fujitsu sample data is shown below:

- Data with high degree of randomness (difficult to compress): Up to approximately 0.9 times.
- Data with high degree of similarity (easy to compress): Up to approximately 0.5 times.

WOS size

```
WOS size = (number of WOS rows) / 185 x 8096
```

One row is added to the number of WOS rows for each INSERT and DELETE, and two rows are added for UPDATE. On the other hand, the number decreases to 520,000 rows or less during conversion to ROS performed by the ROS control daemon.

Note

VCI does not support retrieval of disk space usage using the database object size function pg_indexes_size. To find out the actual total VCI disk space, check the disk space of the storage directory using an OS command or other method.

Appendix F Estimating Memory Requirements

This appendix explains how to estimate the memory.

F.1 FUJITSU Enterprise Postgres Memory Requirements

This section describes the formulas for estimating FUJITSU Enterprise Postgres memory requirements.

Use the following formula to obtain a rough estimate of memory required for FUJITSU Enterprise Postgres:

```
fujitsuEnterprisePostgresRequiredMemory = sharedMemoryAmount + localMemoryAmount
```

Shared memory amount

Refer to "Shared Memory and Semaphores" under "Server Administration" in the PostgreSQL Documentation for information on shared memory. If you enable the Global Meta Cache feature, you must also add the value of pgx_global_metacache. Refer to "Parameters" in the Operation Guide for the setting values.

However, note that if instances have been created using WebAdmin, the parameters below will be configured automatically when the instances are created. Take this into account when calculating the shared memory size.

Parameter name	Set value
shared_buffers	30 percent of the internal memory of the machine.
max_connections	100
max_prepared_transactions	100

Local memory amount

```
localMemoryAmount = processStackArea
                  + memoryUsedInDbSessionsThatUseTempTables
                  + memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
                  + memoryUsedInMaintenanceOperations
                  + baseMemoryUsedInEachProcess
                  + memoryUsedPreparingForDataAccess
```

Process stack area

```
processStackArea
  = max_stack_depth x (max_connections + autovacuum_max_workers + 9)
```

This formula evaluates to the maximum value.
Actually it is used according to the growth of the stack.
In the formula above, 9 is the number of processes that perform roles specific to servers.

Memory used in database sessions that use temporary tables

```
memoryUsedInDbSessionsThatUseTempTables
  = temp_buffers x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as temporary buffers are used, and is released when the session ends.

Memory used in database sessions that perform sort and hash table operations

```
memoryUsedInDbSessionsThatPerformSortAndHashTableOperations
  = work_mem x max_connections
```

This formula evaluates to the maximum value.
Memory is gradually used as operations such as sort are performed, and is released when the query ends.

Memory used in maintenance operations

```
memoryUsedInMaintenanceOperations
  = maintenance_work_mem x (numOfSessionsPerformingMaintenance + autovacuum_max_workers)
```

Note that 'maintenance operations' are operations such as VACUUM, CREATE INDEX, and ALTER TABLE ADD FOREIGN KEY.

Base memory used in each process

```
baseMemoryUsedInEachProcess
  = baseMemoryUsedInOneProcess x (max_connections + autovacuum_max_workers + 9)
```

Use the result of the following formula for memory consumed per process. This formula evaluates to the memory used when server processes are running.
In the formula above, 9 is the number of processes that perform roles specific to servers.

The amount of memory consumed per process is determined by the number of tables, indexes, and all columns of all tables that the process accesses. If your system has about 100 tables, you can estimate it to be 3 MB, but otherwise use the following estimate:

```
baseMemoryUsedInOneProcess
  = (1.9KB x All user tables + 2.9KB x All user indexes + 1.0KB x All user columns) x 1.5(*1)

If you enable the Global Meta Cache feature, use the following formula:
baseMemoryUsedInOneProcess
 = (All user tables + All user indexes + All user columns) x 1.0KB x 1.5 (*1)
    + (All user tables x 1.4KB + All user indexes x 2.4KB)
```

*1) Safety Factor (1.5)
There are variable length information. This value takes that into account.

Memory used preparing for data access

```
memoryUsedPreparingForDataAccess
 = variationAmount x (max_connections + autovacuum_max_workers + 4)

  where variationAmount = shared_buffers / 8KB x 4 bytes
      (note that 8KB is the page length, and 4 bytes is the size of page management data)
```

This formula evaluates to the memory required to access the database cache in the shared memory.
In the formula above, among the processes that perform roles specific to servers, 4 is the number of processes that access the database.

F.2 Database Multiplexing Memory Requirements

This section describes the formula for estimating database multiplexing memory requirements for the database server.

Use the following formula to obtain a rough estimate of memory required for database multiplexing:

```
Memory usage of the database multiplexing feature for the database server
           = Peak memory usage of the Mirroring Controller processes
           + Peak memory usage of the Mirroring Controller commands

Peak memory usage of the Mirroring Controller processes=150 MB

Peak memory usage of the Mirroring Controller commands=50 MB x Number of commands executed
simultaneously
```

F.3 VCI Memory Requirements

This section describes the formula for estimating VCI memory requirements.

Use the following formula to obtain a rough estimate of memory requirements:

```
memUsedByVci = memForData + memForEachProcess
```

Memory required to store data in memory

Secure the space estimated using the formula below on the stable buffer (part of shared_buffers).

```
memForData = (numOfRowsInTables) x (numOfBytesPerRow) + (wosSize)
```

Number of bytes per row

```
numOfBytesPerRow
 = (19 + (numOfColsInCreateIndexStatement) / 8 + (numOfBytesPerSingleColValue)) x 1.1
```

Note: Round up the result to the nearest integer.

WOS size

```
wosSize = (numOfWosRows) / 185 x 8096
```

One row is added to the number of WOS rows for each INSERT and DELETE, and two rows are added for UPDATE. On the other hand, the number decreases to 520,000 rows or less during conversion to ROS performed by the ROS control daemon.

Memory required for each process

```
memForEachProcess
 = memUsedPerScanning
 + memUsedForVciMaintenace
 + memUsedByCreateIndexStatement
```

Memory used per scanning

- Parallel scan

```
memUsedPerScanning
 = vci.shared_work_mem + (numOfParallelWorkers + 1) x vci.maintenance_work_mem
```

Note: The number of parallel workers used by VCI simultaneously in the entire instance is equal to or less than vci.max_parallel_degree.

- Non-parallel scan

```
memUsedPerScanning = vci.max_local_ros + vci.maintenance_work_mem
```

Note

- vci.shared_work_mem, and vci.max_local_ros are used to create local ROS. If local ROS exceeds these sizes, execute a query without using VCI according to the conventional plan.
- vci.maintenance_work_mem specifies the memory size to be secured dynamically. If it exceeds the specified value, a disk temporary file is used for operation.

Memory used for VCI maintenance

```
memUsedForVciMaintenace = vci.maintenance_work_mem x vci.control_max_workers
```

Memory used by CREATE INDEX

```
memUsedByCreateIndexStatement = vci.maintenance_work_mem
```

Note

vci.maintenance_work_mem specifies the memory to be secured dynamically. If it exceeds the specified value, a disk temporary file is used for operation.

F.4 High-Speed Data Load Memory Requirements

This section describes the formula for estimating memory requirements for the high-speed data load feature.

Use the following formula to obtain a rough estimate of memory requirements:

```
Memory usage of high speed data load
 = (Peak memory usage of pgx_loader processes + Peak memory usage of the pgx_loader commands)
 x Number of commands executed simultaneously

Peak memory usage of pgx_loader processes
 = Peak memory usage of the backend process   (6 MB)
 + Peak memory usage of parallel workers       (6 MB x number of parallel workers)
 + Peak memory usage of dynamic shared memory (80 MB x number of parallel workers)

Peak memory usage of the pgx_loader commands=9 MB
```

Point

In addition to the size calculated using the formula above, the database cache on the shared memory estimated using the shared_buffers parameter is consumed according to the size of the data (table and index keys) loaded using this feature. Refer to "E.1 Estimating Table Size Requirements" and "E.2 Estimating Index Size Requirements" for information on estimating an appropriate shared buffers value.

F.5 Global Meta Cache Memory Requirements

This section describes the formula for estimating Global Meta Cache memory requirements.

The memory calculated by "Size of the GMC area" is allocated to the shared memory. The memory calculated by the per-process meta cache management information is allocated to the local memory. Refer to the graphic in "Architecture of Global Meta Cache Feature" in the "Memory usage reduction by Global Meta Cache" in the General Description for more information.

Use the following formula to obtain a rough estimate of memory requirements:

```
Amount of memory used by the Global Meta Cache feature
  = Size of GMC area + Per-process meta cache management information

Size of GMC area = (All user tables x 0.4 KB
     + All user indexes x 0.3 KB
     + All user columns x 0.8 KB) x 1.5 (*1)

Per-process meta cache management information
  = (All user tables + All user indexes + All user columns) x 0.1KB x max_connections x 1.5 (*1)
```

*1) Safety Factor (1.5)
This value takes into account the case where both GMC before and after the change temporarily exist at the same time in shared memory when the table definition is changed or the row of the system catalog is changed.

Appendix G Quantitative Limits

This appendix lists the quantitative limits of FUJITSU Enterprise Postgres.

Table G.1 Length of identifier

Item	Limit
Database name	Up to 63 bytes (*1) (*2)
Schema name	Up to 63 bytes (*1) (*2)
Table name	Up to 63 bytes (*1) (*2)
View name	Up to 63 bytes (*1) (*2)
Index name	Up to 63 bytes (*1) (*2)
Tablespace name	Up to 63 bytes (*1) (*2)
Cursor name	Up to 63 bytes (*1) (*2)
Function name	Up to 63 bytes (*1) (*2)
Aggregate function name	Up to 63 bytes (*1) (*2)
Trigger name	Up to 63 bytes (*1) (*2)
Constraint name	Up to 63 bytes (*1) (*2)
Conversion name	Up to 63 bytes (*1) (*2)
Role name	Up to 63 bytes (*1) (*2)
Cast name	Up to 63 bytes (*1) (*2)
Collation sequence name	Up to 63 bytes (*1) (*2)
Encoding method conversion name	Up to 63 bytes (*1) (*2)
Domain name	Up to 63 bytes (*1) (*2)
Extension name	Up to 63 bytes (*1) (*2)
Operator name	Up to 63 bytes (*1) (*2)
Operator class name	Up to 63 bytes (*1) (*2)
Operator family name	Up to 63 bytes (*1) (*2)
Rewrite rule name	Up to 63 bytes (*1) (*2)
Sequence name	Up to 63 bytes (*1) (*2)
Text search settings name	Up to 63 bytes (*1) (*2)
Text search dictionary name	Up to 63 bytes (*1) (*2)
Text search parser name	Up to 63 bytes (*1) (*2)
Text search template name	Up to 63 bytes (*1) (*2)
Data type name	Up to 63 bytes (*1) (*2)
Enumerator type label	Up to 63 bytes (*1) (*2)

*1: This is the character string byte length when converted by the server character set character code.

*2: If an identifier that exceeds 63 bytes in length is specified, the excess characters are truncated and it is processed.

Table G.2 Database object

Item	Limit
Number of databases	Less than 4,294,967,296 (*1)

Item	Limit
Number of schemas	Less than 4,294,967,296 (*1)
Number of tables	Less than 4,294,967,296 (*1)
Number of views	Less than 4,294,967,296 (*1)
Number of indexes	Less than 4,294,967,296 (*1)
Number of tablespaces	Less than 4,294,967,296 (*1)
Number of functions	Less than 4,294,967,296 (*1)
Number of aggregate functions	Less than 4,294,967,296 (*1)
Number of triggers	Less than 4,294,967,296 (*1)
Number of constraints	Less than 4,294,967,296 (*1)
Number of conversion	Less than 4,294,967,296 (*1)
Number of roles	Less than 4,294,967,296 (*1)
Number of casts	Less than 4,294,967,296 (*1)
Number of collation sequences	Less than 4,294,967,296 (*1)
Number of encoding method conversions	Less than 4,294,967,296 (*1)
Number of domains	Less than 4,294,967,296 (*1)
Number of extensions	Less than 4,294,967,296 (*1)
Number of operators	Less than 4,294,967,296 (*1)
Number of operator classes	Less than 4,294,967,296 (*1)
Number of operator families	Less than 4,294,967,296 (*1)
Number of rewrite rules	Less than 4,294,967,296 (*1)
Number of sequences	Less than 4,294,967,296 (*1)
Number of text search settings	Less than 4,294,967,296 (*1)
Number of text search dictionaries	Less than 4,294,967,296 (*1)
Number of text search parsers	Less than 4,294,967,296 (*1)
Number of text search templates	Less than 4,294,967,296 (*1)
Number of data types	Less than 4,294,967,296 (*1)
Number of enumerator type labels	Less than 4,294,967,296 (*1)
Number of default access privileges defined in the ALTER DEFAULT PRIVILEGES statement	Less than 4,294,967,296 (*1)
Number of large objects	Less than 4,294,967,296 (*1)
Number of index access methods	Less than 4,294,967,296 (*1)

*1: The total number of all database objects must be less than 4,294,967,296.

Table G.3 Schema element

Item	Limit
Number of columns that can be defined in one table	From 250 to 1600 (according to the data type)
Table row length	Up to 400 gigabytes
Number of columns comprising a unique constraint	Up to 32 columns
Data length comprising a unique constraint	Less than 2,000 bytes (*1) (*2)

Item	Limit
Table size	Up to 32 terabyte
Search condition character string length in a trigger definition statement	Up to 800 megabytes (*1) (*2)
Item size	Up to 1 gigabyte

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: This is the character string byte length when converted by the server character set character code.

Table G.4 Index

Item	Limit
Number of columns comprising a key (including VCI)	Up to 32 columns
Key length (other than VCI)	Less than 2,000 bytes (*1)

*1: This is the character string byte length when converted by the server character set character code.

Table G.5 Data types and attributes that can be handled

Item			Limit
Character	Data length		Data types and attributes that can be handled (*1)
	Specification length (n)		Up to 10,485,760 characters (*1)
Numeric	External decimal expression		Up to 131,072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Internal binary expression	2 bytes	From -32,768 to 32,767
		4 bytes	From -2,147,483,648 to 2,147,483,647
		8 bytes	From -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
	Internal decimal expression		Up to 13,1072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Floating point expression	4 bytes	From -3.4E+38 to -7.1E-46, 0, or from 7.1E-46 to 3.4E+38
		8 bytes	From -1.7E+308 to -2.5E-324, 0, or from 2.5E-324 to 1.7E+308
bytea			Up to one gigabyte minus 53 bytes
Large object			Up to 4 terabyte

*1: This is the character string byte length when converted by the server character set character code.

Table G.6 Function definition

Item	Limit
Number of arguments that can be specified	Up to 100
Number of variable names that can be specified in the declarations section	No limit
Number of SQL statements or control statements that can be specified in a function processing implementation	No limit

Table G.7 Data operation statement

Item	Limit
Maximum number of connections for one process in an application (remote access)	4,000 connections
Number of expressions that can be specified in a selection list	Up to 1,664
Number of tables that can be specified in a FROM clause	No limit
Number of unique expressions that can be specified in a selection list/ DISTINCT clause/ORDER BY clause/GROUP BY clause within one SELECT statement	Up to 1,664
Number of expressions that can be specified in a GROUP BY clause	No limit
Number of expressions that can be specified in an ORDER BY clause	No limit
Number of SELECT statements that can be specified in a UNION clause/INTERSECT clause/EXCEPT clause	Up to 4,000 (*1)
Number of nestings in joined tables that can be specified in one view	Up to 4,000 (*1)
Number of functions or operator expressions that can be specified in one expression	Up to 4,000 (*1)
Number of expressions that can be specified in one row constructor	Up to 1,664
Number of expressions that can be specified in an UPDATE statement SET clause	Up to 1,664
Number of expressions that can be specified in one row of a VALUES list	Up to 1,664
Number of expressions that can be specified in a RETURNING clause	Up to 1,664
Total expression length that can be specified in the argument list of one function specification	Up to 800 megabytes (*2)
Number of cursors that can be processed simultaneously by one session	No limit
Character string length of one SQL statement	Up to 800 megabytes (*1) (*3)
Number of input parameter specifications that can be specified in one dynamic SQL statement	No limit
Number of tokens that can be specified in one SQL statement	Up to 10,000
Number of values that can be specified as a list in a WHERE clause IN syntax	No limit
Number of expressions that can be specified in a USING clause	No limit
Number of JOINs that can be specified in a joined table	Up to 4,000 (*1)
Number of expressions that can be specified in COALESCE	No limit
Number of WHEN clauses that can be specified for CASE in a simple format or a searched format	No limit
Data size per record that can be updated or inserted by one SQL statement	Up to one gigabyte minus 53 bytes
Number of objects that can share a lock simultaneously	Up to 256,000 (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: The total number of all database objects must be less than 4,294,967,296.

*3: This is the character string byte length when converted by the server character set character code.

Table G.8 Data size

Item	Limit
Data size per record for input data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)
Data size per record for output data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

Appendix H Determining the Preferred WebAdmin Configuration

This appendix describes the two different configurations in which WebAdmin can be used and how to select the most suitable configuration.

H.1 WebAdmin Configurations

WebAdmin can be installed in two configurations:

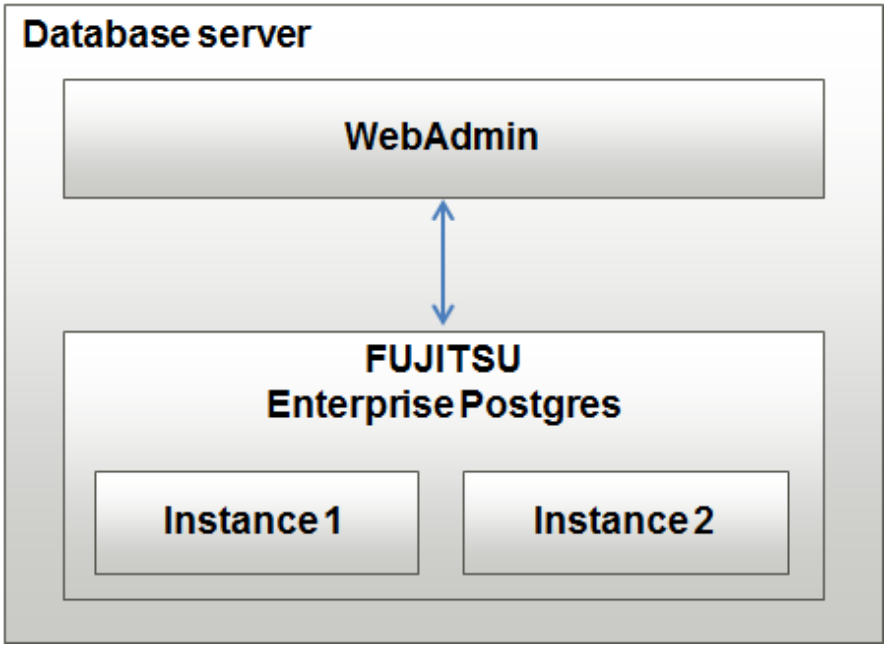
- Single-server
- Multiserver

WebAdmin does not support encrypted communication between browser and server or between servers. Therefore, when using WebAdmin in either configuration, build the communication path with the browser or each server on a network that cannot be accessed externally.

H.1.1 Single-Server Configuration

A single-server configuration enables you to create and operate instances on a single server. In this configuration, WebAdmin must be installed on the same database server as the FUJITSU Enterprise Postgres Server component.

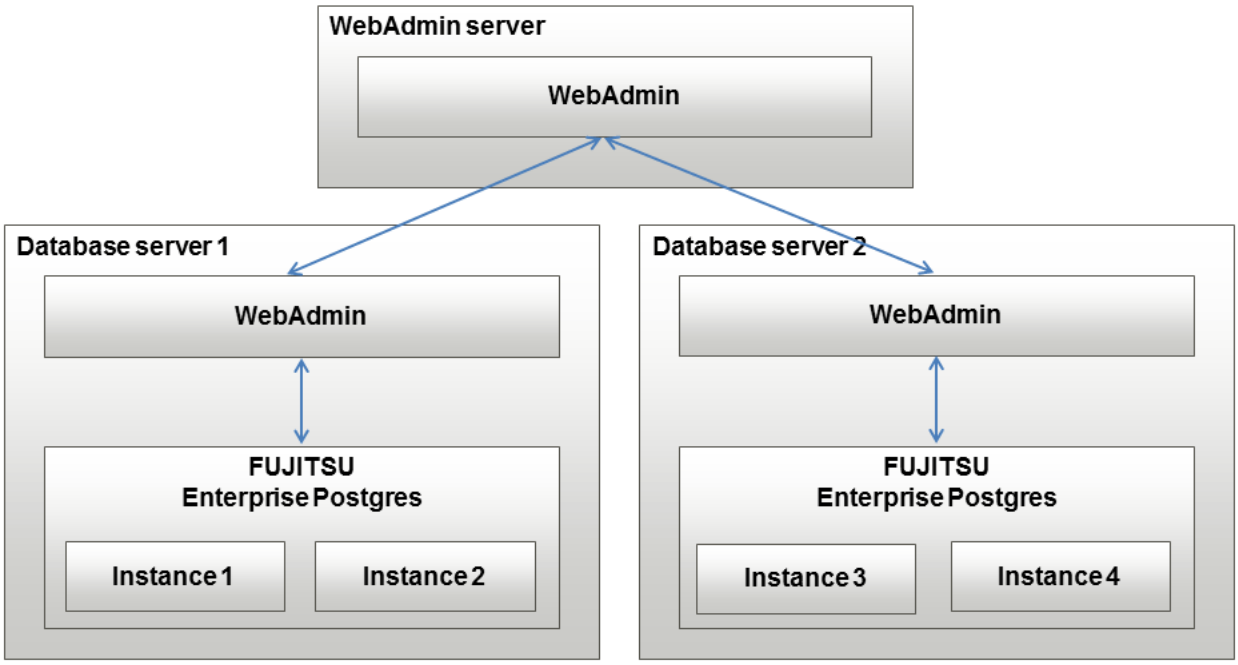
Single-server configuration



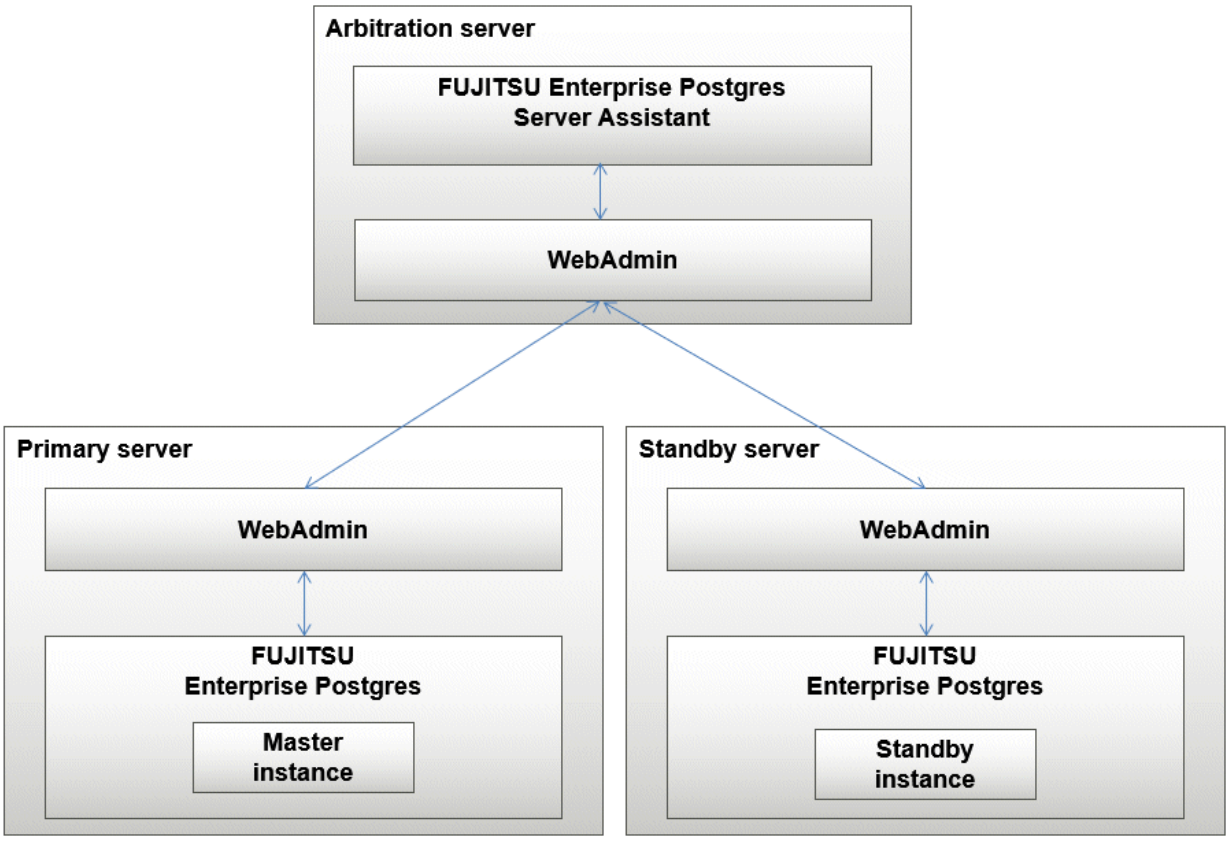
H.1.2 Multiserver Configuration

A multiserver configuration enables you to create and operate instances stored on multiple database servers. As shown in the figure below, WebAdmin can be installed on a dedicated WebAdmin server and used to collectively manage the instances stored on the database servers.

Multiserver configuration



Also, when setting up the arbitration server by WebAdmin during database multiplexing mode, install WebAdmin on the arbitration server.



H.2 Installing WebAdmin in a Single-Server Configuration

To install WebAdmin in a single-server configuration, the FUJITSU Enterprise Postgres Server component and WebAdmin must be installed on the same machine.

Select the following items when installing FUJITSU Enterprise Postgres in a single-server configuration:

- FUJITSU Enterprise Postgres Advanced Edition or FUJITSU Enterprise Postgres Standard Edition
- WebAdmin

H.3 Installing WebAdmin in a Multiserver Configuration

In a multiserver configuration, install WebAdmin on one server, and both WebAdmin and the FUJITSU Enterprise Postgres Server component on any number of database servers.

Select the following items when installing FUJITSU Enterprise Postgres in a multiserver configuration:

- WebAdmin server:
  - WebAdmin
- Database server:
  - FUJITSU Enterprise Postgres Advanced Edition or FUJITSU Enterprise Postgres Standard Edition
  - WebAdmin

Also, when setting up the arbitration server by WebAdmin during database multiplexing mode, select the following when installing FUJITSU Enterprise Postgres.

- Arbitration server
  - FUJITSU Enterprise Postgres Server Assistant
  - WebAdmin

See

Refer to the Installation and Setup Guide for Server Assistant for details on how to install the Server Assistant.

Appendix I Supported contrib Modules and Extensions Provided by External Projects

FUJITSU Enterprise Postgres supports PostgreSQL contrib modules, and extensions provided by external projects.

Refer to the following for details on the supported contrib modules:

- "Additional Supplied Modules" in the PostgreSQL Documentation
- "Additional Supplied Programs" in the PostgreSQL Documentation

Information

You can also check the list of available extensions using the pg_available_extensions view.

Refer to "OSS Supported by FUJITSU Enterprise Postgres" in the General Description for information on supported extensions provided by external projects.

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FUJITSU

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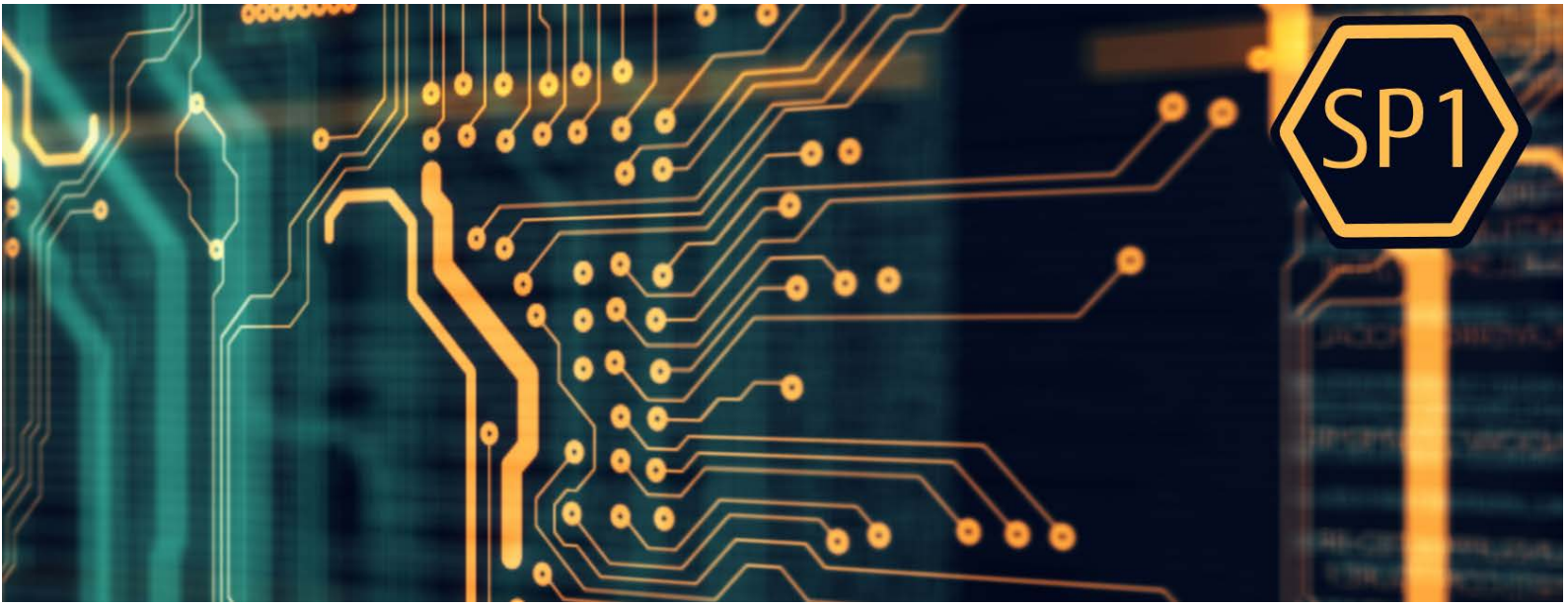

Installation and Setup Guide for Client

Windows/Linux

J2UL-2675-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document describes how to install, uninstall and set up the "FUJITSU Enterprise Postgres client feature".

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

W
- PostgreSQL
- SQL
- Windows

L
- PostgreSQL
- SQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Installation

Describes the features that can be installed, and provides an overview of installation methods

Chapter 2 Installation and Uninstallation of the Windows Client

Describes how to install the FUJITSU Enterprise Postgres client feature (Windows client)

Chapter 3 Installation and Uninstallation of the Linux Client

Describes how to install the FUJITSU Enterprise Postgres client feature (Linux client)

Chapter 4 Setup

Describes the setup procedures to be performed after installation completes

Export restrictions

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```
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```

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Chapter 1 Overview of Installation

This chapter provides an overview of FUJITSU Enterprise Postgres installation.

1.1 Features that can be Installed

FUJITSU Enterprise Postgres provides features to enable access to the database from a variety of platforms and languages, as the connection environment for the client and the database server.

The FUJITSU Enterprise Postgres client package must be installed on the client system to use these features.

The following table shows the relationship between the platforms and the features provided by client packages.

Platform	JDBC	ODBC	.NET Data Provider	C language (libpq)	Embedded SQL (ECPG) in C language	Embedded SQL (ECOBPG) in COBOL	Connection Manager	High-speed data load	pgAdmin	Pgpool-II
Windows	Y	Y	Y	Y	Y	Y		Y	Y	
Linux	Y	Y		Y	Y	Y	Y	Y		Y

Y: Supported

1.2 Installation Types

The following installation types are available for FUJITSU Enterprise Postgres:

- New installation
- Reinstallation
- Multi-version installation

1.2.1 New Installation

In initial installation, the FUJITSU Enterprise Postgres client feature is installed for the first time.

1.2.2 Reinstallation

Perform reinstallation to repair installed program files that have become unusable for any reason.

1.2.3 Multi-Version Installation

Perform multi-version installation to install different versions to the installed program files separately.

1.3 Installation Procedure

The following installation procedures are available for FUJITSU Enterprise Postgres:

- Installation in interactive mode
- Installation in silent mode

Select the installation procedure that corresponds to your environment.

1.3.1 Installation in Interactive Mode

Interactive mode enables installation to be performed while the required information is entered interactively.

In interactive mode installation, the FUJITSU Enterprise Postgres installer automatically determines the installation state of FUJITSU Enterprise Postgres. Install FUJITSU Enterprise Postgres using one of the following installation types in accordance with the installation state:

- New installation
- Reinstallation
- Multi-version installation

1.3.2 Installation in Silent Mode

Silent mode enables installation to be performed without the need to enter any information interactively.

New installations and multi-version installations can be performed in silent mode.

1.4 Uninstallation

Uninstallation removes the system files of the installed FUJITSU Enterprise Postgres client feature.

Chapter 2 Installation and Uninstallation of the Windows Client

This chapter explains how to install and uninstall the Windows client.

2.1 Operating Environment

This section describes the operating environment required to use the Windows client.

2.1.1 Required Operating System

One of the following operating systems is required to use the Windows client:

- Windows(R) 8.1
- Windows(R) 8.1 Pro
- Windows(R) 8.1 Enterprise
- Windows(R) 10 Home
- Windows(R) 10 Education
- Windows(R) 10 Pro
- Windows(R) 10 Enterprise
- Microsoft Windows Server 2016 Datacenter
- Microsoft Windows Server 2016 Standard
- Microsoft Windows Server 2016 Essentials
- Microsoft Windows Server 2019 Datacenter
- Microsoft Windows Server 2019 Standard
- Microsoft Windows Server 2019 Essentials

Note: If Windows is 32 bit, only the Windows client (32 bit) can be installed.

Note

The following components of Windows Server(R) 2016 and Windows Server(R) 2019 are not supported:

- Server Core
- Nano Server
- Windows Server Container

2.1.2 Related Software

The following table lists the software compatible (that can operate) with the Windows client.

Before using any of these, confirm that the OS supports the software.

Table 2.1 Related software

No.	Software name	Version
1	Visual Studio	2015 2017 2019

No.	Software name	Version
2	.NET Framework	4.6.1 or later 4.7/4.7.x 4.8
3	C compiler (*1)	-
4	JDK or JRE	Java SE 6 or later
5	NetCOBOL NetCOBOL for .NET	(*2) (*3)

*1: Only operations using the C compiler provided with the operating system are guaranteed.

*2: NetCOBOL is available in the following editions:

- NetCOBOL Base Edition V10.5.0 or later
- NetCOBOL Standard Edition V10.5.0 or later
- NetCOBOL Professional Edition V10.5.0 or later
- NetCOBOL Enterprise Edition V10.5.0 or later

*3: NetCOBOL for .NET is available in the following editions:

- NetCOBOL Standard Edition for .NET V5.0.0 or later
- NetCOBOL Professional Edition for .NET V5.0.0 or later
- NetCOBOL Enterprise Edition for .NET V5.0.0 or later

Note

The following JDKs or JREs are available:

- JDK or JRE shipped with the Interstage Application Server
- JDK shipped with the Enterprise Application Platform
- Oracle JDK or JRE
- An OpenJDK that has passed the Java TCK (Technology Compatibility Kit)

It is recommended that the JDK or JRE included with Interstage Application Server and Enterprise Application Platform is used.

The following table lists servers that can be connected to the Windows client.

Table 2.2 Connectable servers

OS	Software name
Windows Linux	- FUJITSU Software Enterprise Postgres Advanced Edition 9.5 or later - FUJITSU Software Enterprise Postgres Standard Edition 9.4 or later
Solaris	- FUJITSU Software Enterprise Postgres Standard Edition 9.6 or later

2.1.3 Excluded Software

FUJITSU Enterprise Postgres

The Windows client cannot coexist with the FUJITSU Enterprise Postgres Community Edition (hereafter, "CE") client.

Other products

There are no exclusive products.

2.1.4 Hardware Environment

The following hardware is required to use the Windows client.

Memory

At least 256 MB of memory is required.

Mandatory hardware

None.

2.1.5 Disk Space Required for Installation

The disk space shown below is required for new installation of the Windows client.

At the Windows (32-bit) client installation destination:

467 MB

At the Windows (64-bit) client installation destination:

485 MB

System folder:

273 MB

2.1.6 Supported System Environment

This section describes the supported system environment.

TCP/IP protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

File system

You can install FUJITSU Enterprise Postgres only if the system folder is an NTFS volume.

2.1.7 Versions of Open-Source Software Used as the Base for FUJITSU Enterprise Postgres Drivers

The following table lists the versions of open-source software used as the base for the various FUJITSU Enterprise Postgres drivers.

Driver	Open-source software version
.NET Data Provider	Npgsql 4.1.7
JDBC	pgjdbc 42.2.18
ODBC	psqlodbc 13.00.0000
libpq	PostgreSQL 13.3

2.2 Installation

This section explains how to install the Windows client.

Note

When installing the Fujitsu Enterprise Postgres Client (32 bit) in a 64 bit environment, do not specify a destination folder under the environment ProgramFiles variable.

2.2.1 Pre-installation Tasks

This section describes the operations to be performed before installing the Windows client.

hosts file settings

Using an editor, add the IP address and server name of the connected server to the \System32\drivers\etc\hosts file in the folder where Windows is installed.

Note

For Windows(R) 8.1, or Windows(R) 10, assign write privileges in advance to the user responsible for editing the hosts file.

Check the installed product and determine the installation method

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)]. In the displayed window, check the installed products.

If the Windows client is already installed, determine the installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation as the installation method, remove applied updates using the procedure shown below.

Note

If a product is installed without removing applied updates, the following problems will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
C:\Program Files (x86)\Fujitsu\UpdateAdvisor\UpdateAdvisorMW>uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
C:\Program Files (x86)\Fujitsu\UpdateAdvisor\UpdateAdvisorMW>uam remove -i update-number
```

Confirm service

The Windows Installer service must be running.

Confirm Path system environment variable

Ensure that the Path system environment variable includes "%SystemRoot%\system32".

2.2.2 Pre-installation Considerations

This section describes points that the user must take into account prior to installation.

- The remote desktop service is installed in application server mode, it is necessary to switch to install mode by executing the command shown below before installation. Also, after the installation is completed, execute the command shown below to switch back to execute mode.

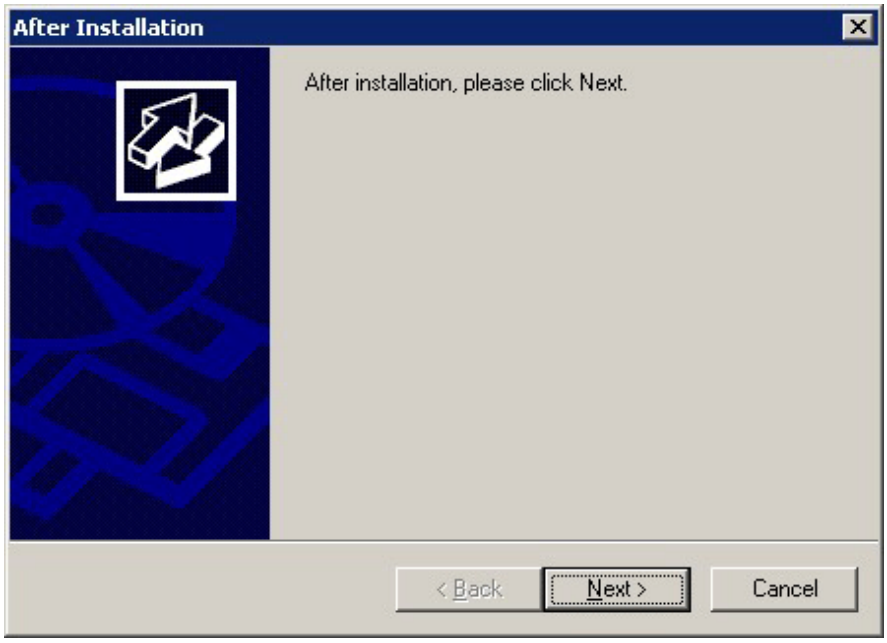
  Before installation:

```
CHANGE USER /INSTALL
```

  After installation:

```
CHANGE USER /EXECUTE
```

- The following window may be displayed when the installation program is executed.



If the above window is displayed, follow the procedure below:

1. Perform the steps in the installation procedure until the [InstallShield Wizard Complete] window is displayed.
2. Click [Next] in the [InstallShield Wizard Complete] window.

3. The following window is displayed. Click [Finish].

4. Restart the system.

Information

- If the [User Account Control] dialog box is displayed when installation or uninstallation starts, click [Yes] to continue the operation.

  If [No] is clicked, the [Error] dialog box will be displayed because continuing is not permitted.
  Click [Retry] in the displayed [Error] dialog box to proceed with installation or uninstallation. To end operations, click [Cancel].

- If installation or uninstallation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed.
  If this happens, click [This program installed correctly] or [This program uninstalled correctly] and continue operation.

2.2.3 Installation in Interactive Mode

The installation procedure is described below.

Point

For installation in interactive mode, default values are set for the installation information. The following settings can be changed for a new installation or a multi-version installation:

- Installation folder

1. Stop applications and programs

If the installation method is the following, all applications and programs that use the product must be stopped:

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product
- pgAdmin

2. Insert the DVD

Insert the client program DVD into the DVD drive.

3. Run the installation

The installation menu is displayed. Click [Installation].

4. Select the product to install

Select the product to install, and then click [Next].
If a selected product can only be reinstalled, refer to "6. Check the settings".

Information

If multi-version installation is possible, the [Select Installation Method] window is displayed for each selected product. Select "Multi-version installation" and click [Next].

5. Confirm the contents for installation

The [Confirm installation] window will be displayed.

Click [Next] to start the installation.

To modify the settings, select [Modify], and then click [Next]. Follow the on-screen instructions.

6. Check the settings

The [Confirm installation] window will be displayed for reinstallation, or if the installation information is modified.

Click [Install] to start the installation.

To modify the settings again, click [Back].

7. Completion of installation

The completion window is displayed. Click [Finish].

Note

In the cases below, refer to "2.4 Registering .NET Data Provider" for information on how to set up .NET Data Provider:

- .NET Framework is installed subsequently
- An issue occurs during installation
- A multi-version installation is performed

2.2.4 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

The installation procedure is described below.

1. Insert the DVD

Insert the client program DVD into the DVD drive.

The [Install Menu] window is displayed. Click [Finish].

2. Create an installation parameters CSV file

Consider the server type or features that will be required for system operations, and then create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
         :
```

Information

The template for the installation parameters CSV file is "*Z*:\sample\sample_windows.csv (*Z* is the drive into which the DVD is inserted.).

3. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

4. Run the installation

Execute the following command:

```
Z:\>silent.bat c:\temp\inspara.csv
```

Z: The drive into which the DVD is inserted.

c:\temp\inspara.csv: The installation parameter CSV file name.

If the silent installer ends in an error, a message is output to the log file and return values are returned.

Note

In the cases below, refer to "2.4 Registering .NET Data Provider" for information on how to set up .NET Data Provider:

- .NET Framework is installed subsequently
- An issue occurs during installation
- A multi-version installation is performed

2.3 Uninstallation

This section describes the procedure for uninstalling the Windows client.

Note

- Before uninstalling the product, close the product program and all applications that are using it.
- Log in using an account that has administrator privileges and then execute the command, or switch to an account that has administrator privileges and then uninstall the product.

2.3.1 Uninstallation in Interactive Mode

The uninstallation procedure is described below.

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgAdmin

2. Start the Uninstall (middleware) tool

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

3. Select the software

Select the product to be uninstalled from [Software Name], and then click [Remove].

4. Start the uninstallation

Click [Uninstall].

5. Finish the uninstallation

The uninstallation completion window is displayed. Click [Finish].

The installation folder may remain after uninstallation. If it is not required, delete it.

6. Stop the Uninstall (middleware) tool

The [Uninstall (middleware)] window is displayed. Click [Close].

2.3.2 Uninstallation in Silent Mode

The uninstallation procedure is described below.

See

Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgAdmin

2. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

3. Start the uninstaller

Execute the command below.

The installation folder may remain after uninstallation. If it is not required, delete it.

Example

```
X:> installFolder\suninst.bat
```

X: Drive on which the product is installed

2.4 Registering .NET Data Provider

This section explains how to register the .NET Data Provider feature in cases such as below, after installing the FUJITSU Enterprise Postgres client feature.

- .NET Framework is installed subsequently
- An issue occurs during installation of the FUJITSU Enterprise Postgres client feature
- Multiple versions of the FUJITSU Enterprise Postgres client feature are installed

In [Control Panel], select [Programs and Features], right-click [FUJITSU Enterprise Postgres Npgsql <x>], and then select [Change]. Note that "<x>" indicates the product version.

Operation	Description
Change	Install Npgsql Performance Counters or perform the Npgsql GAC Installation again. Click [Change], click the relevant item, select "Entire feature will be installed on local hard drive", and then click [Next] >> [Change] >> [Finish].
Repair	Repair a damaged installation. Click [Repair] >> [Repair] >> [Finish].

When you select [Change] and then select [Npgsql Installation], note that this consists of two parts:

- "Npgsql GAC only Installation"
- "Npgsql Publisher Policy and machine.config Installation"

If the FUJITSU Enterprise Postgres client feature is installed in an environment where no other versions exist

Perform "Npgsql GAC only Installation" and "Npgsql Publisher Policy and machine.config Installation".

If multiple versions of the FUJITSU Enterprise Postgres client feature are installed

The procedure differs depending on whether "FUJITSU.Npgsql" or another value is used for the invariant value.

Using "FUJITSU.Npgsql"

Perform "Npgsql GAC only Installation" and "Npgsql Publisher Policy and machine.config Installation".

- When "Npgsql Publisher Policy and machine.config Installation" is performed, an entry with the invariant value "FUJITSU.Npgsql" will be registered in the DbProviderFactories section of the machine.config file. All .NET applications that specify "FUJITSU.Npgsql" as an argument of GetFactory method of the DbProviderFactories class will now use the latest FUJITSU Enterprise Postgres Npgsql. Therefore, in a multi-version installation environment, carefully consider whether to use this option.
- If creating an application using Visual Studio tools when using the invariant value "FUJITSU.Npgsql" in a multi-version environment with FUJITSU Enterprise Postgres 9.6 or earlier, use the Visual Studio Integration Add-On bundled with this version.
  Refer to "Setting Up the Visual Studio Integration Add-On" in the Application Development Guide for details.

Using values other than "FUJITSU.Npgsql"

When using a value other than "FUJITSU.Npgsql" for the invariant value, perform "Npgsql GAC only Installation" and "2.4.1 Registering Entries to the machine.config File".

Point

- If you want to make a modification to use a value other than "FUJITSU.Npgsql" after performing the procedure to use "FUJITSU.Npgsql" for the invariant value, follow the procedure below:

  1. In [Control Panel], select [Programs and Features], right-click [FUJITSU Enterprise Postgres Npgsql <x>], and then select [Change]. Note that "<x>" indicates the product version.
  2. Open the [Npgsql Installation] feature and deselect [Npgsql Publisher Policy and machine.config Installation].
  3. Select [Next] >> [Change] >> [Finish].

- If you want to use different versions of Npgsql for each application in a multi-version environment, use the NpgsqlRegister.exe tool provided. Refer to "2.4.1 Registering Entries to the machine.config File" for details.

2.4.1 Registering Entries to the machine.config File

If you want to use different versions of Npgsql for each application during multi-version installation, this can be achieved by registering multiple entries with different invariant values to DbProviderFactories in the machine.config file and using the relevant value for each application.

NpgsqlRegister.exe is a tool provided by FUJITSU.

The NpgsqlRegister.exe tool allows a user to:

- Change the invariant value registered to a different version of FUJITSU Enterprise Postgres to this version (cannot be edited with the exception of the default invariant value "FUJITSU.Npgsql").
- Register an invariant value.

Note

- When changing existing invariant values, a user must edit existing DbProvider entries very carefully. Ensure that no application is using the DbProvider entries being edited.
- If it is likely that a user will install multiple versions of Npgsql, then it is recommended to add and use new invariant values.

The instructions below describe where to find and how to use this tool to register machine.config entries for the version being installed.

Location of NpgsqlRegister.exe

The NpgsqlRegister.exe tool is stored in the following location.

```
fujitsuEnterprisePostgresClientInstallDir\dotnet\NpgsqlRegister.exe
```

The NpgsqlRegister.exe tool requires .NET Framework 4.6.1 or later to be installed. If not installed, install .NET Framework 4.6.1 or later, and then execute the command again.

Using NpgsqlRegister.exe

Execute the command below as a user with administrator privileges.

```
> NpgsqlRegister.exe
```

The NpgsqlRegister.exe tool checks if a FUJITSU Enterprise Postgres invariant value exists. If a FUJITSU Enterprise Postgres invariant value does not exist in machine.config, an invariant value with the current version (FUJITSU.Npgsql)

is registered to machine.config, and this will be notified to the user. If a FUJITSU Enterprise Postgres invariant value exists, the user will be prompted with the following options.

```
1 - Edit an existing DbProvider entry to point to the current version
2 - Add a new Invariant alias DbProvider entry to point to the current version
3 - Exit
```

Editing an existing DbProvider entry

When this option is selected, applications that use an existing DbProvider entry will reference the latest installed Npgsql version from the GAC.

A list of all FUJITSU Enterprise Postgres Npgsql invariant name entries that exist in machine.config will be displayed as follows.

Example

```
Please select the Invariant attribute you would like to point
to the current version.
1 - Invariant attribute: FUJITSU.Npgsql.12, Npgsql Version: 12.0.0.0
2 - Invariant attribute: FUJITSU.Npgsql.13, Npgsql Version: 13.0.0.0
3 - Invariant attribute: Npgsql, Npgsql Version: 13.0.0.0
4 - Exit
```

Selecting one of the invariant values listed will result in the machine.config entries being updated to point to this version, and any existing application referencing this invariant value will start referencing this version of Npgsql.

Adding a new entry to DbProvider

When this option is selected, a new invariant value can be registered. When referencing the new registered invariant value from the application, this FUJITSU Enterprise Postgres server version of Npgsql is referenced.

Upon selecting the option to add a new invariant value, the following will be displayed.

```
You have chosen to add a new DbProvider entry with an Invariant Alias to the
machine.config

The Invariant attribute can either be in the form of 2 user defined formats (define
xyz):
1 - 'FUJITSU.Npgsql.xyz'
2 - 'Npgsql.xyz'

or add a DbProvider entry with Invariant attribute set to 'Npgsql'
3 - 'Npgsql'
4 - Exit

Please enter one of the options (1 .. 4):
```

By specifying a value to "*xyz*" in the first two options, any invariant value can be created. However, the user must specify at least one alphanumeric character of up to 10 characters.

The option three registers a new invariant value "Npgsql".

If the specified value already exists, a warning will be output as follows.

```
A DbProvider entry with Invariant attribute 'Npgsql' already exists in machine.config
If you require this Invariant attribute, restart the application and choose 'Edit an
existing DbProvider entry'
```

Chapter 3 Installation and Uninstallation of the Linux Client

This chapter explains how to install and uninstall the Linux client.

3.1 Operating Environment

This section describes the operating environment required to use the Linux client.

3.1.1 Required Operating System

One of the following operating systems is required to use the Linux client:

- RHEL7.2 or later minor version
- RHEL8.1 or later minor version
- SLES 12 SP5

Information

- The following packages are required for operations on RHEL7.

Package name	Remarks
glibc	-
glibc.i686	-
libgcc	-
libmemcached	Required when using Pgpool-II.
libstdc++	-
libtool-ltdl	-
ncurses-libs	-
nss-softokn-freebl	-
redhat-lsb	-
rsync	Required when using Pgpool-II.
unixODBC	Required when using ODBC drivers
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on RHEL8.

Package name	Remarks
glibc	-
glibc.i686	-
libnsl2	-
libgcc	-
libmemcached	Required when using Pgpool-II.
libstdc++	-

Package name	Remarks
libtool-ltdl	-
ncurses-libs	-
nss-softokn-freebl	-
redhat-lsb	-
rsync	Required when using Pgpool-II.
unixODBC	Required when using ODBC drivers
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on SLES 12.

Package name	Remarks
glibc	-
glibc-32bit	-
JRE 8	Required by installer The following JREs are available: - Oracle JRE Use update 31 or later of the 64-bit version. - OpenJDK Past the Java TCK (Technology Compatibility Kit)
libfreebl3	-
libgcc	-
libltdl7	-
liblzma5	-
libmemcached	Required when using Pgpool-II.
libncurses5	-
libstdc++	-
libz1	-
rsync	Required when using Pgpool-II.
unixODBC	Required when using ODBC drivers
unzip	-

3.1.2 Related Software

The following table lists the software required to use the Linux client.

Table 3.1 Related software

No.	Software name	Version
1	C compiler (*1)	-
2	JDK or JRE	Java SE 6 or later
3	NetCOBOL	(*2)

*1: Only operations using the C compiler provided with the operating system are guaranteed.

*2: NetCOBOL is available in the following editions:

(RHEL8)

- NetCOBOL Base Edition V12.2.0 or later
- NetCOBOL Standard Edition V12.2.0 or later
- NetCOBOL Enterprise Edition V12.2.0 or later

(RHEL7)

- NetCOBOL Base Edition V11.1.0 or later
- NetCOBOL Standard Edition V11.1.0 or later
- NetCOBOL Enterprise Edition V11.1.0 or later

Note

The following JDKs or JREs are available:

- JDK or JRE shipped with the Interstage Application Server
- JDK shipped with the Enterprise Application Platform
- Oracle JDK or JRE
- An OpenJDK that has passed the Java TCK (Technology Compatibility Kit)

It is recommended that the JDK or JRE included with Interstage Application Server and Enterprise Application Platform is used.

The following table lists servers that can be connected to the Linux client.

Table 3.2 Connectable servers

OS	Software name
Windows Linux	- FUJITSU Software Enterprise Postgres Advanced Edition 9.5 or later - FUJITSU Software Enterprise Postgres Standard Edition 9.4 or later
Solaris	- FUJITSU Software Enterprise Postgres Standard Edition 9.6 or later

3.1.3 Excluded Software

FUJITSU Enterprise Postgres

The Linux client cannot coexist with the FUJITSU Enterprise Postgres Community Edition (hereafter, "CE") client.

Other products

There are no exclusive products.

3.1.4 Required Patches

There are no required patches.

3.1.5 Hardware Environment

The following hardware is required to use the Linux client.

Memory

At least 160 MB of memory is required.

Mandatory hardware

None.

3.1.6 Disk Space Required for Installation

The following table lists the disk space requirements of the corresponding directories for new installation of the Linux client. If necessary, increase the size of the file system.

RHEL

Directory	Required disk space Unit: MB
/etc	1 + 1 (*1)
/var	1 + 2 (*1)
/opt	248 (*1)
Installation destination of the client (64-bit)	131
Installation destination of Pgpool-II	14

*1: Uninstall (middleware) must be installed.

SLES

Directory	Required disk space Unit: MB
/etc	1 + 1 (*1)
/var	1 + 2 (*1)
/opt	2 (*1)
Installation destination of the client (64-bit)	126
Installation destination of Pgpool-II	12

*1: Uninstall (middleware) must be installed.

3.1.7 Supported System Environment

This section describes the supported system environment.

TCP/IP protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

3.1.8 Versions of Open-Source Software Used as the Base for FUJITSU Enterprise Postgres Drivers

The following table lists the versions of open-source software used as the base for the various FUJITSU Enterprise Postgres drivers.

Driver	Open-source software version
JDBC	pgjdbc 42.2.18
ODBC	psqlodbc 13.00.0000
libpq	PostgreSQL 13.3

3.2 Installation

This section explains how to install the Linux client.

3.2.1 Pre-installation Tasks

Check the system environment for the following before the Linux client is installed.

Check the disk capacity

Check if sufficient free disk space is available for installing the Linux client.

Refer to "3.1.6 Disk Space Required for Installation" for information on disk space requirements.

If sufficient free disk space is unavailable, reconfigure disk partitions.

Set JAVA_HOME (SLES 12 only)

Ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

Check the installed product and determine the installation method

Using the operation shown below, start Uninstall (middleware), and check the installed products.

Example

```
# /opt/FJSVcir/cimanager.sh -c
Loading Uninstaller...


Currently installed products
1. productName
2. productName

Type [number] to select the software you want to uninstall.
[number,q]
=>q



Exiting Uninstaller.
```

If the Linux client is already installed, determine the installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation as the installation method, remove applied updates using the procedure shown below.

Note

If a product is installed without removing applied updates, the following will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.

  Perform the reinstallation after removing the update.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
# /opt/FJSVfupde/bin/uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
# /opt/FJSVfupde/bin/uam remove -i update-number
```

Note

If the installation directory/lib is set in the environment variable LD_LIBRARY_PATH for the running user, remove the installation directory/lib from LD_LIBRARY_PATH.

3.2.2 Installation in Interactive Mode

The installation procedure is described below.

Note

The following characters can be used as input values:

Alphanumeric characters, hyphens, commas and forward slashes

Point

For installation in interactive mode, default values are set for the installation information. The following settings can be changed for a new installation or a multi-version installation:

- Installation directory

1. Stop applications and programs

If the installation method is the following, all applications and programs that use the product must be stopped:

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product
- pgBadger
- Pgpool-II

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Mount the DVD drive

Insert the client program DVD into the DVD drive, and then execute the following command:

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./install.sh
```

In the example above, /media/dvd is the DVD mount point.

5. Select the product to install

The list of installation target products is displayed.
Type the number for the product to be installed, or "all", and press Enter.

Information

If the selected product has already been installed, a window for selecting reinstallation or multi-version installation is displayed for each product. Follow the on-screen instructions to select the installation method.

6. Check the settings

The window for checking the installation information is displayed as shown below.
Type "y" and press Enter to start the installation.
To change the settings, type "c" and press Enter, and follow the on-screen instructions. This option is not displayed if there is no information that can be modified.

7. Check the changed settings

If the installation information has been modified, the new installation information is displayed.
Type "y" and press Enter to start the installation.
To change the settings again, type "c" and press Enter.

8. Finish the installation

When the installation is complete, a message is displayed showing the status.
If installation was successful, the following message is displayed:

```
Installed successfully.
```

Note

If an error occurs during the installation, read the error message and remove the cause of the error, and then reexecute the install.sh command.

3.2.3 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

The installation procedure is described below.

1. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

2. Mount the DVD drive

Insert the client program DVD into the DVD drive, and then execute the following command:

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

3. Create an installation parameters CSV file

Consider the features that will be required for system operations, and then create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
    :
```

Information

The templates for the installation parameters CSV file is "*mountPoint*/sample/sample_linux.csv"

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./silent.sh /home/work/inspara.csv
```

In the example above, /media/dvd is the DVD mount point, and /home/work/inspara.csv is the installation parameter CSV.

If the silent installer ends in an error, a message is output to the log file and return values are returned.

3.3 Uninstallation

This section describes the procedure for uninstalling the Linux client.

Note

- Before uninstalling the product, close the product program and all applications that are using it.
- On SLES 12, before uninstallation, ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

3.3.1 Uninstallation in Interactive Mode

The uninstallation procedure is described below.

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgBadger
- Pgpool-II

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Start the Uninstall (middleware)

Execute the following command:

```
# /opt/FJSVcir/cimanager.sh -c
```

4. Select the product

Enter the number for the product to be uninstalled, and press Enter.

5. Start the uninstallation

To start the uninstallation, type "y" and press Enter.

To display the list of products again, type "b" and press Enter.

6. Finish the uninstallation

If uninstallation is successful, the message below is displayed.

The installation directory may remain after uninstallation. If it is not required, delete it.

```
Uninstalling...

productName is being uninstalled now.
    100% ##############################


The following products have been uninstalled successfully:
    productName

Uninstallation of "productName" has completed successfully.



Exiting Uninstaller.
```

3.3.2 Uninstallation in Silent Mode

The uninstallation procedure is described below.

See

Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product
- pgBadger
- Pgpool-II

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$  su -
Password:******
```

3. Run the uninstallation

Execute the following command:

The installation directory may remain after uninstallation. If it is not required, delete it.

Example

```
# /opt/fsepv<x>client64/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>client64 is the installation directory, and "<*x*>" indicates the product version.

```
# /opt/fsepv<x>pgpool-II/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>pgpool-II/setup is the name of the installation directory in which the Pgpool-II is installed.

Chapter 4 Setup

This chapter describes the setup procedures to be performed after installation completes.

4.1 Configuring Environment Variables

Configure the following environment variables when using client commands.

4.1.1 Windows

PATH environment variable

Add "*installationFolder*\bin".

PGLOCALEDIR environment variable

Add "*installationFolder*\share\locale".

Examples of environment variable configurations are shown below.

Example

This example is specific to 32-bit Windows.

Note that "<*x*>" indicates the product version.

```
> SET PATH=%ProgramFiles%\Fujitsu\fsepv<x>client32\bin;%PATH%
> SET PGLOCALEDIR=%ProgramFiles%\Fujitsu\fsepv<x>client32\share\locale
```

4.1.2 Linux

PATH environment variable

Add "*installationDirectory*/bin".

MANPATH environment variable

Add "*installationDirectory*/share/man".

PGLOCALEDIR environment variable

Add "*installationDirectory*/share/locale".

LD_LIBRARY_PATH environment variable

Add "*installationDirectory*/lib".

Examples of environment variable configurations are shown below.

Example

Note that "<*x*>" indicates the product version.

```
$ PATH=/opt/fsepv<x>client64/bin:$PATH ; export PATH
$ MANPATH=/opt/fsepv<x>client64/share/man:$MANPATH ; export MANPATH
$ PGLOCALEDIR=/opt/fsepv<x>client64/share/locale ; export PGLOCALEDIR
$ LD_LIBRARY_PATH=/opt/fsepv<x>client64/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
```

Note

If you execute any command other than FUJITSU Enterprise Postgres (OS commands, etc.) after LD_LIBRARY_PATH is set, remove the installation directory/lib from LD_LIBRARY_PATH.

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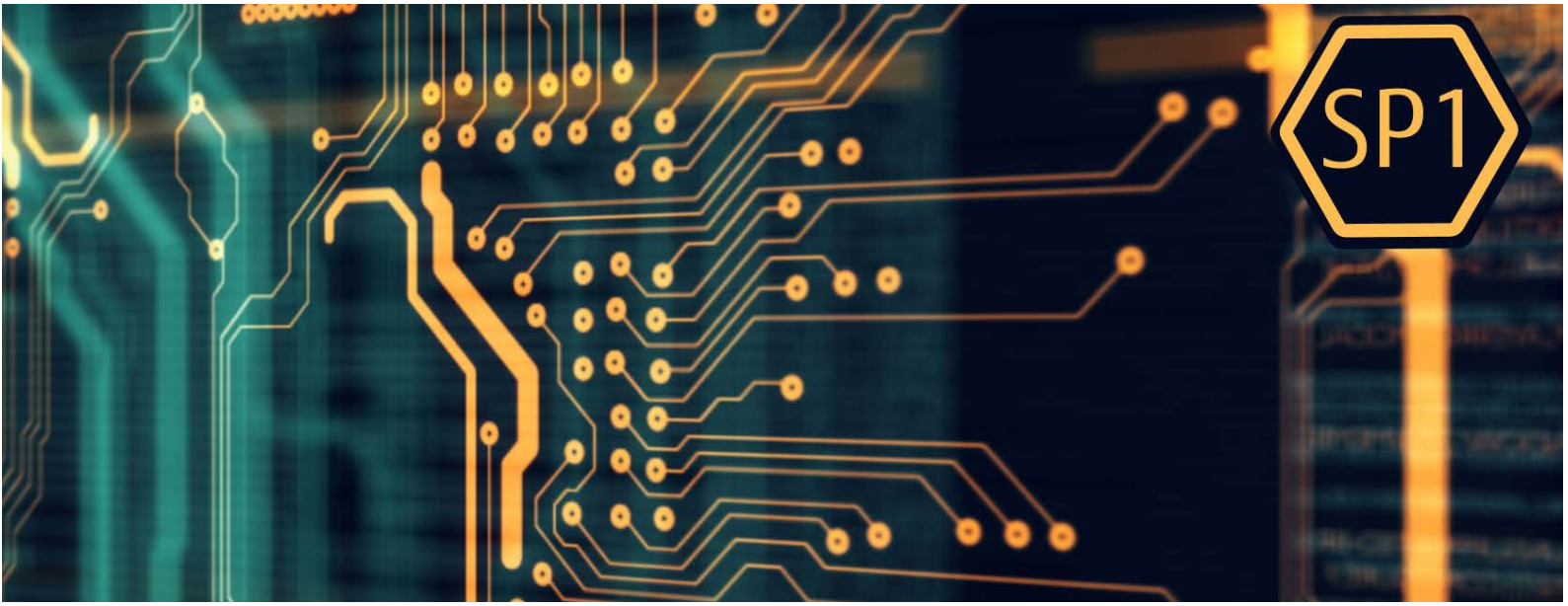

Installation and Setup Guide for Server Assistant

Windows/Linux

J2UL-2676-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document describes how to install and uninstall the FUJITSU Enterprise Postgres Server Assistant.

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

L
- PostgreSQL
- SQL
- Linux

W
- PostgreSQL
- SQL
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Installation

Describes the features that can be installed, and provides an overview of installation methods

Chapter 2 Installation and Uninstallation of the Linux Server Assistant

Describes how to install and uninstall the Linux Server Assistant

Chapter 3 Installation and Uninstallation of the Windows Server Assistant

Describes how to install and uninstall the Windows Server Assistant

Chapter 4 Setup of the Server Assistant

Describes the setup to be performed after installation

Appendix A Estimating Memory Requirements

Describes the formulas for estimating memory requirements

Appendix B Procedure when Modifying the JRE Installation

Describes the procedure to follow when modifying the JRE installation.

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Chapter 1 Overview of Installation

This chapter provides an overview of FUJITSU Enterprise Postgres Server Assistant installation and uninstallation.

1.1 Features that can be Installed

The Server Assistant is provided as a Server Assistant package, which is installed on a different server (referred to as the arbitration server) to that of the database server.

The following table shows the relationship between the platforms and the features provided by the Server Assistant package.

Platform	Server Assistant
Linux	Y
Windows	Y

Y: Can be installed

1.2 Installation Types

The following installation types are available for FUJITSU Enterprise Postgres:

- New installation
- Reinstallation
- Multi-version installation

1.2.1 New Installation

In initial installation, the FUJITSU Enterprise Postgres Server Assistant is installed for the first time.

1.2.2 Reinstallation

Perform reinstallation to repair installed program files that have become unusable for any reason.

1.2.3 Multi-Version Installation

FUJITSU Enterprise Postgres products can be installed on the same server if the product version (indicated by "*x*" in "*x*SP*z*") is different from that of any version of the product that is already installed.

1.3 Installation Procedure

The following installation procedures are available for FUJITSU Enterprise Postgres:

- Installation in interactive mode
- Installation in silent mode

Select the installation procedure that corresponds to your environment.

1.3.1 Installation in Interactive Mode

Interactive mode enables installation to be performed while the required information is entered interactively.

In the interactive mode installation, the FUJITSU Enterprise Postgres installer automatically determines the installation state of FUJITSU Enterprise Postgres. Install FUJITSU Enterprise Postgres using one of the following installation types in accordance with the installation state:

- New installation

- Reinstallation
- Multi-version installation

1.3.2 Installation in Silent Mode

Silent mode enables installation to be performed without the need to enter any information interactively.

New installations and multi-version installations can be performed in silent mode.

1.4 Uninstallation

Uninstallation removes the system files of the installed FUJITSU Enterprise Postgres Server Assistant.

Chapter 2 Installation and Uninstallation of the Linux Server Assistant

This chapter explains how to install and uninstall the Linux Server Assistant.

2.1 Operating Environment

This section describes the operating environment required in order to use the Linux Server Assistant.

2.1.1 Required Operating System

One of the following operating systems is required in order to use the Linux Server Assistant:

- RHEL7.2 or later minor version
- RHEL8.1 or later minor version
- SLES 12 SP5

Information

- The following packages are required for operations on RHEL7.

Package name	Remarks
gdb	Required to run FJQSS.
glibc	-
glibc.i686	-
iputils	Required for Mirroring Controller.
libgcc	-
libstdc++	-
ncurses-libs	-
nss-softokn-freebl	-
redhat-lsb	-
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on RHEL8.

Package name	Remarks
gdb	Required to run FJQSS.
glibc	-
glibc.i686	-
iputils	Required for Mirroring Controller.
libgcc	-

Package name	Remarks
libstdc++	-
ncurses-libs	-
nss-softokn-freebl	-
redhat-lsb	-
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
unzip	-
xz-libs	-
zlib	-

- The following packages are required for operations on SLES 12.

Package name	Remarks
gdb	Required to run FJQSS.
glibc	-
glibc-32bit	-
iputils	Required for Mirroring Controller.
JRE 8	Required when using the installer or Server Assistant. The following JREs are available: - Oracle JRE Use update 31 or later of the 64-bit version. - OpenJDK Past the Java TCK (Technology Compatibility Kit)
libfreebl3	-
libgcc	-
libltdl7	-
liblzma5	-
libncurses5	-
libstdc++	-
libz1	-
rsync	Required when using Pgpool-II.
sysstat	Required when using FJQSS. Set up the sar command after installation.
unzip	-

2.1.2 Related Software

No other software is required in order to use FUJITSU Enterprise Postgres.

The following table lists servers that can be connected to the Linux Server Assistant.

Table 2.1 Connectable servers

OS	Software name
Linux Windows	FUJITSU Software Enterprise Postgres Advanced Edition 13/13 SP1

2.1.3 Excluded Software

There is no excluded software.

2.1.4 Required Patches

There are no required patches.

2.1.5 Hardware Environment

The following hardware is required in order to use the Linux Server Assistant:

Memory

At least 150 MB of memory is required.

Mandatory hardware

None.

2.1.6 Disk Space Required for Installation

The following table lists the disk space requirements of the corresponding directories for new installation of the Linux Server Assistant. If necessary, increase the size of the file system.

Disk space required for installation

RHEL

Directory	Required disk space Unit: MB
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	248 (*1) +1 (*2)
serverAssistantInstallDir	354

*1: Uninstall (middleware) must be installed.

*2: Required for the installation of FJQSS.

SLES

Directory	Required disk space Unit: MB
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	2 (*1) +1 (*2)
serverAssistantInstallDir	2

*1: Uninstall (middleware) must be installed.

*2: Required for the installation of FJQSS.

2.1.7 Supported System Environment

This section describes the supported system environment.

TCP/IP Protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

2.2 Installation

This section describes how to install the Linux Server Assistant.

2.2.1 Pre-installation Tasks

Check the following system environment before installing the Linux Server Assistant.

Check the disk space

Ensure that there is sufficient disk space to install the Linux Server Assistant.

Refer to "2.1.6 Disk Space Required for Installation" for information on disk space requirements.

If sufficient free disk space is unavailable, reconfigure disk partitions.

Set JAVA_HOME (SLES 12 only)

Ensure that JRE 8 is installed, and export the JAVA_HOME environment variable.

```
#export JAVA_HOME="Jre8InstallDir"
```

Refer to "Appendix B Procedure when Modifying the JRE Installation " for information on modifying JRE after installation.

Check the installed product and determine the installation method

Using the operation shown below, start Uninstall (middleware), and check the installed products.

Example

```
# /opt/FJSVcir/cimanager.sh -c
Loading Uninstaller...


Currently installed products
1. productName

Type [number] to select the software you want to uninstall.
[number,q]
=>q



Exiting Uninstaller.
```

If the Linux Server Assistant is already installed, determine the installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation, remove applied updates using the procedure shown below.

Note

If a product is installed without removing applied updates, the following will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.

  Perform reinstallation after removing the update.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
# /opt/FJSVfupde/bin/uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
# /opt/FJSVfupde/bin/uam remove -i update-number
```

   Note

   If the installation directory/lib is set in the environment variable LD_LIBRARY_PATH for the running user, remove the installation directory/lib from LD_LIBRARY_PATH.

2.2.2 Installation in Interactive Mode

The installation procedure is described below.

Note

The following characters can be used as input values:

Alphanumeric characters, hyphens and forward slashes

Point

In interactive mode installation, the default values of the installation information are set. The following setting can be changed for a new installation or a multi-version installation.

- Installation directory

1. Stop the program

If the installation method is the following, the program must be stopped:

- Reinstallation

Before starting the installation, stop the following:

- Mirroring Controller arbitration process

  Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

  Example

```
$ mc_arb stop -M /mcarb_dir/arbiter1
```

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Mount the DVD drive

Insert the Server Assistant program DVD into the DVD drive, and then execute the following command:

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./install.sh
```

In the example above, /media/dvd is the DVD mount point.

5. Select the product to install

The list of installation target products is displayed.
Type the number for the product to be installed, or "all", and press Enter.

Information

If the selected product has been installed, a window for selecting reinstallation or multi-version installation is displayed for each product. Follow the on-screen instructions to select the installation method.

6. Check the settings

The window for checking the installation information is displayed.
Type "y" and press Enter to start the installation.
To change the settings, type "c", press Enter, and follow the on-screen instructions. This option is not displayed if there is no information that can be modified.

7. Check the changed settings

If the settings have been changed, the new installation information is displayed.
Type "y" and press Enter to start the installation.
To change the settings again, type "c" and press Enter.

8. Finish the installation

When the installation is complete, a message is displayed showing the status.
If installation was successful, the following message is displayed:

```
Installed successfully.
```

Note

If an error occurs during the installation, read the error message and remove the cause of the error, and then reexecute the install.sh command.

2.2.3 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

The installation procedure is described below.

1. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

2. Mount the DVD drive

Insert the Server Assistant program DVD into the DVD drive, and then execute the following command:

Example

```
# mount -t iso9660 -r -o loop /dev/dvd /media/dvd
```

Here /dev/dvd is the device name for the DVD drive (which may vary depending on your environment), and /media/dvd is the mount point (which may need to be created before calling the command).

Note

If the DVD was mounted automatically using the automatic mount daemon (autofs), "noexec" is set as the mount option, so the installer may fail to start. In this case, use the mount command to remount the DVD correctly, and then run the installation. Note that the mount options of a mounted DVD can be checked by executing the mount command without any arguments.

3. Create an installation parameters CSV file

Create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
     :
```

Information

The templates for the installation parameters CSV file is "*mountPoint*/sample/sample.csv"

4. Run the installation

Execute the following command:

Example

```
# cd /media/dvd
# ./silent.sh /home/work/inspara.csv
```

In the example above, /media/dvd is the DVD mount point, and /home/work/inspara.csv is the installation parameter CSV.

If the silent installer ends in an error, a message is output to the log file and return values are returned.

2.3 Uninstallation

This section describes how to uninstall the Linux Server Assistant.

Note

Before uninstalling the product, close the product program.

2.3.1 Uninstallation in Interactive Mode

The uninstallation procedure is described below.

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Stop the program

Before starting the uninstallation, stop the following:

- Mirroring Controller arbitration process

  Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

  Example

  ```
  $ mc_arb stop -M /mcarb_dir/arbiter1
  ```

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Start Uninstall (middleware)

Execute the following command:

```
# /opt/FJSVcir/cimanager.sh -c
```

4. Select the product

Enter the number for the product to be uninstalled, and press Enter.

5. Start the uninstallation

To start the uninstallation, type "y" and press Enter.

To display the list of products again, type "b" and press Enter.

6. Finish the uninstallation

If uninstallation is successful, the message below is displayed.

The installation directory may remain after uninstallation. If it is not required, delete it.

```
Uninstalling...

productName is being uninstalled now.
    100% ##############################


The following products have been uninstalled successfully:
    productName

Uninstallation of "productName" has completed successfully.



Exiting Uninstaller.
```

2.3.2 Uninstallation in Silent Mode

The uninstallation procedure is described below.

See

Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Stop the program

Before starting the uninstallation, stop the following:

- Mirroring Controller arbitration process

  Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

  Example

  ```
  $ mc_arb stop -M /mcarb_dir/arbiter1
  ```

2. Change to the superuser

Run the following command to switch to the superuser on the system.

```
$ su -
Password:******
```

3. Run the uninstallation

Execute the following command:

The installation directory may remain after uninstallation. If it is not required, delete it.

Example

```
# /opt/fsepv<x>assistant/setup/suninst.sh
```

In the example above, /opt/fsepv<*x*>assistant is the installation directory, and "<*x*>" indicates the product version.

Chapter 3 Installation and Uninstallation of the Windows Server Assistant

This chapter explains how to install and uninstall the Windows Server Assistant.

3.1 Operating Environment

This section describes the operating environment required in order to use the Windows Server Assistant.

3.1.1 Required Operating System

One of the following operating systems is required in order to use the Windows Server Assistant:

- Microsoft(R) Windows Server(R) 2016 Datacenter
- Microsoft(R) Windows Server(R) 2016 Standard
- Microsoft(R) Windows Server(R) 2016 Essentials
- Microsoft(R) Windows Server(R) 2019 Datacenter
- Microsoft(R) Windows Server(R) 2019 Standard
- Microsoft(R) Windows Server(R) 2019 Essentials

Note

- The following features of Windows Server(R) 2016 and Windows Server(R) 2019 are not supported:
  - Server Core
  - Nano Server
  - Windows Server Container
- The TCP/IP protocol must be installed.

3.1.2 Related Software

There is no software related to FUJITSU Enterprise Postgres.

Note

- The following programs are installed during installation of FUJITSU Enterprise Postgres:
  - Microsoft Visual C++ 2015-2019 Redistributable version 14.24.28127.4

  Do not uninstall the above programs as they are required for running FUJITSU Enterprise Postgres.

The following table lists servers that can be connected to the Windows Server Assistant.

Table 3.1 Connectable servers

OS	Software name
Linux Windows	FUJITSU Software Enterprise Postgres Advanced Edition 13/13 SP1

3.1.3 Excluded Software

There is no excluded software.

3.1.4 Required Patches

There are no required patches.

3.1.5 Hardware Environment

The following hardware is required in order to use the Windows Server Assistant:

Memory

At least 256 MB of memory is required.

Mandatory hardware

None.

3.1.6 Disk Space Required for Installation

The disk space shown below is required for new installation of the Windows Server Assistant.

Windows Server Assistant installation destination:

361 MB

System folder:

291 MB

3.1.7 Supported System Environment

This section describes the supported system environment.

TCP/IP protocol

FUJITSU Enterprise Postgres supports version 4 and 6 (IPv4 and IPv6) of TCP/IP protocols.

Note

Do not use link-local addresses if TCP/IP protocol version 6 addresses are used.

File system

You can install FUJITSU Enterprise Postgres only if the system folder is an NTFS volume.

3.2 Installation

This section describes how to install the Windows Server Assistant.

Note

- The installation must be performed by a user with administrator privileges (a user ID that belongs to the Administrators group).
- Stop all applications before starting the installation.
- The Windows Installer service must be running.

- If antivirus software is installed, the system may crash, fail to start, or stop responding during installation or when starting after installation. Set the scan exclusions so that the installation directory and the resource allocation directory are not scanned for viruses.
- The remote desktop service is installed in application server mode, it is necessary to switch to install mode by executing the command shown below before installation. Also, after the installation is completed, execute the command shown below to switch back to execute mode.

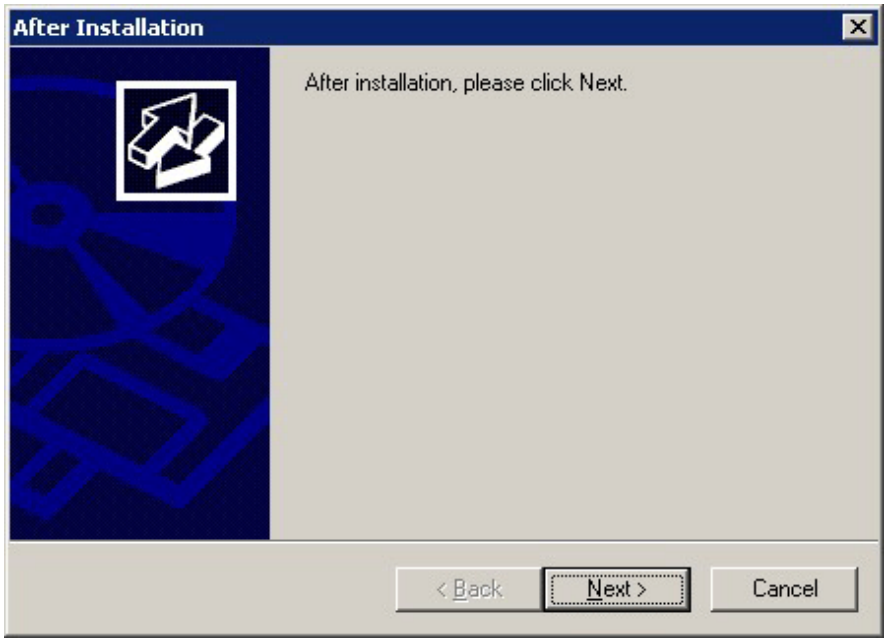
  [Before the installation]

```
CHANGE USER /INSTALL
```

  [After the installation]

```
CHANGE USER /EXECUTE
```

- The following window may be displayed when executing the installation program:



If this window is displayed, perform the following operations:

1. Perform the installation steps until the [InstallShield Wizard Complete] window is displayed.
2. At the window shown above, click [Next].

3. The window shown below is displayed. Click [Finish].

Information

- If a [User Account Control] dialog box is displayed at the start of the installation, click [Yes] to continue processing:

  If [No] is clicked, permission to continue is denied and an [Error] dialog box will be displayed.
  To continue the installation, click [Retry] at the [Error] dialog box. To end the installation, click [Cancel].

- If installation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed. Click [This program installed correctly] and continue operation.

3.2.1 Pre-installation Tasks

This section describes the tasks to be performed before installing the Windows Server Assistant.

Check the disk space

Ensure that there is sufficient disk space to install the Windows Server Assistant.

Refer to "3.1.6 Disk Space Required for Installation" for information on disk space requirements.

hosts file settings

Using an editor, add the IP address and name of the server to be connected to the \System32\drivers\etc\hosts file in the folder where Windows is installed.

Check the installed product and determine the installation method

Using the operation shown below, start Uninstall (middleware), and check the installed products.

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

If the Windows Server Assistant is already installed, determine the installation method to use:

- Reinstallation
- Multi-version installation

Remove applied updates

If you perform reinstallation as the installation method, remove applied updates using the procedure shown below.

Note

If a product is installed without removing applied updates, the following will occur:

- Performing reinstallation

  If an update with the same update and version number is applied, an error informing you that the update has already been applied is displayed.

1. Display the applied updates

   Execute the following command to display the applied updates:

```
C:\>uam showup
```

2. Remove the updates

   Execute the command below to remove the updates. If an update with the same update number was applied more than once, the updates are removed in order, starting from the highest version number.

```
C:\>uam remove -i update-number
```

3.2.2 Installation in Interactive Mode

The installation procedure is described below.

Point

In interactive mode installation, the default values of the installation information are set. The following setting can be changed for a new installation or a multi-version installation.

- Installation folder

1. Stop the program

If the installation method is the following, the program must be stopped:

- Reinstallation

Before starting the installation, stop the following:

- Mirroring Controller arbitration process

  Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

  Example

```
> mc_arb stop -M D:\mcarb_dir\arbiter1
```

2. Insert the DVD

Insert the Server Assistant program DVD into the DVD drive.

3. Run the installation

The installation menu is displayed. Click [Installation].

4. Select the product to install

The [Installation product] window is displayed.
Select the product to install, and then click [Next].
If a selected product can only be reinstalled, refer to "6. Check the settings".

Information

If the selected product has been installed, a window for selecting reinstallation or multi-version installation is displayed for each product. Follow the on-screen instructions to select the installation method.

5. Confirm the contents for installation

The [Confirm installation] window will be displayed.

Click [Next] to start the installation.

To modify the settings, select [Modify], and then click [Next]. Follow the on-screen instructions.

6. Check the settings

The [Confirm installation] window will be displayed. Click [Install] to start the installation.

To modify the settings again, click [Back].

7. Completion of installation

The completion window is displayed. Click [Finish].

3.2.3 Installation in Silent Mode

Installation in silent mode can be performed only when the installation method is one of the following:

- New installation
- Multi-version installation

The installation procedure is described below.

See

Refer to the FUJITSU Enterprise Postgres product website for information on installation in silent mode, such as the installation parameters and error messages.

1. Insert the DVD

Insert the Server Assistant program DVD into the DVD drive.

The [Install Menu] window is displayed. Click [Finish].

2. Create an installation parameters CSV file

Create an installation parameters CSV file that uses the following specification format.

```
sectionName, parameterName, value
sectionName, parameterName, value
    :
```

Information

The template for the installation parameters CSV file is "Z:\sample\sample.csv (Z is the drive into which the DVD is inserted.).

3. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

4. Run the installation

Execute the following command:

```
Z:\>silent.bat c:\temp\inspara.csv
```

Z: The drive into which the DVD is inserted.

c:\temp\inspara.csv: The installation parameter CSV file name.

If the silent installer ends in an error, a message is output to the log file and return values are returned.

3.3 Uninstallation

This section describes how to uninstall the Windows Server Assistant.

Note

- Before uninstalling the product, close the product program.
- Log in using an account that has administrator privileges and then execute the command, or switch to an account that has administrator privileges and then uninstall the product.

Information

- If a [User Account Control] dialog box such as the following is displayed at the start of the uninstallation, click [Yes] to continue processing:

  If [No] is clicked, permission to continue is denied and an [Error] dialog box will be displayed.
  To continue the uninstallation, click [Retry] in the [Error] dialog box. To end the operation, click [Cancel].

- If uninstallation is suspended or processing terminates abnormally, a dialog box of the Program Compatibility Assistant similar to the one shown below may be displayed. Click [This program uninstalled correctly] and continue operation.

3.3.1 Uninstallation in Interactive Mode

The uninstallation procedure is described below.

Information

If an error occurs while the product is being uninstalled, refer to "Uninstall (middleware) Messages" in the FUJITSU Enterprise Postgres product website, and take the required action.

1. Stop the program

Before starting the uninstallation, stop the following:

Mirroring Controller arbitration process

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1
   ```

2. Unregister the Mirroring Controller arbitration process from the Windows service.

   Execute the mc_arb command in unregister mode to unregister the Mirroring Controller arbitration process from the Windows service.

   Example

   ```
   > mc_arb unregister -M D:\mcarb_dir\arbiter1
   ```

3. Delete registrations related to the event log.

   If messages are output to the event log, DLLs are registered in accordance with "Preparatory Tasks for the Output of Error Logs to the Event Log (Windows)" in the Cluster Operation Guide (Database Multiplexing). Delete these registrations so that no unnecessary issues occur.

   - Delete registration for the default event source name

     Example)
     The example below deletes a DLL of a 64-bit product registered under the default event source name. "<*x*>" indicates the product version.

     ```
     > regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib\mcarbevent.dll"
     ```

   - Delete registration for other event source names

     DLL registration is performed so that messages output to the event log are output to any event source named by the user.

     Accordingly, it is necessary to delete the DLL registration. Do this for any event source name.

     Example)
     The example below deletes a DLL of a 64-bit product registered under the event source name "Mirroring Controller arbiter1". "<*x*>" indicates the product version.

     ```
     > regsvr32 /u /i:"Mirroring Controller arbiter1" "c:\Program Files\Fujitsu
     \fsepv<x>assistant64\lib\mcarbevent.dll"
     ```

   - If installing multiple versions

     If error logs are set to be output to the event log, use the DLL path name that you took note of previously as explained in "Preparatory Tasks for the Output of Error Logs to the Event Log (Windows)" in the Cluster Operation Guide (Database Multiplexing) to reregister the default event source name.

   Note

   Ensure that you delete the DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

2. Start Uninstall (middleware)

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

3. Select the software

Select the product to be uninstalled from [Software Name], and then click [Remove].

4. Start the uninstallation

Click [Uninstall].

5. Finish the uninstallation

The uninstallation completion window will be displayed. Click [Finish].

The installation folder may remain after uninstallation. If it is not required, delete it.

6. Stop Uninstall (middleware)

Click [Close].

3.3.2 Uninstallation in Silent Mode

The uninstallation procedure is described below.

See

Refer to the FUJITSU Enterprise Postgres product website for information on uninstallation in silent mode, such as the error messages.

1. Stop the program

Before starting the uninstallation, stop the following:

Mirroring Controller arbitration process

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1
   ```

2. Unregister the Mirroring Controller arbitration process from the Windows service.

   Execute the mc_arb command in unregister mode to unregister the Mirroring Controller arbitration process from the Windows service.

   Example

   ```
   > mc_arb unregister -M D:\mcarb_dir\arbiter1
   ```

3. Delete registrations related to the event log.

   If messages are output to the event log, DLLs are registered in accordance with "Preparatory Tasks for the Output of Error Logs to the Event Log (Windows)" in the Cluster Operation Guide (Database Multiplexing). Delete these registrations so that no unnecessary issues occur.

   - Delete registration for the default event source name

     Example)
     The example below deletes a DLL of a 64-bit product registered under the default event source name. "<*x*>" indicates the product version.

     ```
     > regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib\mcarbevent.dll"
     ```

   - Delete registration for other event source names

     DLL registration is performed so that messages output to the event log are output to any event source named by the user.

     Accordingly, it is necessary to delete the DLL registration. Do this for any event source name.

     Example)
     The example below deletes a DLL of a 64-bit product registered under the event source name "Mirroring Controller arbiter1". "<*x*>" indicates the product version.

```
> regsvr32 /u /i:"Mirroring Controller arbiter1" "c:\Program Files\Fujitsu
\fsepv<x>assistant64\lib\mcarbevent.dll"
```

- If installing multiple versions

  If error logs are set to be output to the event log, use the DLL path name that you took note of previously as explained in "Preparatory Tasks for the Output of Error Logs to the Event Log (Windows)" in the Cluster Operation Guide (Database Multiplexing) to reregister the default event source name.

Note

Ensure that you delete the DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

2. Start the command prompt

In Windows, right-click [Command Prompt] and then select [Run as administrator].

3. Run the uninstallation

Execute the following command:

The installation folder may remain after uninstallation. If it is not required, delete it.

Example

```
X:> installFolder\suninst.bat
```

X: Drive on which the product is installed

Chapter 4 Setup of the Server Assistant

The Server Assistant is a feature that is installed and used on the arbitration server, so its setup is performed as the arbitration server setup.

See

Refer to "Setting Up Database Multiplexing Mode" in the Cluster Operation Guide (Database Multiplexing) for information on setting up and operating the Mirroring Controller arbitration server.

Appendix A Estimating Memory Requirements

This appendix explains how to estimate the memory.

A.1 Server Assistant Memory Requirements

This section describes the formula for estimating memory requirements for the Server Assistant.

Use the following formula to obtain a rough estimate of memory requirements:

```
Memory usage of the Server Assistant
                                = Peak memory usage of the Mirroring Controller arbitration
processes
                                  + Peak memory usage of the Mirroring Controller commands

Peak memory usage of the Mirroring Controller arbitration processes=100 MB

Peak memory usage of the Mirroring Controller commands=50 MB * Number of commands executed
simultaneously
```

Appendix B Procedure when Modifying the JRE Installation

This appendix describes the procedure to follow when modifying the JRE installation.

The JRE, of which the installation destination is specified in the JAVA_HOME environment variable when installing FUJITSU Enterprise Postgres, is used by the Server Assistant.

Therefore, when updating or reinstalling JRE after installing FUJITSU Enterprise Postgres, it is necessary to restart the Mirroring Controller arbitration process, therefore follow the procedure below to modify the JRE installation:

1. Stop the Mirroring Controller arbitration process.

   Refer to the Cluster Operation Guide (Database Multiplexing) for details.

2. Modify the JRE installation.

3. Change the installation environment to be used by Mirroring Controller.

   Set the JAVA_HOME environment variable to the installation destination of JRE 8, and use the mc_update_jre_env command to change the installation environment to be used by the Server Assistant.
   This procedure must be executed by the superuser.

   Example

   /opt/fsepv<*x*>assistant/bin is the installation directory where the Server Assistant is installed.

   ```
   $ su -
   Password:******
   # export JAVA_HOME="Jre8InstallDir"
   # /opt/fsepv<x>assistant/bin/mc_update_jre_env
   ```

4. Start the Mirroring Controller arbitration process.

   Refer to the Cluster Operation Guide (Database Multiplexing) for details.

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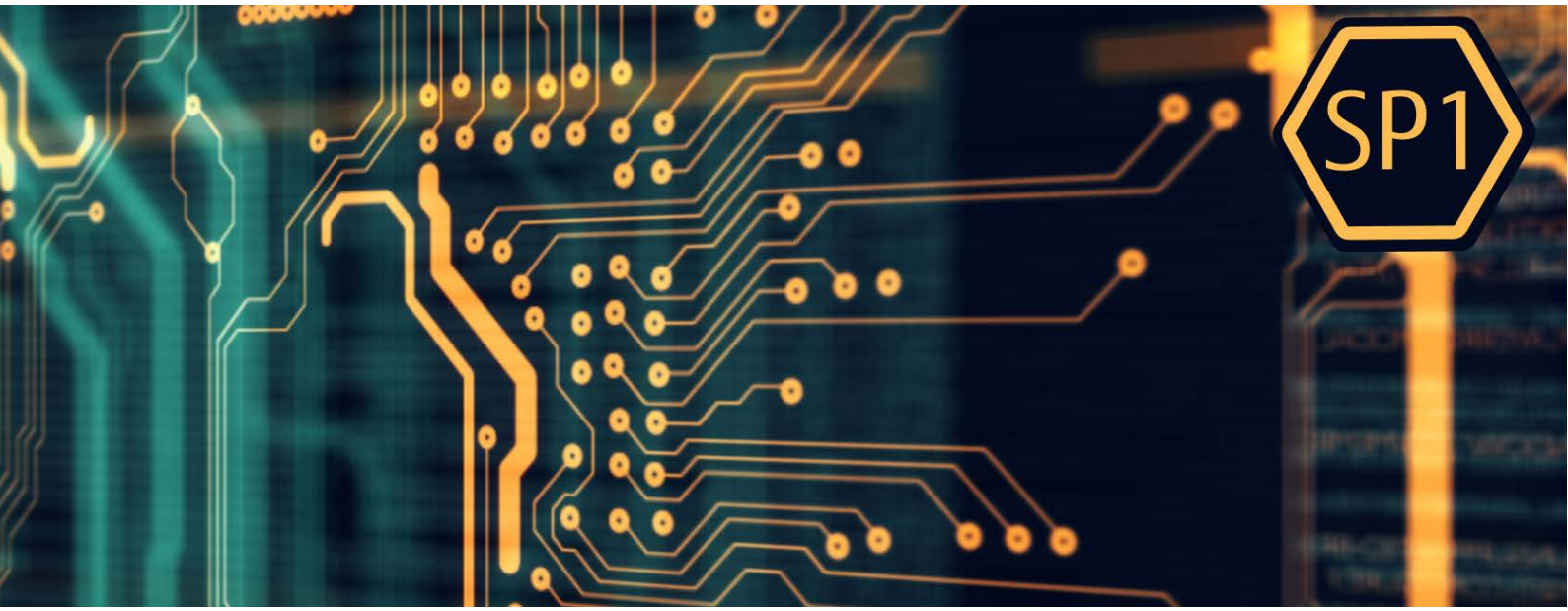
FUJITSU

FUJITSU Enterprise Postgres 13



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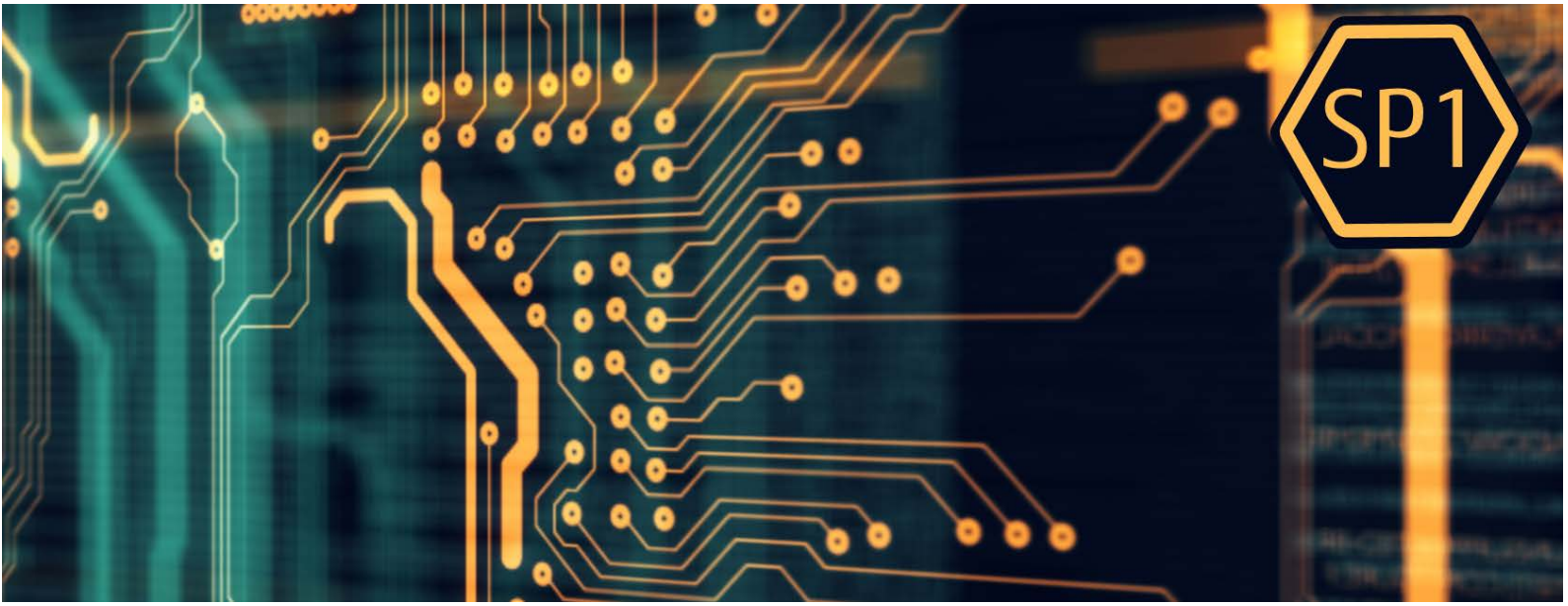

Application Development Guide

Windows/Linux

J2UL-2681-02ENZ0(00)
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Preface

Purpose of this document

This is a guide for the developers of FUJITSU Enterprise Postgres applications.

Intended readers

This document is intended for developers of applications that use FUJITSU Enterprise Postgres. Of the interfaces provided by FUJITSU Enterprise Postgres, this guide describes the PostgreSQL extended interface.

Readers of this document are also assumed to have general knowledge of:

L
- PostgreSQL
- SQL
- Linux

W
- PostgreSQL
- SQL
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Overview of the Application Development Function

Provides an overview of FUJITSU Enterprise Postgres application development.

Chapter 2 JDBC Driver

Explains how to use JDBC drivers.

Chapter 3 ODBC Driver

Explains how to use ODBC drivers.

Chapter 4 .NET Data Provider

Explains how to use .NET Data Provider.

Chapter 5 C Library (libpq)

Explains how to use C applications.

Chapter 6 Embedded SQL in C

Explains how to use embedded SQL in C.

Chapter 7 Embedded SQL in COBOL

Explains how to use embedded SQL in COBOL.

Chapter 8 SQL References

Explains the SQL statements which were extended in FUJITSU Enterprise Postgres development.

Chapter 9 Compatibility with Oracle Databases

Explains features that are compatible with Oracle databases.

Chapter 10 Application Connection Switch Feature

Explains the application connection switch feature.

Chapter 11 Performance Tuning

Explains how to tune application performance.

Chapter 12 Scan Using a Vertical Clustered Index (VCI)

Explains how to perform scan using a Vertical Clustered Index (VCI).

Appendix A Precautions when Developing Applications

Provides some points to note about application development.

Appendix B Conversion Procedures Required due to Differences from Oracle Database

Explains how to convert from an Oracle database to FUJITSU Enterprise Postgres, within the scope noted in "Compatibility with Oracle Databases" from the following perspectives.

Appendix C Tables Used by the Features Compatible with Oracle Databases

Explains the tables used by the features compatible with Oracle databases.

Appendix D ECOBPG - Embedded SQL in COBOL

Explains application development using embedded SQL in COBOL.

Appendix E Quantitative Limits

This appendix explains limitations.

Appendix F Reference

Provides a reference for each interface.

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Chapter 1 Overview of the Application Development Function

The interface for application development provided by FUJITSU Enterprise Postgres is perfectly compatible with PostgreSQL.

Along with the PostgreSQL interface, FUJITSU Enterprise Postgres also provides the following extended interfaces:

- Support for National Characters

  In order to secure portability from mainframes and databases of other companies, FUJITSU Enterprise Postgres provides data types that support national characters. The national characters are usable from the client application languages.

  Refer to "1.1 Support for National Characters" for details.

- Integration with Visual Studio

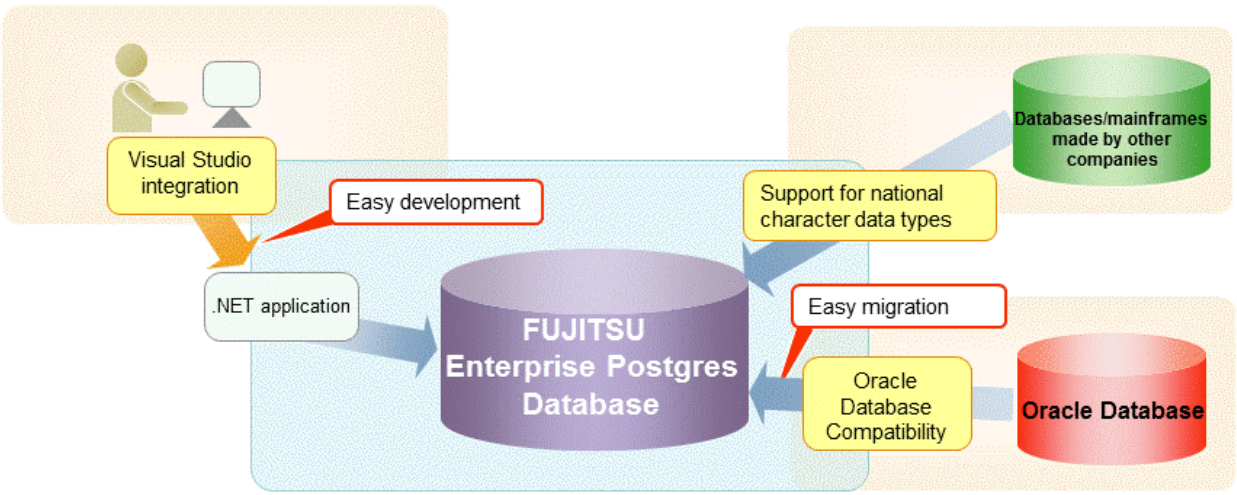
  By integrating with Visual Studio, applications can be created using a standard framework for the building of a database server.

  Refer to "1.2 Integration with Visual Studio" for details.

- Compatibility with Oracle Databases

  Compatibility with Oracle databases is offered. Use of the compatible features means that the revisions to existing applications can be isolated, and migration to open interfaces is made simpler.

  Refer to "1.3 Compatibility with Oracle Database" for details.



- Application connection switch feature

  The application connection switch feature is provided to enable automatic connection to the target server when there are multiple servers with redundant configurations.

  Refer to "1.4 Application Connection Switch Feature" for details.

- Performance tuning

  The following features are provided to control SQL statement query plans:

  - Optimizer hints
  - Locked statistics

  Refer to "11.1 Enhanced Query Plan Stability" for details.

- Scanning using a Vertical Clustered Index (VCI)

  Scans becomes faster during aggregation of many rows by providing the features below:

  - Vertical clustered index (VCI)
  - In-memory data

  This feature can only be used in Advanced Edition.

  Refer to "Chapter 12 Scan Using a Vertical Clustered Index (VCI)" for details.

1.1 Support for National Characters

NCHAR type is provided as the data type to deal with national characters.

The NCHAR type can be used with FUJITSU Enterprise Postgres pgAdmin.

Point

- NCHAR can only be used when the character set of the database is UTF-8.
- NCHAR can be used in the places where CHAR can be used (function arguments, etc.).
- For applications handling NCHAR type data in the database, the data format is the same as CHAR type. Therefore, applications handling data in NCHAR type columns can also be used to handle data stored in CHAR type columns.

Note

Note the following in order to cast NCHAR type data as CHAR type.

- When comparing NCHAR type data where the length differs, ASCII spaces are used to fill in the length of the shorter NCHAR type data so that it can be processed as CHAR type data.
- Depending on the character set, the data size may increase by between 1.5 and 2 times.

1.1.1 Literal

Syntax

```
{ N | n }'[national character [ ...]]'
```

General rules

National character string literals consist of an 'N' or 'n', and the national character is enclosed in single quotation marks ('). Example: N'ABCDEF'

The data type is national character string type.

1.1.2 Data Type

Syntax

```
{ NATIONAL CHARACTER | NATIONAL CHAR | NCHAR } [ VARYING ][(length) ]
```

The data type of the NCHAR type column is as follows:

Data type specification format	Explanation
NATIONAL CHARACTER(*n*) NATIONAL CHAR(*n*) NCHAR(*n*)	National character string with a fixed length of *n* characters This will be the same as (1) if (*n*) is omitted. *n* is a whole number larger than 0.
NATIONAL CHARACTER VARYING(*n*) NATIONAL CHAR VARYING(*n*) NCHAR VARYING(*n*)	National character string with a variable length with a maximum of *n* characters Any length of national character string can be accepted when this is omitted. *n* is a whole number larger than 0.

General rules

NCHAR is the national character string type data type. The length is the number of characters.

The length of the national character string type is as follows:

- When VARYING is not specified, the length of national character strings is fixed and will be the specified length.
- When VARYING is specified, the length of national character strings will be variable.
  In this case, the lower limit will be 0 and the upper limit will be the value specified for length.
- NATIONAL CHARACTER, NATIONAL CHAR, and NCHAR each have the same meaning.

When the national character string to be stored is shorter than the declared upper limit, the NCHAR value is filled with spaces, whereas NCHAR VARYING is stored as is.

The upper limit for character storage is approximately 1GB.

1.1.3 Functions and Operator

Comparison operator

When a NCHAR type or NCHAR VARYING type is specified in a comparison operator, comparison is only possible between NCHAR types or NCHAR VARYING types.

String functions and operators

All of the string functions and operators that can be specified by a CHAR type can also be specified by a NCHAR type. The behavior of these string functions and operators is also the same as with CHAR type.

Pattern matching (LIKE, SIMILAR TO regular expression, POSIX regular expression)

The patterns specified when pattern matching with NCHAR types and NCHAR VARYING types specify the percent sign (%) and the underline (_).

The underline (_) means a match with one national character. The percent sign (%) means a match with any number of national characters 0 or over.

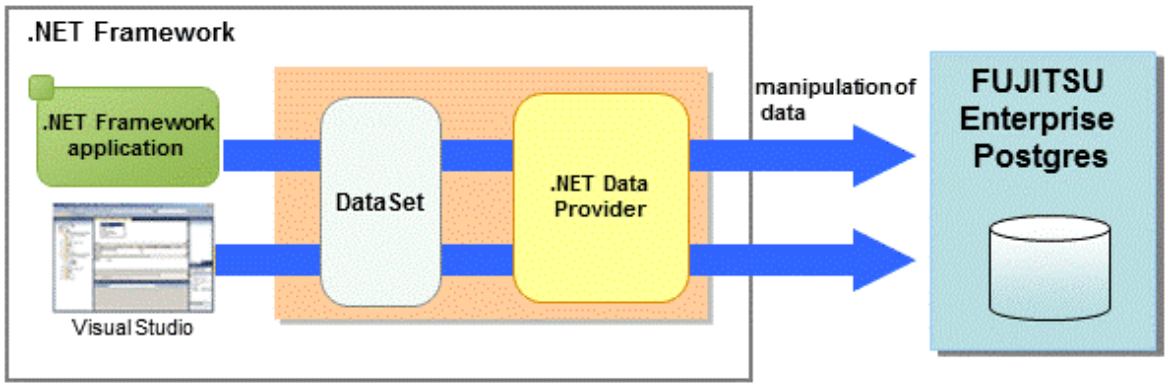
1.2 Integration with Visual Studio

When developing an application to access database server resources, you can create applications and build database server environments integrated with Microsoft Visual Studio.

Refer to "Chapter 4 .NET Data Provider" for information on integration with Visual Studio.

1.2.1 Relationship between .NET Framework and FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres provides .NET Data Provider, which is an interface for ADO.NET of .NET Framework. This enables you to select FUJITSU Enterprise Postgres as the connection destination database of ADO.NET and use the intuitive and efficient application development features of Visual Studio.



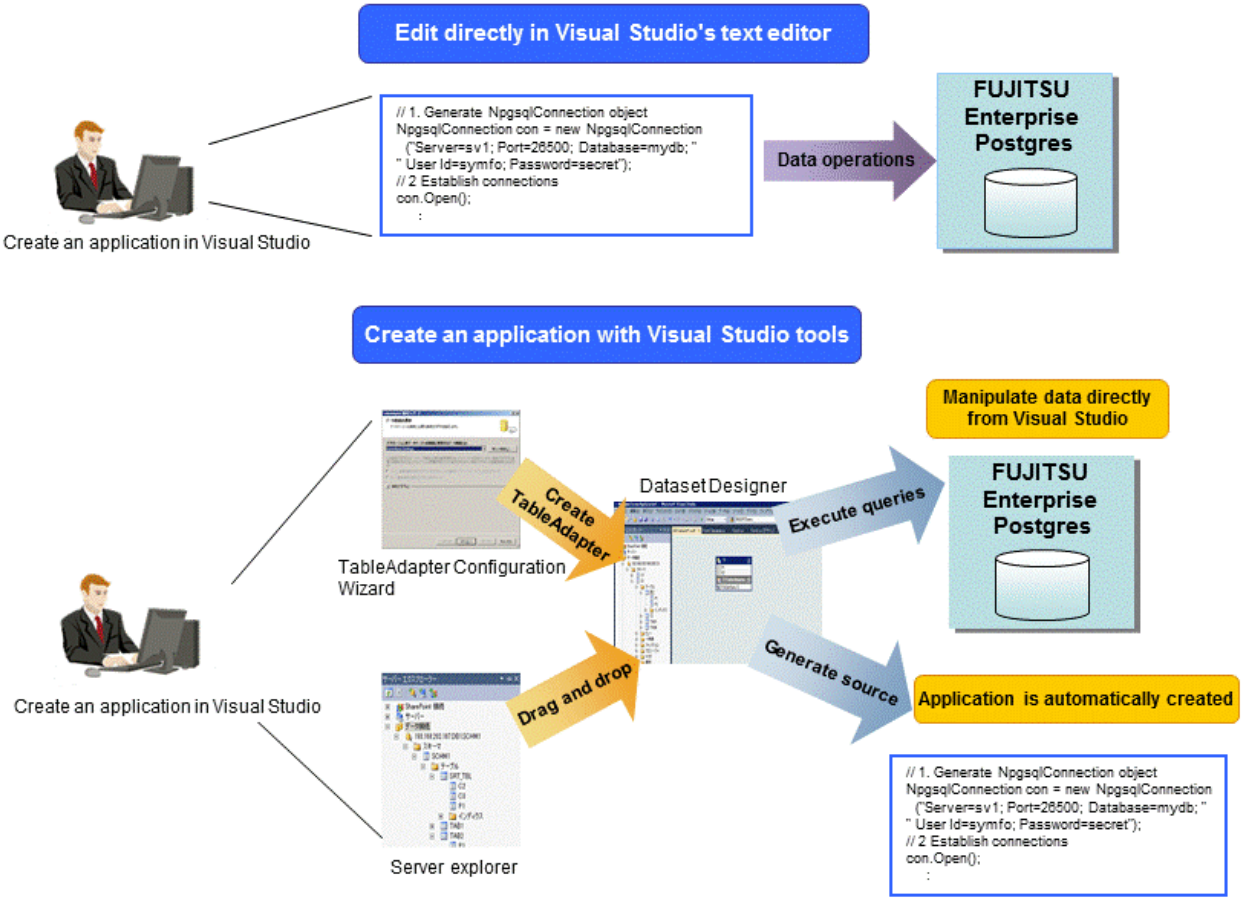
The following provides an overview of application development integrated with Visual Studio.

Edit directory in Visual Studio's text editor

By using a component specified in Visual Studio, applications to access database resources can be created manually.

Create an application with Visual Studio tools

By using basic drag-and-drop operations in the tools provided in Visual Studio, programs to access database resources can be generated automatically.

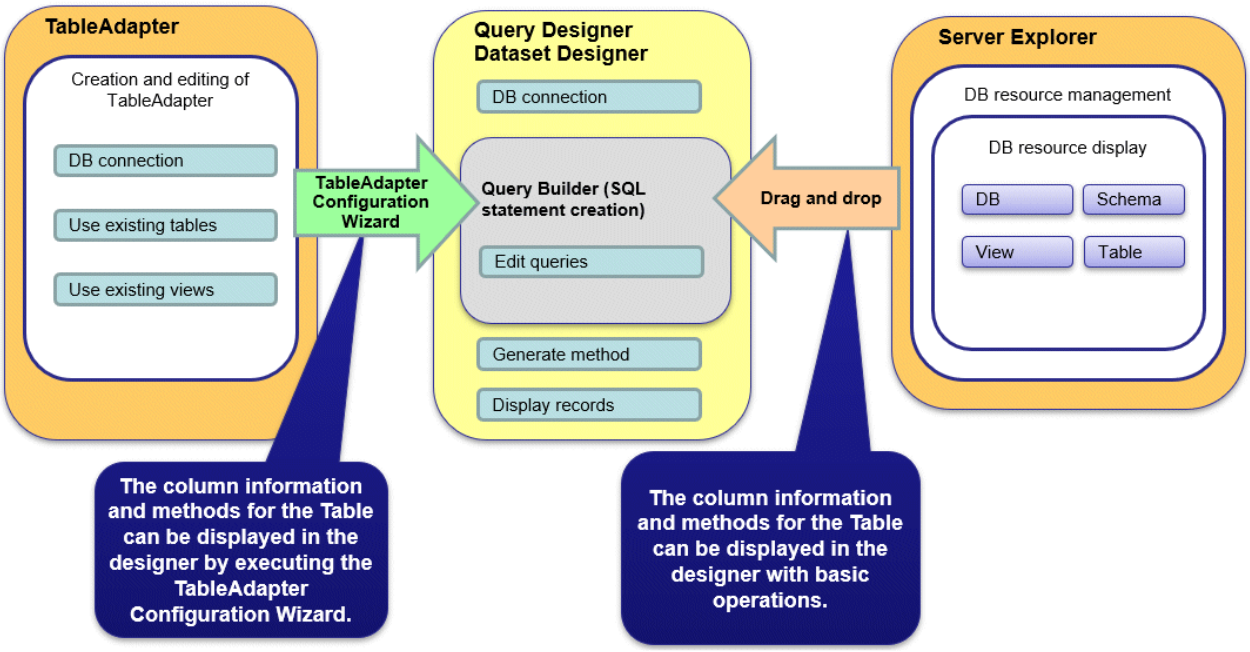


1.2.2 Automatic Application Generation

The Visual Studio tools used to automatically generate applications include TableAdapter and Server Explorer, which enable the following:

- Data manipulation of database resources with TableAdapter
- Management of database resources with Server Explorer

Whether you use TableAdapter or the Server Explorer, programs can be created with basic operations like drag and drop with the resources and tools that comprise Visual Studio.



The following features are available with TableAdapter and Server Explorer:

- Manipulation of database resources with TableAdapter
  - Generating queries using existing tables/views
  - Generating methods using existing tables/views
- Management of database resources with Server Explorer
  - Listing of database resources
  - Generating queries using existing tables/views
  - Generating methods using existing tables/views

1.3 Compatibility with Oracle Database

The following features have been extended in order to enhance compatibility with Oracle databases:

- Query (external join operator (+), DUAL table)
- Function (DECODE, SUBSTR, NVL)
- Built-in package (DBMS_OUTPUT, UTL_FILE, DBMS_SQL)

Refer to "Chapter 9 Compatibility with Oracle Databases" for information on the features compatible with Oracle databases.

1.4 Application Connection Switch Feature

The application connection switch feature enables automatic connection to the target server when there are multiple servers with redundant configurations.

Refer to " Chapter 10 Application Connection Switch Feature " for information on the application connection switch feature.

1.4.1 Integration with Database Multiplexing

The application connection switch feature is provided to enable automatic connection to the appropriate server when there are multiple servers with redundant configurations.

See

Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing.

1.5 Notes on Application Compatibility

FUJITSU Enterprise Postgres upgrades contain feature improvements and enhancements that may affect the applications.

Accordingly, note the points below when developing applications, to ensure compatibility after upgrade.

- Checking execution results
- Referencing system catalogs
- Using functions

1.5.1 Checking Execution Results

Refer to SQLSTATE output in messages to check the SQL statements used in applications and the execution results of commands used during development.

See

Refer to Messages for information on the message content and number.

Refer to "PostgreSQL Error Codes" under "Appendixes" in the PostgreSQL Documentation for information on SQLSTATE.

1.5.2 Referencing System Catalogs

System catalogs can be used to obtain information about the FUJITSU Enterprise Postgres system and database objects.

However, system catalogs may change when the FUJITSU Enterprise Postgres version is upgraded. Also, there are many system catalogs that return information that is inherent to FUJITSU Enterprise Postgres.

Accordingly, reference the information schema defined in standard SQL (information_schema) wherever possible. Note also that queries specifying "*" in the selection list must be avoided to prevent columns being added.

See

Refer to "The Information Schema" under "Client Interfaces" in the PostgreSQL Documentation for details.

The system catalog must be referenced to obtain information not found in the information schema. Instead of directly referencing the system catalog in the application, define a view for that purpose. Note, however, that when defining the view, the column name must be clearly specified after the view name.

An example of defining and using a view is shown below.

Example

```
CREATE VIEW my_tablespace_view(spcname) AS SELECT spcname FROM pg_tablespace;
SELECT * FROM my_tablespace_view V1, pg_tables T1 WHERE V1.spcname = T1.tablespace;
```

If changes are made to a system catalog, the user will be able to take action by simply making changes to the view, without the need to make changes to the application.

The following shows an example of taking action by redefining a view as if no changes were made.

The pg_tablespace system catalog is redefined in response to the column name being changed from spcname to spacename.

Example

```
DROP VIEW my_tablespace_view;
CREATE VIEW my_tablespace_view(spcname) AS SELECT spacename FROM pg_tablespace;
```

1.5.3 Using Functions

The default functions provided with FUJITSU Enterprise Postgres enable a variety of operations and manipulations to be performed, and information to be obtained, using SQL statements.

However, it is possible that internal FUJITSU Enterprise Postgres functions, such as those relating to statistical information or for obtaining system-related information, may change as FUJITSU Enterprise Postgres versions are upgraded.

Accordingly, when using these functions, define them as new functions and then use the newly-defined functions in the applications.

An example of defining and using a function is shown below.

Example

```
CREATE FUNCTION my_func(relid regclass) RETURNS bigint LANGUAGE SQL AS 'SELECT
pg_relation_size(relid)';
SELECT my_func(2619);
```

If changes are made to a function, the user will be able to take action by simply redefining the function, without the need to make changes to the application.

The following shows an example of taking action by redefining a function as if no changes were made.

The pg_relation_size function is redefined after arguments are added.

Example

```
DROP FUNCTION my_func(regclass);
CREATE FUNCTION my_func(relid regclass) RETURNS bigint LANGUAGE SQL AS 'SELECT
pg_relation_size(relid,$$main$$)';
```

Chapter 2 JDBC Driver

This section describes how to use JDBC drivers.

2.1 Development Environment

This section describes application development using JDBC drivers and the runtime environment.

2.1.1 Combining with JDK or JRE

Refer to Installation and Setup Guide for Client for information on combining with JDK or JRE where JDBC drivers can operate.

2.2 Setup

This section describes the environment settings required to use JDBC drivers and how to encrypt communication data.

2.2.1 Environment Settings

Configuration of the CLASSPATH environment variable is required as part of the runtime environment for JDBC drivers.

The name of the JDBC driver file is as follows:

- If using JDK 6 or JRE 6

```
postgresql-jdbc4.jar
```

- If using JDK 7 or JRE 7

```
postgresql-jdbc41.jar
```

- If using JDK 8, JRE 8, JDK 11 or JRE 11

```
postgresql-jdbc42.jar
```

The examples below show how to set the CLASSPATH environment variable if JDK 6 or JRE 6 is used.

If JDK 7, JRE 7, JDK 8, JRE 8, JDK 11 or JRE 11 is used, only the name of the JDBC driver file will be different. The method for configuring the CLASSPATH environment variable is the same.

Note that "<*x*>" indicates the product version.

L

- Linux
  - Setting example (TC shell)

```
setenv CLASSPATH /opt/fsepv<x>client64/jdbc/lib/postgresql-jdbc4.jar:${CLASSPATH}
```

  - Setting example (bash)

```
CLASSPATH=/opt/fsepv<x>client64/jdbc/lib/postgresql-jdbc4.jar:$CLASSPATH;export
CLASSPATH
```

W

- Windows (32-bit)
  - Setting example

```
set CLASSPATH=C:\Program Files\Fujitsu\fsepv<x>client32\JDBC\lib\postgresql-
jdbc4.jar;%CLASSPATH%
```

- Windows (64-bit)
  - Setting example (when FUJITSU Enterprise Postgres Client 32-bit is installed)

```
set CLASSPATH=C:\Program Files (x86)\Fujitsu\fsepv<x>client32\JDBC\lib\postgresql-jdbc4.jar;%CLASSPATH%
```

  - Setting example (when FUJITSU Enterprise Postgres Client 64-bit is installed)

```
set CLASSPATH=C:\Program Files\Fujitsu\fsepv<x>client64\JDBC\lib\postgresql-jdbc4.jar;%CLASSPATH%
```

2.2.2 Message Language and Encoding System Used by Applications Settings

If the JDBC driver is used, it will automatically set the encoding system on the client to UTF-8, so there is no need to configure this.

See

Refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the PostgreSQL Documentation for information on encoding systems.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Set language in the "user.language" system property.

Example

Example of running a Java command with system property specified

```
java -Duser.language=en TestClass1
```

2.2.3 Settings for Encrypting Communication Data

When using the communication data encryption feature to connect to the database server, set as follows:

Settings for encrypting communication data for connection to the server

This section describes how to create applications for encrypting communication data.

Set the property of the SSL parameter to "true" to encrypt. The default for the SSL parameter is "false".

If ssl is set to "true", sslmode is internally treated as "verify-full".

Example

- Setting example 1

```
String url = "jdbc:postgresql://sv1/test";
Properties props = new Properties();
props.setProperty("user","fsepuser");
props.setProperty("password","secret");
props.setProperty("ssl","true");
```

```
props.setProperty("sslfactory","org.postgresql.ssl.DefaultJavaSSLFactory");
Connection conn = DriverManager.getConnection(url, props);
```

- Setting example 2

```
String url = "jdbc:postgresql://sv1/test?
user=fsepuser&password=secret&ssl=true&sslfactory=org.postgresql.ssl.DefaultJavaSSLF
actory";
Connection conn = DriverManager.getConnection(url);
```

To prevent spoofing of the database server, you need to use the keytool command included with Java to import the CA certificate to the Java keystore. In addition, specify "org.postgresql.ssl.DefaultJavaSSLFactory" for the sslfactory parameter.

Refer to JDK documentation and the Oracle website for details.

Note

There is no need to set the ssl parameter if the connection string of the DriverManager class is specified, or if the sslmode parameter is specified in the data source, such as when the application connection switch feature is used. If the ssl parameter is set, the value in the sslmode parameter will be enabled.

See

Refer to "Secure TCP/IP Connections with SSL" in "Server Administration" in the PostgreSQL Documentation for information on encrypting communication data.

2.3 Connecting to the Database

This section explains how to connect to a database.

- Using the DriverManager Class
- Using the PGConnectionPoolDataSource Class
- Using the PGXADataSource Class

Note

Do not specify "V2" for the "*protocolVersion*" of the connection string.

2.3.1 Using the DriverManager Class

To connect to the database using the DriverManager class, first load the JDBC driver, then specify the connection string as a URI in the API of the DriverManager class.

Load the JDBC driver

Specify org.postgresql.Driver.

Connection string

URI connection is performed as follows:

```
jdbc:postgresql://host:port/database?
user=user&password=password1&loginTimeout=loginTimeout&socketTimeout=socketTimeout
```

Argument	Description
host	Specify the host name for the connection destination.
port	Specify the port number for the database server. The default is "27500".
database	Specify the database name.
user	Specify the username that will connect with the database. If this is omitted, the username logged into the operating system that is executing the application will be used.
password	Specify a password when authentication is required.
loginTimeout	Specify the timeout for connections (in units of seconds). Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value. An error occurs when a connection cannot be established within the specified time.
socketTimeout	Specify the timeout for communication with the server (in units of seconds). Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value. An error occurs when data is not received from the server within the specified time.

Example

Code examples for applications

```
import java.sql.*;
...
Class.forName("org.postgresql.Driver");
String url = "jdbc:postgresql://sv1:27500/mydb?
user=myuser&password=myuser01&loginTimeout=20&socketTimeout=20";
Connection con = DriverManager.getConnection(url);
```

2.3.2 Using the PGConnectionPoolDataSource Class

To connect to databases using data sources, specify the connection information in the properties of the data source.

Method description

Argument	Description
setServerName	Specify the host name for the connection destination.
setPortNumber	Specify the port number for the database server. The default is "27500".
setDatabaseName	Specify the database name.
setUser	Specify the username of the database. By default, the name used will be that of the user on the operating system that is executing the application.
setPassword	Specify a password for server authentication.
setLoginTimeout	Specify the timeout for connections (in units of seconds). Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value.

Argument	Description
	An error occurs when a connection cannot be established within the specified time.
setSocketTimeout	Specify the timeout for communication with the server (in units of seconds). Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value. An error occurs when data is not received from the server within the specified time.

Example

Code examples for applications

```
import java.sql.*;
import org.postgresql.ds.PGConnectionPoolDataSource;
...
PGConnectionPoolDataSource source = new PGConnectionPoolDataSource();
source.setServerName("sv1");
source.setPortNumber(27500);
source.setDatabaseName("mydb");
source.setUser("myuser");
source.setPassword("myuser01");
source.setLoginTimeout(20);
source.setSocketTimeout(20);
...
Connection con = source.getConnection();
```

2.3.3 Using the PGXADataSource Class

To connect to databases using data sources, specify the connection information in the properties of the data source.

Method description

Argument	Description
setServerName	Specify the host name for the connection destination.
setPortNumber	Specify the port number for the database server. The default is "27500".
setDatabaseName	Specify the database name.
setUser	Specify the username that will connect with the database. If this is omitted, the name used will be that of the user on the operating system that is executing the application.
setPassword	Specify a password when authentication by a password is required.
setLoginTimeout	Specify the timeout for connections. The units are seconds. Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value. An error occurs when a connection cannot be established within the specified time.
setSocketTimeout	Specify the timeout for communication with the server. The units are seconds. Specify a value between 0 and 2147483647. There is no limit set if you set 0 or an invalid value. An error occurs when data is not received from the server within the specified time.

Example

Code examples for applications

```
import java.sql.*;
import org.postgresql.xa.PGXADataSource;
...
PGXADataSource source = new PGXADataSource();
source.setServerName("sv1");
source.setPortNumber(27500);
source.setDatabaseName("mydb");
source.setUser("myuser");
source.setPassword("myuser01");
source.setLoginTimeout(20);
source.setSocketTimeout(20);...
Connection con = source.getConnection();
```

2.4 Application Development

This section describes the data types required when developing applications that will be connected with FUJITSU Enterprise Postgres.

2.4.1 Relationship between the Application Data Types and Database Data Types

The following table shows the correspondence between data types in applications and data types in databases.

Data type on the server	Java data type	Data types prescribed by java.sql.Types
character	String	java.sql.Types.CHAR
national character	String	java.sql.Types.NCHAR
character varying	String	java.sql.Types.VARCHAR
national character varying	String	java.sql.Types.NVARCHAR
text	String	java.sql.Types.VARCHAR
bytea	byte[]	java.sql.Types.BINARY
smallint	short	java.sql.Types.SMALLINT
integer	int	java.sql.Types.INTEGER
bigint	long	java.sql.Types.BIGINT
smallserial	short	java.sql.Types.SMALLINT
serial	int	java.sql.Types.INTEGER
bigserial	long	java.sql.Types.BIGINT
real	float	java.sql.Types.REAL
double precision	double	java.sql.Types.DOUBLE
numeric	java.math.BigDecimal	java.sql.Types.NUMERIC
decimal	java.math.BigDecimal	java.sql.Types.DECIMAL
money	String	java.sql.Types.OTHER
date	java.sql.Date	java.sql.Types.DATE
time with time zone	java.sql.Time	java.sql.Types.TIME

Data type on the server	Java data type	Data types prescribed by java.sql.Types
time without time zone	java.sql.Time	java.sql.Types.TIME
timestamp without time zone	java.sql.Timestamp	java.sql.Types.TIMESTAMP
timestamp with time zone	java.sql.Timestamp	java.sql.Types.TIMESTAMP
interval	org.postgresql.util.PGInterval	java.sql.Types.OTHER
boolean	boolean	java.sql.Types.BIT
bit	boolean	java.sql.Types.BIT
bit varying	org.postgresql.util.Pgobject	java.sql.Types.OTHER
oid	long	java.sql.Types.BIGINT
xml	java.sql.SQLXML	java.sql.Types.SQLXML
array	java.sql.Array	java.sql.Types.ARRAY
uuid	java.util.UUID	java.sql.Types.OTHER
point	org.postgresql.geometric.Pgpoint	java.sql.Types.OTHER
box	org.postgresql.geometric.Pgbox	java.sql.Types.OTHER
lseg	org.postgresql.geometric.Pglseg	java.sql.Types.OTHER
path	org.postgresql.geometric.Pgpath	java.sql.Types.OTHER
polygon	org.postgresql.geometric.PGpolygon	java.sql.Types.OTHER
circle	org.postgresql.geometric.PGcircle	java.sql.Types.OTHER
json	org.postgresql.util.PGobject	java.sql.Types.OTHER
Network address type (inet,cidr,macaddr, macaddr8)	org.postgresql.util.PGobject	java.sql.Types.OTHER
Types related to text searches (svector, tsquery)	org.postgresql.util.PGobject	java.sql.Types.OTHER
Enumerated type	org.postgresql.util.PGobject	java.sql.Types.OTHER
Composite type	org.postgresql.util.PGobject	java.sql.Types.OTHER
Range type	org.postgresql.util.PGobject	java.sql.Types.OTHER

Although the getString() method of the ResultSet object can be used for all server data types, it is not guaranteed that it will always return a string in the same format for the same data type.

Strings in a format compatible with the JDBC specifications can be obtained using the Java toString() method of the appropriate data type (for example, getInt(), getTimestamp()) to conform to the data type on the server.

2.4.2 Statement Caching Feature

The statement caching feature caches SQL statements for each individual connection. This means that when an SQL statement with an identical string is next executed, the analysis and creation of the statement can be skipped. This improves performance in cases such as when an SQL statement with an identical string is executed within a loop or method that is executed repeatedly. Furthermore, the statement caching feature can be combined with the connection pooling feature to further enhance performance.

Cache registration controls

You can configure whether to cache SQL statements using the setPoolable(boolean) method of the PreparedStatement class when the statement caching feature is enabled.

Values that can be configured are shown below:

false

SQL statements will not be cached, even when the statement caching feature is enabled.

true

SQL statements will be cached if the statement caching feature is enabled.

2.4.3 Creating Applications while in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

See

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.
- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

2.4.3.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information (*1)	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 08006 08007	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during system failure	08001	
Switch to the standby server	Switched during access	57P01 08006 08007	
	Accessed during switch	08001	

*1: Return value of the getSQLState() method of SQLException.

Chapter 3 ODBC Driver

This section describes application development using ODBC drivers.

3.1 Development Environment

Applications using ODBC drivers can be developed using ODBC interface compatible applications, such as Access, Excel, and Visual Basic.

Refer to the manuals for the programming languages corresponding to the ODBC interface for information about the environment for development.

FUJITSU Enterprise Postgres supports ODBC 3.5.

3.2 Setup

You need to set up PsqlODBC, which is an ODBC driver, in order to use applications that use ODBC drivers with FUJITSU Enterprise Postgres. PsqlODBC is included in the FUJITSU Enterprise Postgres client package.

The following describes how to register the ODBC drivers and the ODBC data source.

3.2.1 Registering ODBC Drivers

When using the ODBC driver on Linux platforms, register the ODBC driver using the following procedure:

1. Install the ODBC driver manager (unixODBC)

   Information

   - FUJITSU Enterprise Postgres supports unixODBC Version 2.3 or later.

     You can download unixODBC from the following site:

     http://www.unixodbc.org/

   - To execute unixODBC, you must first install libtool 2.2.6 or later.

     You can download libtool from the following website:

     http://www.gnu.org/software/libtool/

   [Note]

   - ODBC driver operation is supported.
   - unixODBC operation is not supported.

2. Register the ODBC drivers

   Edit the ODBC driver manager (unixODBC) odbcinst.ini file.

   Information

   [location of the odbcinst.ini file]

   ```
   unixOdbcInstallDir/etc/odbcinst.ini
   ```

   Set the following content:

Definition name	Description	Setting value
[Driver name]	ODBC driver name	Set the name of the ODBC driver. Select the two strings below that correspond to the application type. Concatenate the strings with no spaces, enclose in "[ ]", and then specify this as the driver name. **Note** The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string. - Application architecture "FUJITSUEnterprisePostgres<*fujitsuEnterprisePostgresClientVers*>x64" - Encoding system used by the application - In Unicode (only UTF-8 can be used) "unicode" - Other than Unicode "ansi" Example: The encoding system used by the application is Unicode: "[FUJITSUEnterprisePostgres<*fujitsuEnterprisePostgresClientVers*>x64unicode]"
Description	Description of the ODBC driver	Specify a supplementary description for the current data source. Any description may be set.

Driver64	Path of the ODBC driver (64-bit)	Set the path of the ODBC driver (64-bit).
		
		- If the encoding system is Unicode:
		
		`fujitsuEnterprisePostgresClientInstallDir/odbc/lib/psqlodbcw.so`
		
		- If the encoding system is other than Unicode:
		
		`fujitsuEnterprisePostgresClientInstallDir/odbc/lib/psqlodbca.so`

FileUsage	Use of the data source file	Specify 1.
Threading	Level of atomicity secured for connection pooling	Specify 2.

Example

Note that "<x>" indicates the product version.

```
[FUJITSU Enterprise Postgres13x64unicode]
Description = FUJITSU Enterprise Postgres 13 x64 unicode driver
Driver64    = /opt/fsepv<x>client64/odbc/lib/psqlodbcw.so
FileUsage   = 1
Threading   = 2
```

3.2.2 Registering ODBC Data Sources(for Windows(R))

This section describes how to register ODBC data sources.

There are the following two ways to register ODBC data sources on Windows(R).

3.2.2.1 Registering Using GUI

This section describes how to start the [ODBC Data Source Administrator] and register ODBC data sources.

Use the following procedure to register ODBC data sources:

1. Start the [ODBC Data Source Administrator].

   Select [Start] >> [Control Panel] >> [Administrative Tools] >> [ODBC Data Source Administrator].

   Note

   To register data sources for 32-bit applications in Windows(R) for 64-bit, execute the ODBC administrator (odbcad32.exe) for 32-bit, as shown below.

   ```
   %SYSTEMDRIVE%\WINDOWS\SysWOW64\odbcad32.exe
   ```

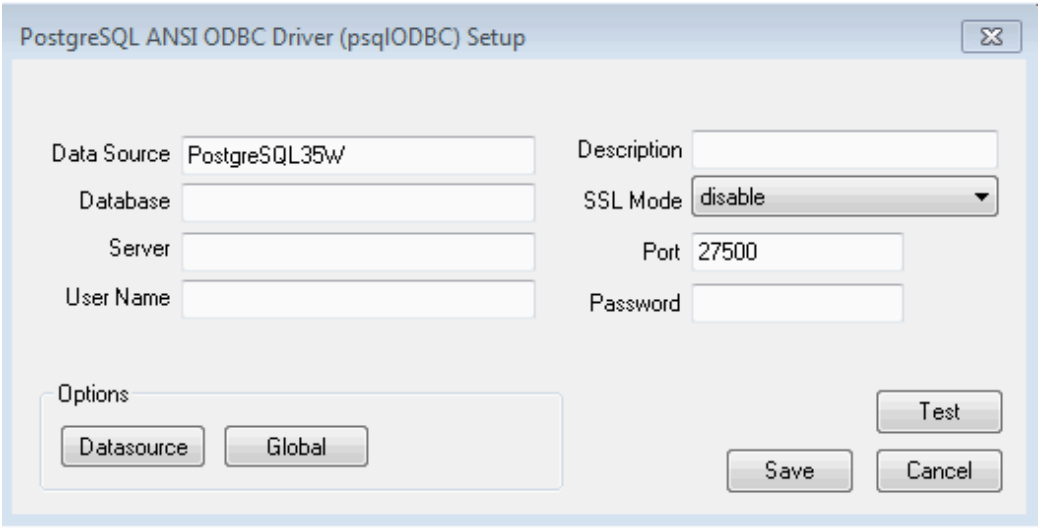
2. When only the current user is to use the ODBC data source, select [User DSN]. When all users using the same computer are to use the ODBC data source, select [System DSN].

3. Click [Add].

4. Select one of the following drivers from the list of available ODBC drivers displayed in [Create New Data Source], and then click [Finish]. The notation "*x*" indicates the version of the FUJITSU Enterprise Postgres client feature.

   - FUJITSU Enterprise Postgres Unicode *x*
     Select this driver if using Unicode as the application encoding system.
   - FUJITSU Enterprise Postgres ANSI *x*
     Select this driver if using other than Unicode as the application encoding system.

5. The [PostgreSQL ANSI ODBC Driver (psqlODBC) Setup] window is displayed. Enter or select the required items, then click [Save].



Set the following content:

Definition name	Setting value
Data Source	Specify the data source name to be registered in the ODBC driver manager. The application will select the name specified here and connect with the FUJITSU Enterprise Postgres database. This parameter cannot be omitted. Specify the following characters up to 32 bytes. - National characters - Alphanumerics - "_", "<", ">", "+", "`", "|", "~", "" " "&" , """, "#" , "$" , "%" , "-" , "^" , ":" , "/" , "."
Description	Specify a supplementary description for the current data source. Specify characters up to 255 bytes. - National characters - Alphanumerics
Database	Specify the database name to be connected.
SSLMode	Specify to encrypt communications. The default is "disable". The setting values for SSLMode are as follows: - disable: Connect without SSL - allow: Connect without SSL, and if it fails, connect using SSL - prefer: Connect using SSL, and if it fails, connect without SSL - require: Connect always using SSL - verify-ca: Connect using SSL, and use a certificate issued by a trusted CA (*1) - verify-full: Connect using SSL, and use a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)

Definition name	Setting value
Server	Specify the host name of the database server to connect to, using up to 63 bytes. This parameter cannot be omitted.
Port	Specify the port number to be used for remote access. The default value is "27500".
Username(*2)	Specify the user that will access the database.
Password(*2)	Specify the password for the user that will access the database.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT of your operating system to specify the CA certificate file as shown below.

Example:

```
Variable name: PGSSLROOTCERT
Variable value: cACertificateFile
```

*2: In consideration of security, specify the Username and the Password by the application.

3.2.2.2 Registering Using Commands

This section describes how to use commands to register ODBC data sources.

Use the following tools from Microsoft to register ODBC data sources.

- ODBCConf.exe
- Add-OdbcDsn

Refer to the Microsoft Developer Network (MSDN) Library for information on how to use these tools.

When using ODBCConf.exe

ODBCConf.exe is a tool supported on all Windows(R) platforms.

Specification format

```
ODBCConf.exe /A { dataSourceType "odbcDriverName" "optionName=value[|
optionName=value...]"} [/Lv fileName]
```

Refer to the Microsoft MSDN library for information on the format and parameters.

Description

Set the following content:

Definition name	Setting value
Data source type	Specify the data source type. - "CONFIGSYSDSN": A system data source is created. This requires user admin rights. The data source can be used by all users of the same computer. - "CONFIGDSN": A user data source is created. The data source can be used by the current user only. Note When CONFIGSYSDSN is specified as the data source type, it is necessary to execute the command in the command prompt in administrator mode.

Definition name	Setting value
ODBC driver name	Specify an ODBC driver name that has already been registered on the system. Specify one of the following. **Note** The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string. - "FUJITSU Enterprise Postgres Unicode *<fujitsuEnterprisePostgresClientVers>*" Specify this driver name if using Unicode as the application encoding system. - "FUJITSU Enterprise Postgres ANSI *<fujitsuEnterprisePostgresClientVers>*" Specify this driver name if using other than Unicode as the application encoding system.
Option name	The following items must be set: - "DSN": Specify the data source name. - "Servername": Specify the host name for the database server. - "Port": Specify the port number for connection to the database - "Database": Specify the database name. Specify the following values as required: - "UID": User ID - "Password": Password - "SSLMode": Specify to encrypt communications. The default is "disable". Refer to the SSLMode explanation in the table under step 5 of "3.2.2.1 Registering Using GUI" for information on how to configure SSLMode.
File Name	You can output process information to a file when creating a data source. This operand can be omitted.

Example

```
ODBCConf.exe /A {CONFIGSYSDSN "FUJITSU Enterprise Postgres Unicode 12" "DSN=odbcconf1|
Servername=sv1|Port=27500|Database=db01|SSLMode=verify-ca"} /Lv log.txt
```

Note

In consideration of security, specify the UID and the Password by the application.

When using Add-OdbcDsn

Add-OdbcDsn is used in the PowerShell command interface.

Specification format

```
Add-OdbcDsn dataSourceName -DriverName "odbcDriverName" -DsnType dataSourceType -
Platform oSArchitecture -SetPropertyValue @("optionName=value" [,"optionName=value"...])
```

Refer to the Microsoft MSDN library for information on the format and parameters.

Description

Set the following content:

Definition name	Setting value
Data source name	Specify any name for the data source name.
ODBC driver name	Specify an ODBC driver name that has already been registered on the system. Specify one of the following. Note The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string. - "FUJITSU Enterprise Postgres Unicode *<fujitsuEnterprisePostgresClientVers>*" Specify this driver name if using Unicode as the application encoding system. - "FUJITSU Enterprise Postgres ANSI *<fujitsuEnterprisePostgresClientVers>*" Specify this driver name if using other than Unicode as the application encoding system.
Data source type	Specify the data source type. - "System": A system data source is created. Requires user admin rights. The data source can be used by all users of the same computer. - "User": A user data source is created. The data source can be used by the current user only. Note When System is specified as the data source type, it is necessary to execute the command in the administrator mode of the command prompt.
OS architecture	Specify the OS architecture of the system. - "32-bit": 32-bit system - "64-bit": 64-bit system
Option name	The following items must be set: - "Servername": Specify the host name for the database server. - "Port": Specify the port number for connection to the database - "Database": Specify the database name. Specify the following values as required: - "SSLMode": Specify to encrypt communications. The default is "disable". Refer to the SSLMode explanation in the table under step 5 of "3.2.2.1 Registering Using GUI" for information on how to configure SSLMode.

Definition name	Setting value
	Note When using Add-OdbcDsn, the strings "UID" and "Password" cannot be set as option names. These can only be used when using ODBCConf.exe.

Example

```
Add-OdbcDsn odbcps1 -DriverName "FUJITSU Enterprise Postgres Unicode 12" -DsnType System -
Platform 32-bit -SetPropertyValue @("Servername=sv1", "Port=27500", "Database=db01",
"SSLMode=verify-ca")
```

L

3.2.3 Registering ODBC Data Sources(for Linux)

This section describes how to register ODBC data sources on Linux.

1. Register the data sources

   Edit the odbc.ini definition file for the data source.

   Information

   Edit the file in the installation directory for the ODBC driver manager (unixODBC)

   ```
   unixOdbcInstallDir/etc/odbc.ini
   ```

   Or

   Create a new file in the HOME directory

   ```
   ~/.odbc.ini
   ```

   Point

   If *unixOdbcInstallDir* is edited, these will be used as the shared settings for all users that log into the system. If created in the HOME directory (~/), the settings are used only by the single user.

   Set the following content:

Definition name	Setting value
[Data source name]	Set the name for the ODBC data source.
Description	Set a description for the ODBC data source. Any description may be set.
Driver	Set the following as the name of the ODBC driver. Do not change this value. Select the two strings below that correspond to the application type. Concatenate the strings with no spaces and then specify this as the driver name. Note The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string.

Definition name	Setting value
	- Application architecture "FUJITSU Enterprise Postgres *<fujitsuEnterprisePostgresClientVers>*x64" - Encoding system used by the application - In Unicode (only UTF-8 can be used) "unicode" - Other than Unicode "ansi" Example: The encoding system used by the application is Unicode: "FUJITSU Enterprise Postgres *<fujitsuEnterprisePostgresClientVers>*x64unicode"
Database	Specify the database name to be connected.
Servername	Specify the host name for the database server.
Username	Specify the user ID that will connect with the database.
Password	Specify the password for the user that will connect to the database.
Port	Specify the port number for the database server. The default is "27500".
SSLMode	Specify the communication encryption method. The setting values for SSLMode are as follows: - disable: Connect without SSL - allow: Connect without SSL, and if it fails, connect using SSL - prefer: Connect using SSL, and if it fails, connect without SSL - require: Connect always using SSL - verify-ca: Connect using SSL, and use a certificate issued by a trusted CA (*1) - verify-full: Connect using SSL, and use a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
ReadOnly	Specify whether to set the database as read-only. - 1: Set read-only - 0: Do not set read-only

*1: If specifying either "verify-ca" or "verify-full", use the environment variable PGSSLROOTCERT to specify the CA certificate file as shown below.

Example

```
export PGSSLROOTCERT=cACertificateFileStorageDir/root.crt
```

Example

```
[MyDataSource]
Description    = FUJITSU Enterprise Postgres
Driver         = FUJITSU Enterprise Postgres13x64ansi
Database       = db01
Servername     = sv1
```

```
Port            = 27500
ReadOnly        = 0
```

Note

In consideration of security, specify the UserName and the Password by the application.

2. Configure the environment variable settings

   To execute applications that use ODBC drivers, all of the following settings must be configured in the LD_LIBRARY_PATH environment variable:

   - *fujitsuEnterprisePostgresClientInstallDir*\lib
   - *unixOdbcInstallDir(*1)*\lib
   - *libtoolInstallDir(*1)*\lib

   *1: If the installation directory is not specified when unixODBC and libtool are installed, they will be installed in /usr/local.

3.2.4 Message Language and Encoding System Used by Applications Settings

This section explains the language settings for the application runtime environment and the encoding settings for the application.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Messages output by an application may include text from messages sent from the database server. In the resulting text, the text of the application message will use the message locale of the application, and the text of the message sent by the database server will use the message locale of the database server. If the message locales do not match, more than one language or encoding system will be used. Moreover, if the encoding systems do not match, characters in the resulting text can be garbled.

L

- Linux

  Set the locale for messages (LC_MESSAGES category) to match the message locale of the database server. This can be done in a few different ways, such as using environment variables. Refer to the relevant manual of the operating system for information on the setlocale function.

  Example

  Example of specifying "en_US.UTF-8" with the setlocale function

  ```
  setlocale(LC_ALL,"en_US.UTF-8");
  ```

  Specifying the locale of the LC_ALL category propagates the setting to LC_MESSAGE.

W

- Windows(R)

  Align the locale of the operating system with the message locale of the database server.

Encoding System Settings

Ensure that the encoding system that is embedded in the application and passed to the database, and the encoding system setting of the runtime environment, are the same. The encoding system cannot be converted correctly on the database server.

Use one of the following methods to set the encoding system for the application:

- Set the PGCLIENTENCODING environment variable in the runtime environment.
- Set the client_encoding keyword in the connection string.
- Use the PQsetClientEncoding function.

See

Refer to "Supported Character Sets" in "Server Administration" in the PostgreSQL Documentation for information on the strings that represent the encoding system that can be set.

For example, when using "Unicode" and "8 bit", set the string "UTF8".

Example

Setting the "PGCLIENTENCODING" environment variable

L

An example of setting when the encoding of the client is "UTF8" (Bash)

```
> PGCLIENTENCODING=UTF8; export PGCLIENTENCODING
```

W

An example of setting when the encoding of the client is "UTF8"

```
> set PGCLIENTENCODING=UTF8
```

Note

Text may be garbled when outputting results to the command prompt. Review the font settings for the command prompt if this occurs.

3.3 Connecting to the Database

Refer to the manual for the programming language corresponding to the ODBC interface, i.e. Access, Excel, or Visual Basic, for example.

3.4 Application Development

This section describes how to develop applications using ODBC drivers.

W

3.4.1 Compiling Applications (for Windows (R))

Refer to the manual for the programming language corresponding to the ODBC interface, i.e. Access, Excel, or Visual Basic, for example.

Note

The cl command expects input to be a program that uses one of the following code pages, so convert the program to these code pages and then compile and link it (refer to the Microsoft documentation for details).

- ANSI console code pages (example: UTF8)
- UTF-16 little-endian with or without BOM (Byte Order Mark)
- UTF-16 big-endian with or without BOM
- UTF-8 with BOM

The cl command converts strings in a program to an ANSI console code page before generating a module, so the data sent to and received from the database server becomes an ANSI console code page. Therefore, set the coding system corresponding to the ANSI console code page as the coding system of the client.

Refer to "Character Set Support" in "Server Administration" in the PostgreSQL Documentation for information on how to set the client encoding system.

L

3.4.2 Compiling Applications (for Linux)

Specify the following options when compiling applications.

Table 3.1 Include file and library path

Option	How to specify the option
Path of the include file	-I *unixOdbc64bitIncludeFileDir*
Path of the library	-L *unixOdbc64bitLibraryDir*

Table 3.2 ODBC library

Type of library	Library name
Dynamic library	libodbc.so

Note

Specify -m64 when creating a 64-bit application.

Example

The following are examples of compiling ODBC applications:

```
gcc -m64 -I/usr/local/include(*1) -L/usr/local/lib(*1) -lodbc testproc.c -o testproc
```

*1: This is an example of building and installing from the source without specifying an installation directory for unixODBC. If you wish to specify a location, set the installation directory.

3.4.3 Creating Applications While in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

See

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.

- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

3.4.3.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information (*1)	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 08S01	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during system failure	08001	
Switch to the standby server	Switched during access	57P01 08S01	
	Accessed during switch	08001	

*1: Return value of SQLSTATE.

Chapter 4 .NET Data Provider

This chapter describes how to configure for the purpose of creating .NET applications with Visual Studio.

4.1 Development Environment

.NET Data Provider can operate in the following environments:

.NET Framework environment for the development and running of applications	.NET Framework 4.8 .NET Framework 4.7/4.7.x .NET Framework 4.6.1 or later	
Integrated development environment for applications running in a .NET Framework environment	Visual Studio 2019 Visual Studio 2017 Visual Studio 2015	
Combinations when TableAdapter is used	Visual Studio 2019	.NET Framework 4.8 .NET Framework 4.7/4.7.x .NET Framework 4.6.1 or later
	Visual Studio 2017	.NET Framework 4.8 .NET Framework 4.7/4.7.x .NET Framework 4.6.1 or later
	Visual Studio 2015	.NET Framework 4.8 .NET Framework 4.7/4.7.x .NET Framework 4.6.1 or later
Available development languages	C# Visual Basic .NET	

4.2 Setup

This section explains how to set up .NET Data Provider and Npgsql for Entity Framework.

4.2.1 Setting Up the Visual Studio Integration Add-On

A user with administrator privileges can register Npgsql Development Tools for .NET as an add-on installing the VSIX package provided. Note that Visual Studio must already be installed in the system prior to installing the VSIX package.

Location of VSIX binaries

The Npgsql.vsix setup package is stored in the following location

```
fujitsuEnterprisePostgresClientInstallDir\DOTNET\Npgsql.vsix
```

Using Npgsql.vsix

Navigate to the Npgsql.vsix binary directory and double-click the package to install it.

```
> Npgsql.vsix
```

See

Refer to "4.5.1 Uninstalling Npgsql" for details.

4.2.2 Setting Up .NET Data Provider

FUJITSU Enterprise Postgres has utilized Microsoft best practices of VSIX technology to integrate .NET Data Provider with Visual Studio.

There is no need to explicitly add a reference to .NET Data Provider when using VSIX. This will be done automatically when a database object is created and added to a project through the Visual Studio Server Explorer.

Note

Additional setup is needed if using ProviderFactory to connect to a database in a multi-version installation. Refer to "2.4 Registering .NET Data Provider" in the Installation and Setup Guide for Client.

Information

The following name will be displayed in [References] in Visual Studio Solution Explorer once a database object has been created and added to the project. Note that the Npgsql reference is automatically added when the new database object is first compiled.

- Npgsql

4.2.3 Setting Up .NET Data Provider Type Plugins

FUJITSU Enterprise Postgres .NET Data Provider now comes packaged with 6 Type Plugins that provide additional support for more data type mappings (eg date time support via the Npgsql.NodaTime). The plugins modify how Npgsql maps the PostgreSQL values to CLR types.

The type plugins are available for installation as a local NuGet packages. There are 6 pacakages available for installation. "<*x*>" indicates the product version.

- Npgsql.NodaTime.<*x*>.0.0.nupkg
- Npgsql.Json.NET.<*x*>.0.0.nupkg
- Npgsql.NetTopologySuite.<*x*>.0.0.nupkg: Spatial type(*1)
- Npgsql.GeoJSON.<*x*>.0.0.nupkg: Spatial type(*1)
- Npgsql.LegacyPostgis.<*x*>.0.0.nupkg: Spatial type(*1)
- Npgsql.RawPostgis.<*x*>.0.0.nupkg: Spatial type(*1)

*1: Please note that the Spatial Type plugins require the PostGIS extension installed on the server.

Also, Refre to "Type Plugins" and "Additional Notes on each Type Plugin" on the each type plugins.

To install any of the plugins please follow the procedure below:

Location of NuGet package

The Plugin NuGet package are stored in the following location:

```
fujitsuEnterprisePostgresClientInstallDir\DOTNET\Npgsql.*.<x>.0.0.nupkg
```

Add a local package source

In Visual Studio, add a NuGet local package source if one does not exist.

1. Click [Tools] >> [Options] >> [NuGet Package Manager], and then select [Package Sources].
2. Click [+] in the upper-right corner, and then set [Name] to "Local Package Source".
3. Click [⋯] and navigate to the folder above. Select this folder, and then click [OK].

Install the NuGet package

In Visual Studio, install the NuGet package from the local package source.

1. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].
2. In the upper-right corner, select "Local Package Source" from [Package Source].
3. Once the local package source is set, all available NuGet packages in this local location will be displayed. Select the plugin to be installed (eg "Npgsql.NodaTime", and then select the projects for which this package is to be installed.
4. Click [Install].

4.2.4 Setting Up Npgsql for Entity Framework

Npgsql for Entity Framework is supplied as a NuGet package file. To install it locally, follow the procedure below.

Location of NuGet package

The EntityFramework6.Npgsql NuGet package is stored in the following location:

```
fujitsuEnterprisePostgresClientInstallDir\DOTNET\EntityFramework6.npgsql.6.4.1.nupkg
```

Add a local package source

In Visual Studio, add a NuGet local package source if one does not exist.

1. Click [Tools] >> [Options] >> [NuGet Package Manager], and then select [Package Sources].
2. Click [+] in the upper-right corner, and then set [Name] to "Local Package Source".
3. Click [···] and navigate to the folder above. Select this folder, and then click [OK].

Install the NuGet package

In Visual Studio, install the NuGet package from the local package source.

1. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].
2. In the upper-right corner, select "Local Package Source" from [Package Source].
3. Once the local package source is set, all available NuGet packages in this local location will be displayed. Select "EntityFramework6.Npgsql", and then select the projects for which this package is to be installed.
4. Click [Install].

4.2.5 Message Language Settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Set language using the "System.Globalization.CultureInfo.CreateSpecificCulture" method.

Example

Code example for changing the locale in a C# application

```
System.Threading.Thread.CurrentThread.CurrentUICulture =
    System.Globalization.CultureInfo.CreateSpecificCulture("en");
```

4.3 Connecting to the Database

This section explains how to connect to a database.

- Using NpgsqlConnection

- Using NpgsqlConnectionStringBuilder
- Using the ProviderFactory Class

4.3.1 Using NpgsqlConnection

Connect to the database by specifying the connection string.

Example

Code examples for applications

```
using Npgsql;

NpgsqlConnection conn = new NpgsqlConnection("Server=sv1;Port=27500;Database=mydb;
Username=myuser;Password=myuser01; Timeout=20;CommandTimeout=20;");
```

Refer to "4.3.4 Connection String" for information on database connection strings.

4.3.2 Using NpgsqlConnectionStringBuilder

Generate connection strings by specifying the connection information in the properties of the NpgsqlConnectionStringBuilder object.

Example

Code examples for applications

```
using Npgsql;

NpgsqlConnectionStringBuilder sb = new NpgsqlConnectionStringBuilder();
sb.Host = "sv1";
sb.Port = 27500;
sb.Database = "mydb";
sb.Username = "myuser";
sb.Password = "myuser01";
sb.Timeout = 20;
sb.CommandTimeout = 20;
NpgsqlConnection conn = new NpgsqlConnection(sb.ConnectionString);
```

Refer to "4.3.4 Connection String" for information on database connection strings.

4.3.3 Using the ProviderFactory Class

Obtain the DbConnection object from the provider factory.

Example

Code examples for applications

```
using System.Data.Common;

DbProviderFactory factory = DbProviderFactories.GetFactory("FUJITSU.Npgsql");
DbConnection conn = factory.CreateConnection();
conn.ConnectionString = "Server=sv1;Port=27500;Database=mydb;
Username=myuser;Password=myuser01; Timeout=20;CommandTimeout=20;";
```

Refer to "4.3.4 Connection String" for information on database connection strings.

4.3.4 Connection String

Specify the following connection information to connect to the database.

```
Server=127.0.0.1;Port=27500;Database=mydb;Username=myuser;Password=myuser01;...;
       (1)           (2)           (3)          (4)           (5)      (6)
```

(1) Specify the host name or IP address of the server to be connected. This must be specified.

(2) Specify the port number for the database server. The default is "27500".

(3) Specify the database name to be connected.

(4) Specify the username that will connect with the database.

(5) Specify the password for the user that will connect to the database.

(6) Refer to the following for information on how to specify other connection information.

The table below shows keywords that are available to specify in the connection string in .NET Data Provider (Npgsql):

Note that some settings require care if using an Oracle database-compatible feature (refer to "9.2.2 Notes when Integrating with the Interface for Application Development" for details).

Keyword	Default value	Description
Host	None	Specify the host name or IP address of the server to be connected. Specify up to 63 bytes when specifying a host name. A host name or IP address must be specified.
Port	27500	Specify the port number for the database server.
Username	None	Specify the username that will connect with the database. Not required if using Integrated Security.
Password	None	Specify the password for the username that will connect to the database. Not required if using Integrated Security.
Database	Username	Specify the database name to be connected.
Search Path		Specify the default schema name of the SQL statements used in the application.
Timeout	15	Specify the timeout for connections. Specify a value between 0 and 1024 (in seconds). The default is 15 seconds. An error occurs when a connection cannot be established within the specified time.
Connection Idle Lifetime	300	Specify the time to wait before closing idle connections in the pool if the count of all connections exceeds Minimum Pool Size.
Pooling	true	Specify whether to use connection pooling. - Connection pooling is used if you specify true. - Connection pooling is not used if you specify false.
Maximum Pool Size	100	Maximum size of a connection pool. If the request exceeds this limit, it will wait until another connection closes and the pool is available. Specify in the range between 0 and 1024.

Keyword	Default value	Description
Minimum Pool Size	1	Minimum size of a connection pool. When you specify Minimum Pool Size, NpgsqlConnection will pre-allocate connections with the specified number of servers. Specify in the range from 0 to the value specified at Maximum Pool Size.
SSL Mode	Disable	Specify one of the following values for the SSL connection control mode: - Prefer: SSL is used for connection wherever possible. - Require: An exception is thrown when SSL connection is not possible. - Disable: SSL connection is not performed.
Enlist	true	Specify whether to have connections participate in transactions with the transaction scope declared: - Connections will participate in transactions when true is specified. - Connections will not participate in transactions when false is specified.
Command Timeout	30	Specify the timeout for communication with the server. Specify a value between 0 and 2147483647 (in seconds). There is no limit set if you set 0. An error occurs when data is not received from the server within the specified time.
Integrated Security	false	Set this when using Windows Integrated Security.
Trust Server Certificate	false	Whether to trust the server certificate without validating it.
Check Certificate Revocation	false	Whether to check the certificate revocation list during authentication.
Persist Security Info	false	Gets or sets a Boolean value that indicates if security-sensitive information, such as the password, is not returned as part of the connection if the connection is open or has ever been in an open state.
Kerberos Service Name	postgres	The Kerberos service name to be used for authentication.
Include Realm		The Kerberos realm to be used for authentication.
Connection Pruning Interval	10	How many seconds the pool waits before attempting to prune idle connections that are beyond idle lifetime
Internal Command Timeout	-1	The time to wait (in seconds) while trying to execute an internal command before terminating the attempt and generating an error. -1 uses Command Timeout, 0 means no timeout.
Keepalive	disabled	The number of seconds of connection inactivity before Npgsql sends a keepalive query.
Tcp Keepalive Time	disabled	The number of milliseconds of connection inactivity before a TCP keepalive query is sent. Use of this option is discouraged, use Keepalive instead if possible. Supported only on Windows.
Tcp Keepalive Interval	Tcp Keepalive Time	The interval, in milliseconds, between when successive keep-alive packets are sent if no acknowledgement is received. Tcp Keepalive Time must be non-zero as well. Supported only on Windows.

Keyword	Default value	Description
Application Name		Optional application name parameter to be sent to the backend during connection initiation.
Client Encoding		Sets the client_encoding parameter.
EF Template Database	template1	The database template to specify when creating a database in Entity Framework.
Max Auto Prepare	0	The maximum number of SQL statements that can be automatically prepared at any given point. Beyond this number the least-recently-used statement will be recycled. Zero disables automatic preparation.
Auto Prepare Min Usages	5	The minimum number of usages an SQL statement is used before it is automatically prepared.
Use Perf Counters	false	Makes Npgsql write performance information about connection use to Windows Performance Counters. Supported only on Windows. Using performance counters first involves setting them up on your Windows system. To do this you will need to install Npgsql's MSI and ensure that the Performance Counters option is installed. In addition, you will need to pass "Use Perf Counters=true" on your connection string. Once you start your Npgsql application with this addition, you should start seeing real-time data in the Performance Monitor.
Read Buffer Size	8192	Size of the internal buffer Npgsql uses when reading. Increasing may improve performance if transferring large values from the database.
Write Buffer Size	8192	Size of the internal buffer Npgsql uses when writing. Increasing may improve performance if transferring large values to the database.
Socket Receive Buffer Size	System dependent	Size of socket receive buffer.
Socket Send Buffer Size	System dependent	Size of socket send buffer.
Target Server Type	any	In the Database Multiplexing Mode, select the server to connect to when both primary and standby are specified as the connection destination. Specify "any" if you want to connect to the server that was able to connect first in the order specified as the connection destination, "primary" if you want to connect to the primary server, "standby" if you want to connect to the standby server, "preferStandby" if you want to connect to the standby server preferentially.

4.4 Application Development

This section explains the range of support provided with Visual Studio integration.

4.4.1 Data Types

A variety of data types can be used with FUJITSU Enterprise Postgres.

The data types below are supported whether you automatically generate applications using tools in Visual Studio (Query Builder in TableAdapter and Server Explorer), or create applications yourself (with DataProvider).

Table 4.1 List of supported data types

Data Types	Supported	
	Operation in the Visual Studio integration window	Fujitsu Npgsql .NET Data Provider
character	Y	Y
character varying	Y	Y
national character	Y	Y
national character varying	Y	Y
text	Y	Y
bytea	N	N
smallint	Y	Y
integer	Y	Y
bigint	Y	Y
smallserial	N	N
serial	N	N
bigserial	N	N
real	Y	Y
double precision	Y	Y
numeric	Y	Y
decimal	Y	Y
money	N	Y
date	Y	Y
time with time zone	Conditional (*1)	Conditional (*1)
time without time zone	Conditional (*1)	Conditional (*1)
timestamp without time zone	Y	Y
timestamp with time zone	Y	Y
interval	Conditional (*2)	Conditional (*2)
boolean	Y	Y
bit	N	N
bit varying	N	N
uuid	Y	Y
inet	N	Conditional (*3)
macaddr	N	Y
macaddr8	N	Y
cidr	N	Conditional (*4)
Geometric data type (point,lseg,box,path,polygon,circle)	N	Y
array	N	Y
oid	N	N
xml	N	Y

Data Types	Supported	
	Operation in the Visual Studio integration window	Fujitsu Npgsql .NET Data Provider
json	N	N
Types related to text searches(tsvector,tsquery)	N	N
Enumerated type	N	N
Composite type	N	N
Range type	N	N

Y: Supported

N: Not supported

*1: As shown below, "time with time zone" and "time without time zone" values display the date portion as additional information. However, the actual data comprises the time data only, so with the exception of this displayed format, there are no other resulting issues.

Example:

Composition of table (t1)

col1 (time with time zone)	col2 (time without time zone)
1/01/0001 10:21:30 +08:00	10:21:30
1/01/0001 23:34:03 +08:00	23:34:03
1/01/0001 17:23:54 +08:00	17:23:54

"time with time zone" values display a fixed value of “2/01/0001” in the date portion, while "time without time zone" values display just the time data.

```
SELECT *
  FROM t1;
 col1                        |    col2
-----------------------------+--------------------
 1/01/0001 10:21:30 +08:00 | 10:21:30
 1/01/0001 23:34:03 +08:00 | 23:34:03
 1/01/0001 17:23:54 +08:00 | 17:23:54
```

*2: The format is d.hh:mm:ss, where d is an integer and hh:mm:ss is a maximum of 23.59.59 (23 hours, 59 minutes, and 59 seconds).

*3: When updating inet types, only a single host is supported. The input format is *addr*/*y* where *addr* is an IPv4 or IPv6 address and *y* is the number of bits in the netmask. If /*y* is omitted, the number of bits in the netmask is set to 32 for an IPv4 address and 128 for an IPv6 address. On display, the /*y* portion is suppressed.

*4: When updating cidr types, only a single host is supported.

4.4.2 Relationship between Application Data Types and Database Data Types

The data types available for SQL data types are as follows:

DbType	NpgsqlDbType	PostgreSQL type	Accepted C# types	.Net Framework Type
	Char	char	string, char[], char, IConvertible	System.String, System.Char[], System.Char
	Varchar	varchar	string, char[], char, IConvertible	System.String, System.Char[], System.Char
String, StringFixedLength, AnsiString, AnsiStringFixedLength	Text	text	string, char[], char, IConvertible	System.String, System.Char[], System.Char
Binary	Bytea	bytea	byte[], ArraySegment	System.Byte[]
Int16	Smallint	int2	short, IConvertible	System.Int16
Int32	Integer	int4	int, IConvertible	System.Int32
Int64	Bigint	int8	long, IConvertible	System.Int64
Single	Real	float4	float, IConvertible	System.Single
Double	Double	float8	double, IConvertible	System.Double
Decimal, VarNumeric	Numeric	numeric	decimal, IConvertible	System.Decimal
Date	Date	date	DateTime, NpgsqlDate, IConvertible	System.DateTime
	TimeTZ	timetz	DateTimeOffset, DateTime, TimeSpan	System.DateTimeOffset, System.DateTime, System.TimeSpan
Time	Time	time	TimeSpan, string	System.Timespan
DateTime, DateTime2	Timestamp	timestamp	DateTime, DateTimeOffset, NpgsqlDateTime, IConvertible	System.DateTime
DateTimeOffset	TimestampTZ	timestamptz	DateTime, DateTimeOffset, NpgsqlDateTime, IConvertible	System.DateTime
	Interval	interval	TimeSpan, NpgsqlTimeSpan, string	System.TimeSpan
	Boolean	bool	bool, IConvertible	System.Boolean
	Bit	bit	BitArray, bool, string	System.Boolean, System.String
	Uuid	uuid	Guid, string	System.Guid
	Inet	inet	IPAddress, NpgsqlInet	ValueTuple<IPAddress, int>, IPAddress, NpgsqlInet

DbType	NpgsqlDbType	PostgreSQL type	Accepted C# types	.Net Framework Type
	MacAddr	macaddr	PhysicalAddress	System.Net.NetworkInformation.PhysicalAddress
	MacAddr8	macaddr8	PhysicalAddress	System.Net.NetworkInformation.PhysicalAddress
	Box	box	NpgsqlBox	NpgsqlBox
	Circle	circle	NpgsqlCircle	NpgsqlCircle
	LSeg	lseg	NpgsqlLSeg	NpgsqlLSeg
	Path	path	NpgsqlPath	NpgsqlPath
	Point	point	NpgsqlPoint	NpgsqlPoint
	Polygon	polygon	NpgsqlPolygon	NpgsqlPolygon
	Array	array types	Array, IList, IList	System.Array

4.4.3 Creating Applications while in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

See

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.
- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

4.4.3.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 (*1) Empty string (*1)	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during system failure	Empty string (*1)	
Switch to the standby server	Switched during access	57P01 (*1) Empty string (*1)	
	Accessed during switch	Empty string (*1)	

*1: This is the return value of the PostgresException attribute SqlState.

4.4.4 Notes

Notes on TableAdapter

- If [SELECT which returns a single value] is selected when adding a query to a TableAdapter, it will not be possible to execute the SQL statement displayed on the window - therefore, correct the SQL statement.

Type Plugins

- These type libraries include:
  - NodaTime - the recommended way to interact with PostgrSQL date/time types
  - Json.NET - allows Npgsql to use the NewtonSoft Json.NET library when reading and writing JSON data (both json and jsonb)
  - NetTopologySuite - allows Npgsql to map PostGIS spatial types directly to the NetTopology suite types (the leading spatial library in .NET)
  - GeoJSON - allows Npgsql to read and write PostGIS spatial types as GeoJSON types via the GeoJSON.NET library
  - LegacyPostgis - implements the previously supported PostGIS spatial types as a plugin and is limited to geometry and XY only. Gerography and XYZ, XYM and XYZM is not supported in this plugin and if required, use the NetTopologySuite plugin
  - RawPostgis - allows raw byte access to PostGIS types
- Setup the plugin in your application simply by adding a dependency on the plugin (this should have been done automatically when installed to the project) and set it up. See the following code snippet for an example of setting up the Npgsql.NodaTime plugin:

```
    using Npgsql;
    // Place this at the beginning of your program to use NodaTime everywhere
(recommended)
    NpgsqlConnection.GlobalTypeMapper.UseNodaTime();
    // Or to temporarily use NodaTime on a single connection only:
    conn.TypeMapper.UseNodaTime();
```

  Once the plugin is setup, you can read and write NodaTime objects as per the code snippet below:

```
    // Write NodaTime Instant to PostgreSQL "timestamp without time zone"
    using (var cmd = new NpgsqlCommand(@"INSERT INTO mytable (my_timestamp) VALUES
(@p)", conn))
    {
        cmd.Parameters.Add(new NpgsqlParameter("p", Instant.FromUtc(2011, 1, 1, 10,
30)));
        cmd.ExecuteNonQuery();
    }

    // Read timestamp back from the database as an Instant
    using (var cmd = new NpgsqlCommand(@"SELECT my_timestamp FROM mytable", conn))
    using (var reader = cmd.ExecuteReader())
    {
        reader.Read();
        var instant = reader.GetFieldValue<Instant>(0);
    }
```

- To apply the type plugin updates, do one of the following:
  - After uninstalling the type plugin (Refer to "4.5.2 Uninstalling .NET Data Provider Type Plugins"), setup the type plugin (Refer to "4.2.3 Setting Up .NET Data Provider Type Plugins**").**
  - Remove the type plugin directory from the packages directory of the solution, and then restore it using the nuget restore command.
- When you deploy an application with a type plugin, the type plugin is included in the distribution. Therefore, after applying the type plugin updates, you must rebuild the application and deploy the updated application.

Additional Notes on each Type Plugin

Describe notes about each type plugin.

NodaTime

Mapping Table

Describes the mapping of PostgreSQL data types to NodaTime data types.

PostgreSQL Type	Default NodaTime Type	Additional NodaTime Type	Note
timestamp	Instant	LocalDateTime	It's common to store UTC timestamps in databases - you can simply do so and read/write Instant values. You also have the option of readin/writing LocalDateTime, which is a date/time with no information about timezones; this makes sense if you're storing the timezone in a different column and want to read both into a NodaTime ZonedDateTime
timestamp with time zone	Instant	ZonedDateTime, OffsetDateTime	This PostgreSQL type stores only a timestamp, assumed to be in UTC. If you read/write this as an Instant, it will be provided as stored with no timezone conversions whatsoever. If, however, you read/write as a ZonedDateTime or OffsetDateTime, the plugin will automatically convert to and from UTC according to your PostgreSQL session's timezone.
date	LocalDate		A simple date with no timezone or offset information.
time	LocalTime		A simple time-of-day, with no timezone or offset information.
time with time zone	OffsetTime		This is a PostgreSQL type that stores a time and an offset.
interval	Period		This is a human interval which does not have a fixed absolute length ("two months" can vary depending on the months in question), and so it is mapped to NodaTime's Period (and not Duration or TimeSpan).

Json.NET

Once the JSON plugin has been setup, users can transparently read and write CLR objects as JSON values and the plugin will automatically serialize/deserialize them

See the code snippet below:

```
// Write arbitrary CLR types as JSON
using (var cmd = new NpgsqlCommand(@"INSERT INTO mytable (my_json_column) VALUES (@p)",
conn))
{
    cmd.Parameters.Add(new NpgsqlParameter("p", NpgsqlDbType.Jsonb) { Value =
MyClrType });
    cmd.ExecuteNonQuery();
}
```

```
// Read arbitrary CLR types as JSON
using (var cmd = new NpgsqlCommand(@"SELECT my_json_column FROM mytable", conn))
using (var reader = cmd.ExecuteReader())
{
    reader.Read();
    var someValue = reader.GetFieldValue<MyClrType>(0);
}
```

NetTopologySuite (spatial)

By default the plugin handles only ordinates provided by the DefaultCoordinateSequenceFactory of GeometryServiceProvider.Instance. If GeometryServiceProvider is initialized automatically the X and Y ordinates are handled. To change the behavior specify the handleOrdinates parameter like in the following example:

```
conn.TypeMapper.UseNetTopologySuite(handleOrdinates: Ordinates.XYZ);
```

To process the M ordinate, you must initialize GeometryServiceProvider.Instance to a new NtsGeometryServices instance with coordinateSequenceFactory set to a DotSpatialAffineCoordinateSequenceFactory. Or you can specify the factory when calling UseNetTopologySuite.

```
// Place this at the beginning of your program to use the specified settings everywhere
(recommended)
GeometryServiceProvider.Instance = new NtsGeometryServices(
    new DotSpatialAffineCoordinateSequenceFactory(Ordinates.XYM),
    new PrecisionModel(PrecisionModels.Floating),
    -1);

// Or specify settings for Npgsql only
conn.TypeMapper.UseNetTopologySuite(
    new DotSpatialAffineCoordinateSequenceFactory(Ordinates.XYM));
```

Reading and Writing Geometry Values

When reading PostGIS values from the database, Npgsql will automatically return the appropriate NetTopologySuite types: Point, LineString, and so on. Npgsql will also automatically recognize NetTopologySuite's types in parameters, and will automatically send the corresponding PostGIS type to the database. The following code demonstrates a roundtrip of a NetTopologySuite Point to the database:

```
var point = new Point(new Coordinate(1d, 1d));
conn.ExecuteNonQuery("CREATE TEMP TABLE data (geom GEOMETRY)");
using (var cmd = new NpgsqlCommand("INSERT INTO data (geom) VALUES (@p)", conn))
{
    cmd.Parameters.AddWithValue("@p", point);
    cmd.ExecuteNonQuery();
}

using (var cmd = new NpgsqlCommand("SELECT geom FROM data", conn))
using (var reader = cmd.ExecuteReader())
{
    reader.Read();
    Assert.That(reader[0], Is.EqualTo(point));
}
```

You may also explicitly specify a parameter's type by setting NpgsqlDbType.Geometry.

Geography (geodetic) Support

PostGIS has two types:geometry (for Cartesian coordinates) and geography (for geodetic or spherical coordinates). You can read about the geometry/geography distinction in the PostGIS docs. In a nutshell, geography is much more

accurate when doing calculations over long distances, but is more expensive computationally and supports only a small subset of the spatial operations supported by geometry.

Npgsql uses the same NetTopologySuite types to represent both geometry and geography - the Point type represents a point in either Cartesian or geodetic space. You usually don't need to worry about this distinction because PostgreSQL will usually cast types back and forth as needed. However, it's worth noting that Npgsql sends Cartesian geometry by default, because that's the usual requirement. You have the option of telling Npgsql to send geography instead by specifying NpgsqlDbType.Geography:

```
using (var cmd = new NpgsqlCommand("INSERT INTO data (geog) VALUES (@p)", conn))
{
    cmd.Parameters.AddWithValue("@p", NpgsqlDbType.Geography, point);
    cmd.ExecuteNonQuery();
}
```

If you prefer to use geography everywhere by default, you can also specify that when setting up the plugin:

```
NpgsqlConnection.GlobalTypeMapper.UseNetTopologySuite(geographyAsDefault: true);
```

GeoJSON (spatial)

Using the GeoJSON plugin is the same as the NetTopologuSuite.

LegacyPostgis (spatial)

If you've used the internal PostGIS types in Npgsql 3.2 or earlier, the plugin works in the same way:

```
NpgsqlConnection.GlobalTypeMapper.UseLegacyPostgis();

// Write
var cmd = new NpgsqlCommand("INSERT INTO table (pg_point, pg_polygon) VALUES (@point,
@polygon)", conn);
cmd.Parameters.AddWithValue("point", new PostgisPoint(3.5, 4.5));
cmd.ExecuteNonQuery();

// Read
var cmd = new NpgsqlCommand("SELECT * FROM table", conn);
var reader = cmd.ExecuteReader();
while (reader.Read()) {
    var point = reader.GetFieldValue<PostgisPoint>(0);
    var polygon = reader.GetFieldValue<PostgisPolygon>(1);
}
```

Notes on the Query Builder

- Prefix named parameters with "@".
- Uppercase object names cannot be used, even when enclosed in double quotation marks.
  To use uppercase object names enclosed in double quotation marks, include them in SQL statements and enter these in the [Generate the SQL statements] window rather than in the Query Builder.
- SQL statements cannot be correctly generated if the SQL statement specified in Filter matches any of the conditions below:
  - It uses PostgreSQL intrinsic operators such as << or ::.
  - It uses functions with keywords such as AS, FROM, IN, OVER.

    Example: extract(field from timestamp), RANK( ) OVER
  - It uses functions with the same names as those prescribed in SQL conventions, but that require different arguments.

Notes on Server Explorer

- The temporary table is not displayed.

Notes on metadata

- The CommandBehavior.KeyInfo argument must be specified if executing ExecuteReader before obtaining metadata using GetSchemaTable.

Example

```
NpgsqlDataReader  ndr=cmd.ExecuteReader(CommandBehavior.KeyInfo);
DataTable dt = dr.GetSchemaTable();
```

Notes on automatically generating update-type SQL statements

- If the SQL statement includes a query (which cannot be updated) that matches any of the conditions below, an update-type SQL statement will be generated (note that it may not be possible to execute this SQL statement in some cases):
  - It includes derived tables
  - It includes the same column name as the select list

  Update-type SQL statements will be automatically generated in the following cases:
  - If update statements are obtained using NpgsqlCommandBuilder
  - If data is updated using NpgsqlDataAdapter
  - If data is updated using TableAdapter

Notes on distributed transactions

- Applications using transaction scope can use distributed transactions by linking with Microsoft Distributed Transaction Coordinator (MSDTC). In this case, note the following:
  - Ensure that the value of max_prepared_transactions is greater than max_connection, so that "PREPARE TRANSACTION" can be issued for each transaction that simultaneously connects to the database server.
  - If each transaction in the transaction scope accesses the same resource using different connections, the database server will perceive it as requests from different applications, and a deadlock may occur. By configuring a timeout value for the transaction scope beforehand, the deadlock can be broken.

4.5 Uninstallation

This section explains how to uninstall Npgsql and Npgsql for Entity Framework.

4.5.1 Uninstalling Npgsql

To uninstall Npgsql, uninstall each of its components separately:

1. Uninstall DDEX.

   DDEX provides the Visual Studio integration tools within the IDE through the Npgsql.VSIX package installation.

   1. Open Visual Studio 2019.
   2. Click [Tools], and then [Extensions and Updates].
   3. Select the FUJITSU Npgsql PostgreSQL Integration extension, and then click [Uninstall].

4. In the confirmation dialog box "Are you sure you want to schedule FUJITSU Npgsql PostgreSQL Integration for uninstall?", click [Yes].

   Note that the status at the bottom of the [Extensions and Updates] window will change to "Your changes will be scheduled. The modifications will begin when all Microsoft Visual Studio windows are closed".

5. Click [Close].

6. Close all Visual Studio instances currently open.

   The VSIX Installer will automatically start.

7. Click [Modify] to continue with uninstallation of FUJITSU Npgsql PostgreSQL Integration.

8. Upon completion, a dialog box will be displayed - click [Close].

2. Uninstall Npgsql GAC.

   Npgsql.dll provides DBProviderFactory functionality for Npgsql.

   1. Click [Control Panel], and then [Programs and Features].

   2. Right-click the target program below in the list, and click [Uninstall]. (The notation "<*x*>" indicates the version of the FUJITSU Enterprise Postgres.)
      Name: FUJITSU Enterprise Postgres Npgsql <*x*>
      Issuing company: FUJITSU LIMITED
      Version: <*x*>.0.000

   3. In the confirmation dialog box "Are you sure you want to uninstall FUJITSU Enterprise Postgres Npgsql <*x*>?", click [Yes].

   4. Upon completion, the uninstall window will close, and the uninstallation target version of FUJITSU Enterprise Postgres Npgsql <*x*> will no longer be listed.

4.5.2 Uninstalling .NET Data Provider Type Plugins

The **.NET Data Provider** type plugins are installed per project. To uninstall it, follow the procedure below:

1. In Visual Studio, open a project for which Npgsql the Plugin to be removed is installed.

2. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].

3. Select all the projects that have Npgsql Plugin(s) installed, and then click [Uninstall].
   Alternatively, if the plugin packages have been removed and are no longer installed, in the solution explorer open the Dependencies/NuGet node and delete the plugins that require uninstallation.

4.5.3 Uninstalling Npgsql for Entity Framework

Npgsql for Entity Framework is installed per project. To uninstall it, follow the procedure below:

1. In Visual Studio, open a project for which Npgsql for Entity Framework is installed.

2. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].

3. Select all the projects that have Npgsql for Entity Framework installed, and then click [Uninstall].
   Alternatively, if the Entity Framework package has been removed and is no longer installed, in the solution explorer open the Dependencies/NuGet node and delete the Entity Framework package

Chapter 5 C Library (libpq)

This chapter describes how to use C libraries.

5.1 Development Environment

Install FUJITSU Enterprise Postgres Client Package for the architecture to be developed and executed.

See

Refer to Installation and Setup Guide for Client for information on the C compiler required for C application development.

5.2 Setup

This section describes the environment settings required to use C libraries and how to encrypt data for communication.

5.2.1 Environment Settings

To execute an application that uses libpq, set the environment variable as shown below.

L

Linux

- Required for compile/link
  - LD_LIBRARY_PATH
    fujitsuEnterprisePostgresClientInstallDir/lib
- Required for execution of the application
  - PGLOCALEDIR
    fujitsuEnterprisePostgresClientInstallDir/share/locale

Example

"<*x*>" indicates the product version.

```
> LD_LIBRARY_PATH=/opt/fsepv<x>client64/lib:$LD_LIBRARY_PATH;export LD_LIBRARY_PATH
> PGLOCALEDIR=/opt/fsepv<x>client64/share/locale;export PGLOCALEDIR
```

W

Windows (R)

- Required for compile/link
  - LIB
    fujitsuEnterprisePostgresClientInstallDir\lib
  - INCLUDE
    fujitsuEnterprisePostgresClientInstallDir\include
- Required for execution of the application
  - PATH
    fujitsuEnterprisePostgresClientInstallDir\lib
  - PGLOCALEDIR
    fujitsuEnterprisePostgresClientInstallDir\share\locale

Example

When the 32-bit version client package is installed on a 64-bit operating system. "<*x*>" indicates the product version.

```
> SET PATH=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\lib;%PATH%
> SET LIB=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\lib;%LIB%
> SET INCLUDE=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\include;%INCLUDE%
> SET PGLOCALEDIR=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\share\locale
```

5.2.2 Message Language and Encoding System Used by Applications Settings

This section explains the language settings for the application runtime environment and the encoding settings for the application.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Messages output by an application may include text from messages sent from the database server. In the resulting text, the text of the application message will use the message locale of the application, and the text of the message sent by the database server will use the message locale of the database server. If the message locales do not match, more than one language or encoding system will be used. Moreover, if the encoding systems do not match, characters in the resulting text can be garbled.

L

- Linux

Set the locale for messages (LC_MESSAGES category) to match the message locale of the database server. This can be done in a few different ways, such as using environment variables. Refer to the relevant manual of the operating system for information on the setlocale function.

Example

Example of specifying "en_US.UTF-8" with the setlocale function

```
setlocale(LC_ALL,"en_US.UTF-8");
```

Specifying the locale of the LC_ALL category propagates the setting to LC_MESSAGE.

W

- Windows(R)

Align the locale of the operating system with the message locale of the database server.

Encoding System Settings

Ensure that the encoding system that is embedded in the application and passed to the database, and the encoding system setting of the runtime environment, are the same. The encoding system cannot be converted correctly on the database server.

Use one of the following methods to set the encoding system for the application:

- Set the PGCLIENTENCODING environment variable in the runtime environment.
- Set the client_encoding keyword in the connection string.
- Use the PQsetClientEncoding function.

See

Refer to "Supported Character Sets" in "Server Administration" in the PostgreSQL Documentation for information on the strings that represent the encoding system that can be set.

For example, when using "Unicode" and "8 bit", set the string "UTF8".

Note

Text may be garbled when outputting results to the command prompt. Review the font settings for the command prompt if this occurs.

5.2.3 Settings for Encrypting Communication Data

Set in one of the following ways when performing remote access using communication data encryption:

When setting from outside with environment variables

Specify "require", "verify-ca", or "verify-full" in the PGSSLMODE environment variable.

In addition, the parameters for the PGSSLROOTCERT and PGSSLCRL environment variables need to be set to prevent spoofing of the database server.

See

Refer to "Environment Variables" in "Client Interfaces" in the PostgreSQL Documentation for information on environment variables.

When specifying in the connection URI

Specify "require", "verify-ca", or "verify-full" in the "sslmode" parameter of the connection URI.

In addition, the parameters for the sslcert, sslkey, sslrootcert, and sslcrl need to be set to prevent spoofing of the database server.

See

Refer to "Secure TCP/IP Connections with SSL" in "Server Administration" in the PostgreSQL Documentation for information on encrypting communication data.

5.3 Connecting with the Database

Point

Use the connection service file to specify the connection destination. In the connection service file, a name (service name) is defined as a set, comprising information such as connection destination information and various types of tuning information set for connections. By using the service name defined in the connection service file when connecting to databases, it is no longer necessary to modify applications when the connection information changes.

Refer to "Client Interfaces", "The Connection Service File" in the PostgreSQL Documentation for details.

See

Refer to "Database Connection Control Functions" in "Client Interfaces" in the PostgreSQL Documentation.

In addition, refer to "6.3 Connecting with the Database" in "Embedded SQL in C " for information on connection string.

5.4 Application Development

See

Refer to "libpq - C Library" in "Client Interfaces" in the PostgreSQL Documentation for information on developing applications.

However, if you are using the C library, there are the following differences to the PostgreSQL C library (libpq).

5.4.1 Compiling Applications

Specify the following paths when compiling applications.

Refer to your compiler documentation for information on how to specify the path.

L - Linux

L Table 5.1 Include file and library path

Type of path	Path name
Path of the include file	*fujitsuEnterprisePostgresClientInstallDir*/include
Path of the library	*fujitsuEnterprisePostgresClientInstallDir*/lib

L Table 5.2 C Library (libpq library)

Type of library	Library name
Dynamic library	libpq.so
Static library	libpq.a

W - Windows(R)

If the include file and the library path have been set in the environment variable, there is no need to specify the paths shown below for the compile.

W Table 5.3 Include file and library path

Type of path	Path name
Path of the include file	*fujitsuEnterprisePostgresClientInstallDir*\include
Path of the library	*fujitsuEnterprisePostgresClientInstallDir*\lib

W Table 5.4 C Library (libpq library)

Type of library	Library name
Library for links	libpq.lib
Dynamic library	libpq.dll

5.4.2 Creating Applications while in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

See

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.

- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

5.4.2.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during system failure	CONNECTION_BAD(*3)	
Switch to the standby server	Switched during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	
	Accessed during switch	CONNECTION_BAD(*3)	

*1: Return value of PQresultStatus().

*2: Return value of PQresultErrorField() PG_DIAG_SQLSTATE.

*3: Return value of PQstatus().

Chapter 6 Embedded SQL in C

This chapter describes application development using embedded SQL in C.

6.1 Development Environment

Install FUJITSU Enterprise Postgres Client Package for the architecture to be developed and executed.

See

Refer to Installation and Setup Guide for Client for information on the C compiler required for C application development.

Note

C++ is not supported. Create a library by implementing embedded SQL in C, and call it from C++.

6.2 Setup

6.2.1 Environment Settings

When using embedded SQL in C, the same environment settings as when using the C library (libpq) are required.

Refer to "5.2.1 Environment Settings" in "C Library (libpq)" for information on the environment settings for the library for C.

Additionally, set the following path for the precompiler ecpg in the PATH environment variable:

Linux

```
fujitsuEnterprisePostgresClientInstallDir/bin
```

Windows(R)

```
fujitsuEnterprisePostgresClientInstallDir\bin
```

6.2.2 Message Language and Encoding System Used by Applications Settings

The message language and the encoding System Settings Used by Applications settings are the same as when using the library for C.

However, in embedded SQL, the PQsetClientEncoding function cannot be used in the encoding system settings. In embedded SQL, use the SET command to specify the encoding system in client_encoding.

Refer to "5.2.2 Message Language and Encoding System Used by Applications Settings" in "C Library (libpq)" for information on the settings for the library for C.

6.2.3 Settings for Encrypting Communication Data

When encrypting the communication data, the same environment settings as when using the C library (libpq) are required.

Refer to "5.2.3 Settings for Encrypting Communication Data" in "C Library (libpq)" for information on the environment settings for the C library.

6.3 Connecting with the Database

Point

- It is recommended to use a connection service file to specify connection destinations. In the connection service file, a name (service name) is defined as a set, comprising information such as connection destination information and various types of tuning information set for connections. By using the service name defined in the connection service file when connecting to databases, it is no longer necessary to modify applications when the connection information changes. Refer to "The Connection Service File" in "Client Interfaces" in the PostgreSQL Documentation for information.
- If using a connection service file, perform either of the procedures below:
  - Set the service name as a string literal or host variable, as follows:

    tcp:postgresql://?service=my_service
  - Set the service name in the environment variable PGSERVICE, and use CONNECT TO DEFAULT

Use the CONNECT statement shown below to create a connection to the database server.

Format

```
EXEC SQL CONNECT TO target [AS connection-name] [USER user-name];
```

target

Write in one of the following formats:

- dbname@host:port
- tcp:postgresql://host:port/dbname[?options]
- unix:postgresql://host[:port][/dbname][?options]
  (Definition method when using the UNIX domain socket)
- SQL string literal containing one of the above formats
- Reference to a character variable containing one of the above formats
- DEFAULT

user-name

Write in one of the following formats:

- username
- username/password
- username IDENTIFIED BY password
- username USING password

Description of the arguments

Argument	Description
dbname	Specify the database name.
host	Specify the host name for the connection destination.
port	Specify the port number for the database server. The default is "27500".
connection-name	Specify connection names to identify connections when multiple connections are to be processed within a single program.

Argument	Description
username	Specify the user that will connect with the database. If this is omitted, the name used will be that of the user on the operating system that is executing the application.
password	Specify a password when authentication is required.
options	Specify the following parameter when specifying a time for timeout. Connect parameters with & when specifying more than one. The following shows the values specified for each parameter. - connect_timeout Specify the timeout for connections. Specify a value between 0 and 2147483647 (in seconds). There is no limit set if you set 0 or an invalid value. If "1" is specified, the behavior will be the same as when "2" was specified. An error occurs when a connection cannot be established within the specified time. - keepalives This enables keepalive. Keepalive is disabled if 0 is specified. Keepalive is enabling when any other value is specified. The default is keepalive enabled. Keepalive causes an error to occur when it is determined that the connection with the database is disabled. - keepalives_idle Specify the time until the system starts sending keepalive messages when communication with the database is not being performed. - Linux Specify a value between 1 and 32767 (in seconds). The default value of the system is used if this is not specified. - Windows(R) Specify a value between 1 and 2147483647 (in seconds). 7200 will be set as default if a value outside this range is specified or if nothing is specified. - keepalives_interval Specify the interval between resends when there is no response to keepalive messages. - Linux Specify a value between 1 and 32767 (in seconds). The default value of the system is used if this is not specified. - Windows(R) Specify a value between 1 and 2147483647 (in seconds). 1 will be set as default if a value outside this range is specified or if nothing is specified. - keepalives_count Specify the number of resends for keepalive messages. - Linux Specify a value between 1 and 127. The default value of the system is used if this is not specified. - Windows(R) The system default value is used irrespective of what is specified for this parameter. - tcp_user_timeout

Argument	Description
	After establishing the connection, when sending from the client to the server, if the TCP resend process operates, specify the time until it is considered to be disconnected. - Linux Specify a value between 0 and 2147483647 (in millseconds). The default value of the system is used if 0. 0 will be set as default if nothing is specified. - Windows(R) Cannot be specified.

L

Note

If a value other than 0 is specified for the tcp_user_timeout parameter, the waiting time set by the tcp_keepalives_idle parameter and tcp_keepalives_interval parameter will be invalid and the waiting time specified by the tcp_user_timeout parameter will be used.

Code examples for applications

```
EXEC SQL CONNECT TO tcp:postgresql://sv1:27500/mydb?
connect_timeout=20&keepalives_idle=20&keepalives_interval=5&keepalives_count=2&keepalives=
1 USER myuser/myuser01;
```

6.4 Application Development

Refer to "ECPG - Embedded SQL in C" in "Client Interfaces" in the PostgreSQL Documentation for information on developing applications.

However, when using embedded SQL in C, there are the following differences to the embedded SQL (ECPG) in PostgreSQL C.

6.4.1 Support for National Character Data Types

This section describes how to use the national character data types using the SQL embedded C preprocessor.

The following explains the C language variable types corresponding to the NCHAR type:

Specify the number of characters specified for the NCHAR type multiple by 4, plus 1 for the length of the host variable.

Data Type	Host variable type
NATIONAL CHARACTER(*n*)	NCHAR variable name [nx4+1]
NATIONAL CHARACTER VARYING(*n*)	NVARCHAR variable name [nx4+1]

See

Refer to "Handling Character Strings" in "Client Interfaces" in the PostgreSQL documentation for information on using character string types.

6.4.2 Compiling Applications

Append the extension "pgc" to the name of the source file for the embedded SQL in C.

When the pgc file is precompiled using the ecpg command, C source files will be created, so use the C compiler for the compile.

Precompiling example

```
ecpg testproc.pgc
```

If an optimizer hint block comment is specified for the SQL statement, specify the following option in the ecpg command:

--enable-hint

Enables the optimizer hint block comment (hereafter, referred to as the "hint clause"). If this option is not specified, the hint clause will be removed as a result of the ecpg precompile and be disabled.

The SQL statements that can be specified in the hint clause are SELECT, INSERT, UPDATE, and DELETE.

The locations in which the hint clause can be specified are immediately after one of the SELECT, INSERT, UPDATE, DELETE, or WITH keywords. A syntax error will occur if any other location is specified.

Example of specifying the hint clause

```
EXEC SQL SELECT /*+ IndexScan(prod ix01) */ name_id INTO :name_id FROM prod WHERE id
= 1;
```

Refer to "11.1.1 Optimizer Hints" for information on optimizer hints.

Note

Take the following points into account when using embedded SQL source files:

- Multibyte codes expressed in SJIS or UTF-16 cannot be included in statements or host variable declarations specified in EXEC SQL.
- Do not use UTF-8 with a byte order mark (BOM), because an error may occur during compilation if the BOM character is incorrectly recognized as the source code.
- Multibyte characters cannot be used in host variable names.
- It is not possible to use a TYPE name that contains multibyte characters, even though it can be defined.

Specify the following paths when compiling a C application output with precompiling.

Refer to your compiler documentation for information on how to specify the path.

Linux

Table 6.1 Include file and library path

Type of path	Path name
Path of the include file	*fujitsuEnterprisePostgresClientInstallDir*\include
Path of the library	*fujitsuEnterprisePostgresClientInstallDir*\lib

Table 6.2 C Library

Type of library	Library name	Note
Dynamic library	libecpg.so	
	libpgtypes.so	When using the pgtypes library
Static library	libecpg.a	
	libpgtypes.a	When using the pgtypes library

Windows(R)

If the include file and the library path have been set in the environment variable, there is no need to specify the paths shown below for the compile.

Table 6.3 Include file and library path

Type of path	Path name
Path of the include file	*fujitsuEnterprisePostgresClientInstallDir\include*
Path of the library	*fujitsuEnterprisePostgresClientInstallDir\lib*

Table 6.4 C Library

Type of library	Library name	Note
Library for links	libecpg.lib	
	libpgtypes.lib	When using the pgtypes library
Dynamic library	libecpg.dll	
	libpgtypes.dll	When using the pgtypes library

Note

- The libecpg library in Windows(R) is created by "release" and "multithreaded" options. When using the ECPGdebug function included in this library, compile using the "release" and "multithreaded" flags in all programs that use this library. When you do this, use the "dynamic" flag if you are using libecpg.dll, and use the "static" flag if you are using libecpg.lib.

  Refer to "Library Functions" in "Client Interfaces" in the PostgreSQL Documentation for information on the ECPGdebug function.

- The cl command expects input to be a program that uses one of the following code pages, so convert the program to these code pages and then compile and link it (refer to the Microsoft documentation for details).

  - ANSI console code pages (example: Shift-JIS for Japanese)
  - UTF-16 little-endian with or without BOM (Byte Order Mark)
  - UTF-16 big-endian with or without BOM
  - UTF-8 with BOM

  The cl command converts strings in a program to an ANSI console code page before generating a module, so the data sent to and received from the database server becomes an ANSI console code page. Therefore, set the coding system corresponding to the ANSI console code page as the coding system of the client.

  Refer to "Character Set Support" in "Server Administration" in the PostgreSQL Documentation for information on how to set the client encoding system.
  (Example: To use environment variables in Japanese, set SJIS in PGCLIENTENCODING.)

6.4.3 Bulk INSERT

This section describes the bulk INSERT.

Synopsis

```
EXEC SQL [ AT conn ] [ FOR { numOfRows | ARRAY_SIZE } ]
    INSERT INTO tableName [ ( colName [, ...] ) ]
    { VALUES ( { expr | DEFAULT } [, ...] ) [, ...] | query }
```

```
[ RETURNING * | outputExpr [ [ AS ] outputName ] [, ...]
INTO outputHostVar [ [ INDICATOR ] indicatorVar  ]  [, ...] ];
```

Description

Bulk INSERT is a feature that inserts multiple rows of data in bulk.

By specifying the array host variable that stored the data in the VALUES clause of the INSERT statement, the data for each element in the array can be inserted in bulk. This feature is used by specifying the insertion count in the FOR clause immediately before the INSERT statement.

FOR Clause

Specify the insertion count using numOfRows or ARRAY_SIZE in the FOR clause. The FOR clause can be specified only in the INSERT statement, not in other update statements.

numOfRows and ARRAY_SIZE

Insertion processing will be executed only for the specified count. However, if the count is 1, it will be assumed that the FOR clause was omitted when the application is executed. In this case, proceed according to the INSERT specification in the PostgreSQL Documentation.

Specify the FOR clause as an integer host variable or as a literal.

Specify ARRAY_SIZE to insert all elements of the array in the table. When specifying ARRAY_SIZE, specify at least one array in *expr*.

If two or more arrays were specified in expr, it will be assumed that ARRAY_SIZE is the minimum number of elements in the array.

numOfRows or ARRAY_SIZE must exceed the minimum number of elements in all arrays specified in *expr*, *outputHostVar*, and *indicatorVal*.

The following example shows how to specify the FOR clause.

```
int  number_of_rows = 10;
int id[25];
char name[25][10];

EXEC SQL FOR :number_of_rows    /* will process 10 rows */
INSERT INTO prod (name, id) VALUES (:name, :id);

EXEC SQL FOR ARRAY_SIZE           /* will process 25 rows */
INSERT INTO prod (name, id) VALUES (:name, :id);
```

expr

Specify the value to be inserted in the table. Array host variables, host variable literals, strings, and pointer variables can be specified. Structure type arrays and pointer variable arrays cannot be specified.

Do not use pointer variables and ARRAY_SIZE at the same time. The reason for this is that the number of elements in the area represented by the pointer variable cannot be determined.

query

A query (SELECT statement) that supplies the rows to be inserted. The number of rows returned by *query* must be 1. If two or more rows are returned, an error will occur. This cannot be used at the same time as ARRAY_SIZE.

outputHostVar, indicatorVal

These must be array host variables or pointer variables.

Error Messages

Given below are the error messages that are output when bulk INSERT functionality is not used correctly.

Message

invalid statement name "FOR value should be positive integer"

Cause

The value given for *numOfRows* is less than or equal to 0.

Solution

Specify a value that is more than or equal to 1 for *numOfRows*.

Message

invalid statement name "Host array variable is needed when using FOR ARRAY_SIZE"

Cause

A host array is not specified in the values clause when using the ARRAY_SIZE keyword.

Solution

At least one host array variable should be included in the values clause

Message

SELECT...INTO returns too many rows

Cause

The number of rows returned by the 'SELECT ... INTO' query in the INSERT statement is more than one.

Solution

When the value of *numOfRows* is more than one, the maximum number of rows that can be returned by the 'SELECT ... INTO' query in the INSERT statement is one.

Limitations

The limitations when using bulk INSERT are given below.

- Array of structures should not be used as an input in the 'VALUES' clause. Attempted use will result in junk data being inserted into the table.
- Array of pointers should not be used as an input in the 'VALUES' clause. Attempted use will result in junk data being inserted into the table.
- ECPG supports the use of 'WITH' clause in single INSERT statements. 'WITH' clause cannot be used in bulk INSERT statements.
- ECPG does not calculate the size of the pointer variable. So when a pointer variable is used that includes multiple elements, *numOfRows* should be less than or equal to the number of elements in the pointer. Otherwise, junk data will be inserted into the table.
- If an error occurs, all bulk INSERT actions will be rolled back, therefore, no rows are inserted. However, if the RETURNING clause was used, and the error occurred while obtaining the rows after the insertion was successful, the insertion processing will not be rolled back.

Samples

Given below are some sample usages of the bulk INSERT functionality.

Basic Bulk INSERT

```
int in_f1[4] = {1,2,3,4};
...
EXEC SQL FOR 3 INSERT INTO target (f1) VALUES (:in_f1);
```

The number of rows to insert indicated by the FOR clause is 3, so the data in the first 3 elements of the host array variable are inserted into the table. The contents of the target table will be:

```
 f1
----
  1
  2
  3
(3 rows)
```

Also a host integer variable can be used to indicate the number of rows that will be inserted in FOR clause, which will produce the same result as above:

```
int num = 3;
int in_f1[4] = {1,2,3,4};
...
EXEC SQL FOR :num INSERT INTO target (f1) VALUES (:in_f1);
```

Inserting constant values

Constant values can also be bulk INSERTed into the table as follows:

```
EXEC SQL FOR 3 INSERT INTO target (f1,f2) VALUES (DEFAULT,'hello');
```

Assuming the 'DEFAULT' value for the 'f1' column is '0', the contents of the target table will be:

```
f1 |  f2
---+-------
 0 | hello
 0 | hello
 0 | hello
(3 rows)
```

Using ARRAY_SIZE

'FOR ARRAY_SIZE' can be used to insert the entire contents of a host array variable, without explicitly specifying the size, into the table.

```
    int in_f1[4] = {1,2,3,4};
...
EXEC SQL FOR ARRAY_SIZE INSERT INTO target (f1) VALUES (:in_f1);
```

In the above example, four rows are inserted into the table.

Note

If there are multiple host array variables specified as input values, then the number of rows inserted is same as the smallest array size. The example given below demonstrates this usage.

```
int in_f1[4] = {1,2,3,4};
char in_f3[3][10] = {"one", "two", "three"};
...
EXEC SQL FOR ARRAY_SIZE INSERT INTO target (f1,f3) VALUES (:in_f1,:in_f3);
```

In the above example, the array sizes are 3 and 4. Given that the smallest array size is 3, only three rows are inserted into the table. The table contents are given below.

```
 f1 |  f3
----+-------
  1 | one
  2 | two
```

```
  3 | three
(3 rows)
```

Using Pointers as Input

Pointers that contain multiple elements can be used in bulk INSERT.

```
int *in_pf1 = NULL;
in_pf1 = (int*)malloc(4*sizeof(int));
in_pf1[0]=1;
in_pf1[1]=2;
in_pf1[2]=3;
in_pf1[3]=4;
...
EXEC SQL FOR 4 INSERT INTO target (f1) values (:in_pf1);
```

The above example will insert four rows into the target table.

Using SELECT query

When using bulk INSERT, the input values can be got from the results of a SELECT statement. For example,

```
EXEC SQL FOR 4 INSERT INTO target(f1) SELECT age FROM source WHERE name LIKE 'foo';
```

Assuming that the 'SELECT' query returns one row, the same row will be inserted into the target table four times.

Note

If the 'SELECT' query returns more than one row, the INSERT statement will throw an error.

```
EXEC SQL FOR 1 INSERT INTO target(f1) SELECT age FROM source;
```

In the above example, all the rows returned by the 'SELECT' statement will be inserted into the table. In this context '1' has the meaning of 'returned row equivalent'.

Using RETURNING clause

Bulk INSERT supports the same RETURNING clause syntax as normal INSERT. An example is given below.

```
int out_f1[4];
int in_f1[4] = {1,2,3,4};
...
EXEC SQL FOR 3 INSERT INTO target (f1) VALUES (:in_f1) RETURNING f1 INTO :out_f1;
```

After the execution of the above INSERT statement, the 'out_f1' array will have 3 elements with the values of '1','2' and '3'.

6.4.4 DECLARE STATEMENT

This section describes the DECLARE STATEMENT.

Synopsis

```
EXEC SQL [ AT connName] DECLARE statementName STATEMENT;
```

Description

DECLARE STATEMENT is an embedded SQL command that declares an identifier for a prepared statement. The declared identifier can be used as an identifier in a prepared statement for the following SQL commands:

- EXECUTE
- DECLARE
- DESCRIBE
- PREPARE (Embedded SQL commands)
- PREPARE (SQL commands)

You can associate an identifier in a prepared statement with a connection by executing a DECLARE STATEMENT that specifies the connection. If you specify an identifier associated with the connection in a later SQL command, the SQL command is executed using the connection associated with the identifier. The association between the connection and the identifier in the prepared statement is shared throughout the process.

Only one connection can be associated with a prepared statement of the same name. If you make multiple associations across files, subsequent DECLARE STATEMENT are ignored. If you associate the same file more than once, precompiling the file fails.

If you use the identifier associated with a connection in a SQL command, do not use the AT clause. If a connection different from the connection linked to the identifier using the AT clause is selected, a runtime error will occur.

Parameters

connName

A database connection name established by the CONNECT command.

If AT clause is omitted, no association is made between the connection and the identifier. DECLARE STATEMENT is executed, but has no effect.

statementName

Specify the identifier of the prepared statement. You can specify either a SQL identifier or a host variable.

Examples

Dynamic SQL statement

DECLARE STATEMENT is primarily used to execute dynamic SQL statements.

```
EXEC SQL BEGIN DECLARE SECTION;
char dbname[128];
EXEC SQL END DECLARE SECTION;
...
EXEC SQL CONNECT TO postgres AS con1;
EXEC SQL CONNECT TO another_database AS con2;
EXEC SQL AT con1 DECLARE sql_stmt STATEMENT;
EXEC SQL DECLARE cursor_name CURSOR FOR sql_stmt;
EXEC SQL PREPARE sql_stmt FROM "SELECT current_database()";
EXEC SQL OPEN cursor_name;
EXEC SQL FETCH cursor_name INTO :dbname;
EXEC SQL CLOSE cursor_name;
```

In the example above, the connection 'con1' is associated with the prepared statement identifier 'sql_stmt'. So the current connection is 'con2', but the embedded SQL commands that follow are executed on 'con1'.

PREPARE AS statement

The following is an example using a PREPARE statement in the SQL command:

```
EXEC SQL AT db1 DECLARE stmt STATEMENT;
EXEC SQL PREPARE stmt (int) AS
```

```
    SELECT * FROM employee WHERE id = $1;
EXEC SQL EXECUTE stmt USING 1;
```

The above SELECT statement is executed on the connection 'db1'.

Compatibility

DECLARE STATEMENT is not specified in the SQL standard.

See Also

EXECUTE, DECLARE, DESCLIBE, PREPARE (Embedded SQL commands), PREPARE (SQL commands)

See

- Refer to "Embedded SQL Commands" in "Client Interfaces" in the PostgreSQL documentation for information on the embedde SQL commands.
- Refer to "SQL Commands" in "Reference" in the PostgreSQL documentation for information on the SQL commands.

6.4.5 Creating Applications while in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

See

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.
- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

6.4.5.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information (*1)	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 57P02 YE000 26000 40001	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during node/system failure	08001	
Switch to the standby server	Switched during access	57P01 57P02 YE000 26000	

State		Error information (*1)	Action
		40001	
	Accessed during switch	08001	

*1: Return value of SQLSTATE.

6.4.6 Notes

Notes on creating multithreaded applications

In embedded SQL in C, DISCONNECT ALL disconnects all connections within a process, and therefore it is not thread-safe in all operations that use connections. Do not use it in multithreaded applications.

Chapter 7 Embedded SQL in COBOL

This chapter describes application development using embedded SQL in COBOL.

7.1 Development Environment

Install FUJITSU Enterprise Postgres Client Package for the architecture to be developed and executed.

See

Refer to the Installation and Setup Guide for Client for information on the COBOL compiler required for COBOL application development.

7.2 Setup

7.2.1 Environment Settings

When using embedded SQL in COBOL, the same environment settings as when using the C library (libpq) are required. Refer to "5.2.1 Environment Settings" in "C Library (libpq)" for information on the environment settings for the library for C.

Additionally, set the following path for the precompiler ecobpg in the PATH environment variable:

L

Linux

```
fujitsuEnterprisePostgresClientInstallDir/bin
```

W

Windows(R)

```
fujitsuEnterprisePostgresClientInstallDir\bin
```

7.2.2 Message Language and Encoding System Used by Applications

The settings for the message language and the encoding system used by applications should be the same as those required when using the library for C.

However, in embedded SQL, the PQsetClientEncoding function cannot be used in the encoding system settings. In embedded SQL, use the SET command to specify the encoding system in client_encoding.

Refer to "5.2.2 Message Language and Encoding System Used by Applications Settings" in "C Library (libpq)" for information on the settings for the library for C.

7.2.3 Settings for Encrypting Communication Data

When encrypting the communication data, the same environment settings as when using the C library (libpq) are required.

Refer to "5.2.3 Settings for Encrypting Communication Data" in "C Library (libpq)" for information on the environment settings for the C library.

7.3 Connecting with the Database

Use the CONNECT statement shown below to create a connection to the database server.

Format

```
EXEC SQL CONNECT TO target [AS connection-name] [USER user-name]END-EXEC.
```

target

Write in one of the following formats:

- dbname@host:port
- tcp:postgresql://host:port/dbname[?options]
- unix:postgresql://host[:port][/dbname][?options]
  (Definition method when using the UNIX domain socket)
- SQL string literal containing one of the above formats
- Reference to a character variable containing one of the above formats
- DEFAULT

Note

If target is DEFAULT, the AS clause and USER clause cannot be specified.

user-name

Write in one of the following formats:

- username
- username/password
- username IDENTIFIED BY password
- username USING password

Description of the arguments

Argument	Description
dbname	Specify the database name.
host	Specify the host name for the connection destination.
port	Specify the port number for the database server. The default is "27500".
connection-name	Specify connection names to identify connections when multiple connections are to be processed within a single program.
username	Specify the user that will connect with the database. If this is omitted, the name used will be that of the user on the operating system that is executing the application.
password	Specify a password when authentication is required.
options	Specify the following parameter when specifying a time for timeout. Connect parameters with & when specifying more than one. The following shows the values specified for each parameter. - connect_timeout Specify the timeout for connections. Specify a value between 0 and 2147483647 (in seconds). There is no limit set if you set 0 or an invalid value. If "1" is specified, the behavior will be the same as when "2" was specified. An error occurs when a connection cannot be established within the specified time. - keepalives This enables keepalive.

Argument	Description
	Keepalive is disabled if 0 is specified. Keepalive is enabled when any other value is specified. The default is keepalive enabled. Keepalive causes an error to occur when it is determined that the connection with the database is disabled. - keepalives_idle Specify the time until the system starts sending keepalive messages when communication with the database is not being performed. - Linux Specify a value between 1 and 32767 (in seconds). The default value of the system is used if this is not specified. - Windows(R) Specify a value between 1 and 2147483647 (in seconds). 7200 will be set as default if a value outside this range is specified or if nothing is specified. - keepalives_interval Specify the interval between resends when there is no response to keepalive messages. - Linux Specify a value between 1 and 32767 (in seconds). The default value of the system is used if this is not specified. - Windows(R) Specify a value between 1 and 2147483647 (in seconds). 1 will be set as default if a value outside this range is specified or if nothing is specified. - keepalives_count Specify the number of resends for keepalive messages. - Linux Specify a value between 1 and 127. The default value of the system is used if this is not specified. - Windows(R) The system default value is used irrespective of what is specified for this parameter.

Code examples for applications

```
EXEC SQL CONNECT TO tcp:postgresql://sv1:27500/mydb?
connect_timeout=20&keepalives_idle=20&keepalives_interval=5&keepalives_count=2&keepalives=
1 USER myuser/myuser01 END-EXEC.
```

7.4 Application Development

Refer to "Appendix D ECOBPG - Embedded SQL in COBOL" for information on developing applications.

7.4.1 Support for National Character Data Types

This section describes how to use the national character data types using the SQL embedded COBOL preprocessor.

The table below lists the COBOL variable types supporting the national character data types. The number of characters specified for the national character data type must be specified for the length of the host variable.

National character data type	COBOL variable type
CHARACTER(*n*)	*varName* PIC N(*n*)

National character data type	COBOL variable type
NATIONAL CHARACTER(*n*)	
CHARACTER VARYING(*n*) NATIONAL CHARACTER VARYING(*n*)	*varName* PIC N(*n*) VARYING

To use COBOL variable types that support national character data types, it is necessary to specify the ECOBPG_NCHAR environment variable.

ECOBPG_NCHAR={ UTF16LE | UTF16BE | UTF32LE | UTF32BE | SJIS }

In SQL embedded COBOL, specify the encoding of the COBOL variable types that support national character data types.

- UTF16LE: UTF-16 little-endian
- UTF16BE: UTF-16 big-endian
- UTF32LE: UTF-32 little-endian
- UTF32BE: UTF-32 big-endian
- SJIS: Shift JIS

If this environment variable is omitted, the encoding will be determined according to the encoding system of the client.

- If UTF8 is used: UTF16 (endians will be encoded in accordance with endians of the client system)
- If SJIS is used: SJIS

If encoding is specified for the translation option when compiling with NetCOBOL, the encoding specified for the national character data types should be used for the environment variable ECOBPG_NCHAR.

The list below shows NetCOBOL translation options and their corresponding environment variable ECOBPG_NCHAR values.

NetCOBOL translation options	Environment variable ECOBPG_NCHAR
ENCODE (UTF-8,UTF16,LE) RCS (UTF-16,LE)	UTF-16LE
ENCODE (UTF-8,UTF-16,BE) RCS (UTF-16,BE)	UTF-16BE
ENCODE (UTF-8,UTF-32,LE)	UTF-32LE
ENCODE (UTF-8,UTF-32,BE)	UTF-32BE
ENCODE (SJIS,SJIS)	SJIS
Not specified	No need to specify

Also, if the post-compiling encoding for an application differs from the locale of the execution environment, then the client encoding must be used for the application.

The list below shows the values supported for the combinations of application encoding, locale of the execution environment, and client encodings.

Application encoding	Locale used when executing an application	Client encoding
UTF-8	UTF-8	UTF-8
	SJIS	UTF-8
SJIS	UTF-8	SJIS

Application encoding	Locale used when executing an application	Client encoding
	SJIS	SJIS

Refer to "7.2.2 Message Language and Encoding System Used by Applications" for information on how to set client encoding systems.

The following example shows host variable declaration of a national character data type.

```
01 DATA1 PIC N(10).
01 DATA2 PIC N(10) VARYING.
```

Note

- Halfwidth characters should not be used for the national character data type COBOL variable.
- The national character data type column attribute obtained by applications should be the CHAR type.
- Encoding cannot be specified using the ENCODING clause, which is a feature of NetCOBOL.

7.4.2 Compiling Applications

Append the extension "pco" to the name of the source file for the embedded SQL in COBOL.

When the pco file is precompiled using the ecobpg command, COBOL source files will be created, so use the COBOL compiler for the compile.

Precompiling example

```
ecobpg testproc.pco
```

For COBOL code notation, "fixed" or "variable" format can be specified as an ecobpg command option. If not specified, "fixed" format is used.

Refer to "D.1 Precautions when Using Functions and Operators" and "D.12.1 ecobpg" for information on COBOL code notation and how to specify options for ecobpg.

If an optimizer hint block comment is specified for the SQL statement, specify the following option in the ecobpg command:

--enable-hint

Enables the optimizer hint block comment (hereafter, referred to as the "hint clause"). If this option is not specified, the hint clause will be removed as a result of the ecobpg precompile and be disabled.

The SQL statements that can be specified in the hint clause are SELECT, INSERT, UPDATE, and DELETE.

The locations in which the hint clause can be specified are immediately after one of the SELECT, INSERT, UPDATE, DELETE, or WITH keywords. A syntax error will occur if it is specified in any other location.

Example of specifying the hint clause

```
EXEC SQL SELECT /*+ IndexScan(prod ix01) */ name_id
INTO :name_id FROM prod WHERE id = 1 END-EXEC.
```

Refer to "11.1.1 Optimizer Hints" for information on optimizer hints.

If the encoding used for embedded SQL source files differs from that of the locale when precompiling was executed, set the encoding for the embedded SQL source files by specifying the following option for ecobpg.

-E-encode

Specify "UTF8", "SJIS", or "EUC_JP".

If this option is omitted, the encoding is processed based on the locale.

Path of the library file

The ecobpg command defines a group item "sqlca_t" to handle errors, which is defined in the library file stored in the following path:

Linux

Library file name	The storage destination of library file
SQLCA-COBOL.cob	*fujitsuEnterprisePostgresClientInstallDir*\include

Windows(R)

Library file name	The storage destination of library file
SQLCA-COBOL.cob	*fujitsuEnterprisePostgresClientInstallDir*\include

When the ecobpg command generates a COBOL file, it inserts a COPY statement with no options to copy the library file. Therefore, specify the path of the storage destination of library file when compiling. How to specify the path must conform to your compiler's specifications.

There is also a library file with the same contents without the extension"cob".

Information

Refer "D.7.2 sqlca"for information on the sqlca_t.

Libraries to use

The applications generated by ecobpg connect to PostgreSQL through the ECPG library. The ECPG library internally loads the libpq library.

Path of library

Refer to "6.4.2 Compiling Applications" for information on the location and name of the ECPG library. And Refer to " Chapter 5 C Library (libpq)" for information on the location and name of the libpq library.

The COBOL compiler provides the how to link various libraries, so be sure to specify the path and libraries according to the specifications of your compiler.

Entry information of subprogram

If you use the ECPG library with a dynamic program structure, copy the entry information stored below. For details, follow the specifications of your compiler.

Linux

```
fujitsuEnterprisePostgresClientInstallDir/share/cobol_entry.info
```

Windows(R)

```
fujitsuEnterprisePostgresClientInstallDir\share\cobol_entry.info
```

Example

The examples of compiling the applications that dynamically links the COBOL language library.
Note that "<*x*>" indicates the product version.

Linux

- Linux 64-bit application:

```
cobol -M  -o testproc -I/opt/fsepv<x>client64/include -L/opt/fsepv<x>client64/lib -
lecpg -lpq testproc.cob
```

Windows(R)

The examples of compiling on a 64-bit operating system.

- 64-bit application

```
> SET LIB=%ProgramFiles%\Fujitsu\fsepv<x>client64\lib;%LIB%
> cobol -I "%ProgramFiles%\Fujitsu\fsepv<x>client64\include" -M testproc.cob
> link testproc.obj F4AGCIMP.LIB LIBCMT.LIB LIBECPG.LIB LIBPQ.LIB /OUT:testproc.exe
```

- 32-bit application

[NetCOBOL V10.5 or earlier]

```
> SET LIB=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\lib;%LIB%
> cobol32 -I "%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\include" -M testproc.cob
> link testproc.obj LIBC.LIB F3BICIMP.LIB LIBECPG.LIB LIBPQ.LIB /OUT:testproc.exe
```

[NetCOBOL V11.0 or later]

```
> SET LIB=%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\lib;%LIB%
> cobol32 -I "%ProgramFiles(x86)%\Fujitsu\fsepv<x>client32\include" -M testproc.cob
> link testproc.obj MSVCRT.LIB F3BICIMP.LIB LIBECPG.LIB LIBPQ.LIB /OUT:testproc.exe
```

7.4.3 Bulk INSERT

This section describes the bulk INSERT.

Synopsis

```
EXEC SQL [ AT conn ] [ FOR { numOfRows | ARRAY_SIZE } ]
    INSERT INTO tableName [ ( colName [, ...] ) ]
    { VALUES ( { expr | DEFAULT } [, ...] ) [, ...] | query }
    [ RETURNING * | outputExpr [ [ AS ] outputName ] [, ...]
    INTO outputHostVar [ [ INDICATOR ] indicatorVar ] [, ...] ] END-EXEC
```

Description

Bulk INSERT is a feature that inserts multiple rows of data in bulk.

By specifying the array host variable that stored the data in the VALUES clause of the INSERT statement, the data for each element in the array can be inserted in bulk. This feature is used by specifying the insertion count in the FOR clause immediately before the INSERT statement.

FOR Clause

Specify the insertion count using *numOfRows* or ARRAY_SIZE in the FOR clause. The FOR clause can be specified only in the INSERT statement, not in other update statements.

numOfRows and ARRAY_SIZE

Insertion processing will be executed only for the specified count. However, if the count is 1, it will be assumed that the FOR clause was omitted when the application is executed. In this case, proceed according to the INSERT specification in the PostgreSQL Documentation.

Specify the FOR clause as an integer host variable or as a literal.

Specify ARRAY_SIZE to insert all elements of the array in the table. When specifying ARRAY_SIZE, specify at least one array in *expr*.

If two or more arrays were specified in *expr*, it will be assumed that ARRAY_SIZE is the minimum number of elements in the array.

numOfRows or ARRAY_SIZE must exceed the minimum number of elements in all arrays specified in *expr*, *outputHostVar*, and *indicatorVal*.

The following example shows how to specify the FOR clause.

```
01 NUMBER-OF-ROWS PIC S9(9) COMP VALUE 10.
01 GROUP-ITEM.
05 ID1 PIC S9(9) OCCURS 25.
05 NAME PIC X(10) OCCURS 25.
* will process 10 rows
EXEC SQL FOR :NUMBER-OF-ROWS
INSERT INTO prod (name, id) VALUES (:NAME, :ID1) END-EXEC
* will process 25 rows
EXEC SQL FOR ARRAY_SIZE
INSERT INTO prod (name, id) VALUES (:NAME, :ID1) END-EXEC
```

expr

Specify the value to be inserted in the table. Array host variables, host variable literals, strings, and pointer variables can be specified. Structure type arrays and pointer variable arrays cannot be specified.

Do not use pointer variables and ARRAY_SIZE at the same time. The reason for this is that the number of elements in the area represented by the pointer variable cannot be determined.

query

A query (SELECT statement) that supplies the rows to be inserted. The number of rows returned by *query* must be 1. If two or more rows are returned, an error will occur. This cannot be used at the same time as ARRAY_SIZE.

outputHostVar and indicatorVal

These must be array host variables or pointer variables.

Error Messages

The messages below are output if an error occurs when the bulk INSERT is used.

Message

The value for the FOR clause must be a positive integer.

Cause

The value given for *numOfRows* is less than or equal to 0.

Solution

Specify a value that is more than or equal to 1 for *numOfRows*.

Message

Array host variable is needed when using FOR ARRAY_SIZE.

Cause

An array host variable is not specified in the VALUES clause.

Solution

Specify more than one array host variable in the VALUES clause.

Message

The SELECT..INTO query returned too many rows in row number %d.

Cause

The "SELECT ... INTO" query in the INSERT statement returned more than one row.

Solution

If *numOfRows* is more than one, the maximum number of rows that can be returned in the "SELECT ... INTO" query in the INSERT statement is one.

Limitations

The limitations when using bulk INSERT are given below.

- Array of structures should not be used as an input in the 'VALUES' clause.
- Array of pointers should not be used as an input in the 'VALUES' clause.
- ECOBPG supports the use of 'WITH' clause in single INSERT statements. 'WITH' clause cannot be used in bulk INSERT statements.
- If an error occurs, all bulk INSERT actions will be rolled back, therefore, no rows are inserted. However, if the RETURNING clause was used, and the error occurred while obtaining the rows after the insertion was successful, the insertion processing will not be rolled back.

Samples

Given below are some sample usages of the bulk INSERT functionality.

Basic Bulk INSERT

```
01 GROUP-ITEM.
05 IN-F1 PIC S9(9) OCCURS 4.
MOVE 1 TO IN-F1(1)
MOVE 2 TO IN-F1(2)
MOVE 3 TO IN-F1(3)
MOVE 4 TO IN-F1(4)
...
EXEC SQL FOR 3 INSERT INTO target (f1) VALUES (:IN-F1) END-EXEC
```

The number of rows to insert indicated by the FOR clause is 3, so the data in the first 3 elements of the host array variable are inserted into the table. The contents of the target table will be:

```
f1
----
1
2
3
(3 rows)
```

Also a host integer variable can be used to indicate the number of rows that will be inserted in FOR clause, which will produce the same result as above:

```
01 NUM PIC S9(9) COMP VALUE 3.
01 GROUP-ITEM.
```

```
05 IN-F1 PIC S9(9) OCCURS 4.
MOVE 1 TO IN-F1(1)
MOVE 2 TO IN-F1(2)
MOVE 3 TO IN-F1(3)
MOVE 4 TO IN-F1(4)
...
EXEC SQL FOR :NUM INSERT INTO target (f1) VALUES (:IN-F1) END-EXEC
```

Inserting constant values

Constant values can also be bulk INSERTed into the table as follows:

```
EXEC SQL FOR 3 INSERT INTO target (f1,f2) VALUES (DEFAULT,'hello') END-EXEC
```

Assuming the 'DEFAULT' value for the 'f1' column is '0', the contents of the target table will be:

```
f1 | f2
---+-------
0  | hello
0  | hello
0  | hello
(3 rows)
```

Using ARRAY_SIZE

'FOR ARRAY_SIZE' can be used to insert the entire contents of a host array variable, without explicitly specifying the size, into the table.

```
01 GROUP-ITEM.
05 IN-F1 PIC S9(9) OCCURS 4.
MOVE 1 TO IN-F1(1)
MOVE 2 TO IN-F1(2)
MOVE 3 TO IN-F1(3)
MOVE 4 TO IN-F1(4)
...
EXEC SQL FOR ARRAY_SIZE INSERT INTO target (f1) VALUES (:IN-F1) END-EXEC
```

Note

If there are multiple host array variables specified as input values, then the number of rows inserted is same as the smallest array size. The example given below demonstrates this usage.

```
01 GROUP-ITEM.
05 IN-F1 PIC S9(9) OCCURS 4.
05 IN-F3 PIC X(10) OCCURS 3.
MOVE 1 TO IN-F1(1)
MOVE 2 TO IN-F1(2)
MOVE 3 TO IN-F1(3)
MOVE 4 TO IN-F1(4)
MOVE "one" TO IN-F3(1)
MOVE "two" TO IN-F3(2)
MOVE "three" TO IN-F3(3)
...
EXEC SQL FOR ARRAY_SIZE INSERT INTO target (f1,f3) VALUES (:IN-F1,:IN-F3) END-EXEC
```

In the above example, the array sizes are 3 and 4. Given that the smallest array size is 3, only three rows are inserted into the table. The table contents are given below.

```
f1 | f3
---+-------
1  | one
```

```
2  | two
3  | three
(3 rows)
```

Using SELECT query

The result of a SELECT query can be used to insert values.

```
EXEC SQL FOR 4 INSERT INTO target(f1) SELECT age FROM source WHERE name LIKE 'foo' END-
EXEC
```

In the example above, assuming that the SELECT query returns one row, the same row will be inserted into the table four times.

If "2" or more is specified for the FOR clause, the INSERT statement returns an error when two or more rows of query results are returned.

If "1" is specified for the FOR clause, all rows returned by the SELECT query will be inserted into the table.

```
EXEC SQL FOR 1 INSERT INTO target(f1) SELECT age FROM source END-EXEC
```

In the example above, "1" specified for the FOR clause indicates all returned rows.

Using RETURNING clause

Bulk INSERT supports the same RETURNING clause syntax as normal INSERT. An example is given below.

```
01 GROUP-ITEM.
05 IN-F1 PIC S9(9) OCCURS 4.
05 OUT-F1 PIC S9(9) OCCURS 4.
MOVE 1 TO IN-F1(1)
MOVE 2 TO IN-F1(2)
MOVE 3 TO IN-F1(3)
MOVE 4 TO IN-F1(4)
...
EXEC SQL FOR 3 INSERT INTO target (f1) VALUES (:IN-F1) RETURNING f1 INTO :OUT-F1 END-EXEC
```

After the execution of the above INSERT statement, the 'out_f1' array will have 3 elements with the values of '1', '2' and '3'.

7.4.4 DECLARE STATEMENT

Refer to "6.4.4 DECLARE STATEMENT" in "Embedded SQL in C".

7.4.5 Creating Applications while in Database Multiplexing Mode

This section explains points to consider when creating applications while in database multiplexing mode.

- Refer to the Cluster Operation Guide (Database Multiplexing) for information on database multiplexing mode.
- Refer to "Application Development" in the Cluster Operation Guide (PRIMECLUSTER) for points to consider when creating applications using the failover feature integrated with the cluster software.

7.4.5.1 Errors when an Application Connection Switch Occurs and Corresponding Actions

If an application connection switch occurs while in database multiplexing mode, explicitly close the connection and then reestablish the connection or reexecute the application.

The table below shows errors that may occur during a switch, and the corresponding action to take.

State		Error information (*1)	Action
Server failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 57P02 YE000 26000 40001	After the switch is complete, reestablish the connection, or reexecute the application.
	Accessed during system failure	08001	
Switch to the standby server	Switched during access	57P01 57P02 YE000 26000 40001	
	Accessed during switch	08001	

*1: Return value of SQLSTATE.

Chapter 8 SQL References

This chapter explains the SQL statement features expanded by FUJITSU Enterprise Postgres.

8.1 Expanded Trigger Definition Feature

This section explains the expanded trigger definition feature.

8.1.1 CREATE TRIGGER

In addition to features of PostgreSQL, triggers can be created with OR REPLACE option and DO option.

Synopsis

```
CREATE [ OR REPLACE ] [ CONSTRAINT ] TRIGGER name { BEFORE | AFTER | INSTEAD OF } { event
[ OR ... ] }
    ON table_name
    [ FROM referenced_table_name ]
    [ NOT DEFERRABLE | [ DEFERRABLE ] [ INITIALLY IMMEDIATE | INITIALLY DEFERRED ] ]
    [ REFERENCING { { OLD | NEW } TABLE [ AS ] transition_relation_name } [ ... ] ]
    [ FOR [ EACH ] { ROW | STATEMENT } ]
    [ WHEN ( condition ) ]
    { EXECUTE { FUNCTION | PROCEDURE } function_name ( arguments )
        | DO [ LANGUAGE lang_name ] code }
```

Description

Refer to the PostgreSQL Documentation for information about CREATE TRIGGER. This section describes OR REPLACE option and DO option.

A trigger which is created with OR REPLACE option and DO option will be associated with the specified table or view and will execute the specified code by the specified procedural language of DO (unnamed code block) when certain events occur.

Parameters

OR REPLACE

If the specified trigger is not defined in the table, it defines a new trigger.
If the specified trigger is already defined in the table, the named trigger replaces existing trigger.

code

When the certain events occur, it executes the code in a specified procedural language. The unnamed code block does not require a prior definition like a function. Syntax is same as procedural language.

lang_name

The name of the language that the function is implemented in. Can be SQL, C, internal, or the name of a user-defined procedural language. The default is 'plpgsql'.

plpgsql is supported in CREATE TRIGGER.

- A normal trigger cannot be replaced by a constraint trigger.
- A constraint trigger cannot be replaced by a normal trigger.
- A trigger defined with DO option cannot be replaced by a trigger defined with EXECUTE PROCEDURE option.

- A trigger defined with EXECUTE PROCEDURE option cannot be replaced by a trigger defined with DO option.

Examples

It executes the code block that is specified by DO before the table is updated.
(Example that LANGUAGE is plpgsql)

```
CREATE TRIGGER check_update
    BEFORE UPDATE ON accounts
    FOR EACH ROW
    DO $$BEGIN RETURN NEW; END;$$ ;
```

Information

When a trigger created with DO option, a new function is created internally. The name of function is "schema name"."on table name"_"trigger name"_TRIGPROC(serial number).

8.1.2 How to Define Triggers in pgAdmin

The expanded features of the trigger definition can also be used in pgAdmin.

See

Refer to "pgAdmin Help" for information on how to define triggers using pgAdmin.

Chapter 9 Compatibility with Oracle Databases

This chapter describes the environment settings and functionality offered for features that are compatible with Oracle databases.

9.1 Overview

Features compatible with Oracle databases are provided. These features enable you to easily migrate to FUJITSU Enterprise Postgres and reduce the costs of reconfiguring applications.

The table below lists features compatible with Oracle databases.

Table 9.1 Features compatible with Oracle databases

Category		Feature	
		Item	Overview
SQL	Queries	Outer join operator (+)	Operator for outer joins
		DUAL table	Table provided by the system
	Functions	DECODE	Compares values, and if they match, returns a corresponding value
		SUBSTR	Extracts part of a string using characters to specify position and length
		NVL	Returns a substitute value when a value is NULL
Package		DBMS_ALERT	Sends alerts
		DBMS_ASSERT	Perform assertions on input values
		DBMS_OUTPUT	Sends messages to clients
		DBMS_PIPE	Execution of inter-session communication
		DBMS_RANDOM	Random number generation
		DBMS_UTILITY	Addition of various functions
		UTL_FILE	Enables text file operations
		DBMS_SQL	Enables dynamic SQL execution

See

In addition to the above, refer to the file below for information on the features compatible with Oracle databases.

L - Linux:
fujitsuEnterprisePostgresInstallDir/share/doc/extension/README.asciidoc

W - Windows(R):
fujitsuEnterprisePostgresInstallDir\doc\extension\README.asciidoc

9.2 Precautions when Using the Features Compatible with Oracle Databases

This section provides notes on using the features compatible with oracle databases.

9.2.1 Notes on SUBSTR

SUBSTR is implemented in FUJITSU Enterprise Postgres and Oracle databases using different external specifications.

For this reason, when using SUBSTR, define which specification is to take precedence. In the default configuration of FUJITSU Enterprise Postgres, the specifications of FUJITSU Enterprise Postgres take precedence.

When using the SUBSTR function compatible with Oracle databases, set "oracle" and "pg_catalog" in the "search_path" parameter of postgresql.conf. You must specify "oracle" before "pg_catalog" when doing this.

```
search_path = '"$user", public, oracle, pg_catalog'
```

Information

- The search_path parameter specifies the order in which schemas are searched. The SUBSTR function in Oracle databases is defined in the oracle schema.
- Refer to "Statement Behavior" in "Client Connection Defaults" in "Server Administration" in the PostgreSQL Documentation for information on search_path.

9.2.2 Notes when Integrating with the Interface for Application Development

The SQL noted in "Table 9.1 Features compatible with Oracle databases" can be used in the interface for application development. However, outer join operators cannot be used when integrated with Visual Studio.

When integrated with Visual Studio or using the features compatible with Oracle databases from Fujitsu Npgsql .NET Data Provider, select one of the actions below for the SearchPath parameter, which is one of the pieces of information needed to connect to databases specified for individual connections.

- Do not specify the SearchPath parameter itself, or
- Specify both "public" and the schema name in the SQL statement.

Note that both "public" and the schema name in the SQL statement must be specified as the SearchPath parameter before "oracle" and "pg_catalog" when using the Oracle database-compatible feature SUBSTR.

9.3 Queries

The following queries are supported:

- Outer Join Operator (+)
- DUAL Table

9.3.1 Outer Join Operator (+)

In the WHERE clause conditional expression, by adding the plus sign (+), which is the outer join operator, to the column of the table you want to add as a table join, it is possible to achieve an outer join that is the same as a joined table (OUTER JOIN).

Syntax

SELECT statement

```
SELECT … [WHERE [NOT] joinCond ...] …
SELECT … [WHERE srchCond ]... ] …
```

Join condition

```
{ colSpec(+) = colSpec | colSpec = colSpec(+) }
```

Note

Here we are dealing only with the WHERE clause of the SELECT statement. Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the overall syntax of the SELECT statement.

General rules

WHERE clause

- The WHERE clause specifies search condition or join conditions for the tables that are derived.
- Search conditions are any expressions that return BOOLEAN types as the results of evaluation. Any rows that do not meet these conditions are excluded from the output. When the values of the actual rows are assigned to variables and if the expression returns TRUE, those rows are considered to have met the conditions.
- Join conditions are comparison conditions that specify outer join operators. Join conditions in a WHERE clause return a table that includes all the rows that meet the join conditions, including rows that do not meet all the join conditions.
- Join conditions take precedence over search conditions. For this reason, all rows returned by the join conditions are subject to the search conditions.
- The following rules and restrictions apply to queries that use outer join operators. It is therefore recommended to use FROM clause joined tables (OUTER JOIN) rather than outer join operators:
  - Outer join operators can only be specified in the WHERE clause.
  - Outer join operators can only be specified for base tables or views.
  - To perform outer joins using multiple join conditions, it is necessary to specify outer join operators for all join conditions.
  - When combining join conditions with constants, specify outer join operators in the corresponding column specification. When not specified, they will be treated as search conditions.
  - The results column of the outer join of table t1 is not returned if table t1 is joined with table t2 by specifying an outer join operator in the column of t1, then table t1 is joined with table t3 by using search conditions.
  - It is not possible to specify columns in the same table as the left/right column specification of a join condition.
  - It is not possible to specify an expression other than a column specification for outer join operators, but they may be specified for the columns that compose the expression.

    There are the following limitations on the functionality of outer join operators when compared with joined tables (OUTER JOIN). To use functionality that is not available with outer join operators, use joined tables (OUTER JOIN).

Table 9.2 Range of functionality with outer join operators

Functionality available with joined tables (OUTER JOIN)	Outer join operator
Outer joins of two tables	Y
Outer joins of three or more tables	Y (*1)
Used together with joined tables within the same query	N
Use of the OR logical operator to a join condition	N
Use of an IN predicate to a join condition	N
Use of subqueries to a join condition	N

Y: Available
N: Not available

*1: The outer joins by outer join operators can return outer join results only for one other table. For this reason, to combine outer joins of table t1 and table t2 or table t2 and table t3, it is not possible to specify outer join operators simultaneously for table t2.

Example

Table configuration

t1

col1	col2	col3
1001	AAAAA	1000
1002	BBBBB	2000
1003	CCCCC	3000

t2

col1	col2
1001	aaaaa
1002	bbbbb
1004	ddddd

Example 1: Return all rows in table t2, including those that do not exist in table t1.

```
SELECT *
  FROM t1, t2
  WHERE t1.col1(+) = t2.col1;
 col1 |    col2    | col3 | col1 |    col2
------+------------+------+------+------------
 1001 | AAAAA      | 1000 | 1001 | aaaaa
 1002 | BBBBB      | 2000 | 1002 | bbbbb
      |            |      | 1004 | ddddd
(3 rows)
```

This is the same syntax as the joined table (OUTER JOIN) of the FROM clause shown next.

```
SELECT *
  FROM t1 RIGHT OUTER JOIN t2
       ON t1.col1 = t2.col1;
```

Example 2: In the following example, the results are filtered to records above 2000 in t1.col3 by search conditions, and the records are those in table t2 that include ones that do not exist in table t1. After filtering with the join conditions, there is further filtering with the search conditions, so there will only be one record returned.

```
SELECT *
  FROM t1, t2
  WHERE t1.col1(+) = t2.col1
    AND t1.col3 >= 2000;
 col1 |    col2    | col3 | col1 |    col2
------+------------+------+------+------------
 1002 | BBBBB      | 2000 | 1002 | bbbbb
(1 row)
```

This is the same syntax as the joined table (OUTER JOIN) of the FROM clause shown next.

```
SELECT *
  FROM t1 RIGHT OUTER JOIN t2
       ON t1.col1 = t2.col1
  WHERE t1.col3 >= 2000;
```

9.3.2 DUAL Table

DUAL table is a virtual table provided by the system. Use when executing SQL where access to a base table is not required, such as when performing tests to get result expressions such as functions and operators.

Example

In the following example, the current system date is returned.

```
SELECT  CURRENT_DATE  "date" FROM DUAL;
    date
------------
 2013-05-14
(1 row)
```

9.4 SQL Function Reference

The following SQL functions are supported:

- DECODE
- SUBSTR
- NVL

9.4.1 DECODE

Description

Compares values and if they match, returns a corresponding value.

Syntax

```
DECODE(expr, srch, result [, srch, result ]... [, default ])
```

General rules

- DECODE compares values of the value expression to be converted and the search values one by one. If the values match, a corresponding result value is returned. If no values match, the default value is returned if it has been specified. A NULL value is returned if a default value has not been specified.
- If the same search value is specified more than once, then the result value returned is the one listed for the first occurrence of the search value.
- The following data types can be used in result values and in the default value:
  - CHAR
  - VARCHAR
  - NCHAR
  - NCHAR VARYING
  - TEXT
  - INTEGER
  - BIGINT
  - NUMERIC
  - DATE
  - TIME WITHOUT TIME ZONE
  - TIMESTAMP WITHOUT TIME ZONE

  - TIMESTAMP WITH TIME ZONE

- The same data type must be specified for the values to be converted and the search values. However, note that different data types may also be specified if a literal is specified in the search value, and the value expression to be converted contains data types that can be converted. When specifying literals, refer to "Table A.1 Data type combinations that contain literals and can be converted implicitly" in "A.3 Implicit Data Type Conversions" for information on the data types that can be specified.
- If the result values and default value are all literals, the data types for these values will be as shown below:
  - If all values are string literals, all will become character types.
  - If there is one or more numeric literal, all will become numeric types.
  - If there is one or more literal cast to the datetime/time types, all will become datetime/time types.
- If the result values and default value contain a mixture of literals and non-literals, the literals will be converted to the data types of the non-literals. When specifying literals, refer to "Table A.1 Data type combinations that contain literals and can be converted implicitly" in "A.3 Implicit Data Type Conversions" for information on the data types that can be converted.
- The same data type must be specified for all result values and for the default value. However, different data types can be specified if the data type of any of the result values or default value can be converted - these data types are listed below:

Table 9.3 Data type combinations that can be converted by DECODE (summary)

		Other result values or default value		
		Numeric type	Character type	Date/time type
Result value (any)	Numeric type	Y	N	N
	Character type	N	Y	N
	Date/time type	N	N	S (*1)

Y: Can be converted
S: Some data types can be converted
N: Cannot be converted

*1: The data types that can be converted for date/time types are listed below:

Table 9.4 Result value and default value date/time data types that can be converted by DECODE

		Other result values or default value			
		DATE	TIME WITHOUT TIME ZONE	TIMESTAMP WITHOUT TIME ZONE	TIMESTAMP WITH TIME ZONE
Result value (any)	DATE	Y	N	Y	Y
	TIME WITHOUT TIME ZONE	N	Y	N	N
	TIMESTAMP WITHOUT TIME ZONE	Y	N	Y	Y
	TIMESTAMP WITH TIME ZONE	Y	N	Y	Y

Y: Can be converted
N: Cannot be converted

- The data type of the return value will be the data type within the result or default value that is longest and has the highest precision.

Example

In the following example, the value of col3 in table t1 is compared and converted to a different value. If the col3 value matches search value 1, the result value returned is "one". If the col3 value does not match any of search values 1, 2, or 3, the default value "other number" is returned.

```
SELECT col1, DECODE(col3, 1000, 'one',
                          2000, 'two',
                          3000, 'three',
                          'other number') "num-word"
       FROM t1;
col1  | num-word
------+----------
 1001 | one
 1002 | two
 1003 | three
(3 rows)
```

9.4.2 SUBSTR

Description

Extracts part of a string using characters to specify position and length.

Syntax

```
SUBSTR(str, startPos [, len ])
```

General rules

- SUBSTR extracts and returns a substring of string *str*, beginning at position *startPos*, for number of characters *len*.
- When *startPos* is positive, it will be the number of characters from the beginning of the string.
- When *startPos* is 0, it will be treated as 1.
- When *startPos* is negative, it will be the number of characters from the end of the string.
- When *len* is not specified, all characters to the end of the string are returned. NULL is returned when *len* is less than 1.
- For *startPos* and *len*, specify a SMALLINT or INTEGER type. When specifying literals, refer to "Table A.1 Data type combinations that contain literals and can be converted implicitly" in "A.3 Implicit Data Type Conversions" for information on the data types that can be specified.
- The data type of the return value is TEXT.

Note

- There are two types of SUBSTR. One that behaves as described above, and one that behaves the same as SUBSTRING. The search_path parameter must be modified for it to behave the same as the specification described above.
- It is recommended to set search_path in postgresql.conf. In this case, it will be effective for each instance. Refer to "9.2.1 Notes on SUBSTR" for information on how to configure postgresql.conf.
- The configuration of search_path can be done at the user level or at the database level. Setting examples are shown below.
  - Example of setting at the user level

    This can be set by executing an SQL command. In this example, user1 is used as the username.

    ```
    ALTER USER user1 SET search_path = "$user",public,oracle,pg_catalog;
    ```

  - Example of setting at the database level

    This can be set by executing an SQL command. In this example, db1 will be used as the database name.

```
ALTER DATABASE db1 SET search_path = "$user",public,oracle,pg_catalog;
```

You must specify "oracle" before "pg_catalog".

- If the change has not been implemented, SUBSTR is the same as SUBSTRING.

See

Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on ALTER USER and ALTER DATABASE.

Information

The general rules for SUBSTRING are as follows:

- The start position will be from the beginning of the string, whether positive, 0, or negative.
- When *len* is not specified, all characters to the end of the string are returned.
- An empty string is returned if no string is extracted or *len* is less than 1.

See

Refer to "String Functions and Operators" under "The SQL Language" in the PostgreSQL Documentation for information on SUBSTRING.

Example

In the following example, part of the string "ABCDEFG" is extracted:

```
SELECT SUBSTR('ABCDEFG',3,4) "Substring" FROM DUAL;

 Substring
-----------
 CDEF
(1 row)

SELECT SUBSTR('ABCDEFG',-5,4) "Substring" FROM DUAL;

 Substring
-----------
(1 row)
```

9.4.3 NVL

Description

Returns a substitute value when a value is NULL.

Syntax

```
NVL(expr1, expr2)
```

General rules

- NVL returns a substitute value when the specified value is NULL. When *expr1* is NULL, *expr2* is returned. When *expr1* is not NULL, *expr1* is returned.

- Specify the same data types for *expr1* and *expr2*. However, if a constant is specified in *expr2*, and the data type can also be converted by *expr1*, different data types can be specified. When this happens, the conversion by *expr2* is done to suit the data type in *expr1*, so the value of *expr2* returned when *expr1* is a NULL value will be the value converted in the data type of *expr1*.
- When specifying literals, refer to "Table A.1 Data type combinations that contain literals and can be converted implicitly" in "A.3 Implicit Data Type Conversions" for information on the data types that can be converted.

Example

In the following example, "IS NULL" is returned if the value of col1 in table t1 is a NULL value.

```
SELECT col2, NVL(col1,'IS NULL') "nvl" FROM t1;
 col2 |   nvl
------+---------
 aaa  | IS NULL
(1 row)
```

9.5 Package Reference

A "package" is a group of features, brought together by schemas, that have a single functionality, and are used by calling from PL/pgSQL.

The following packages are supported:

- DBMS_ALERT
- DBMS_ASSERTION
- DBMS_OUTPUT
- DBMS_PIPE
- DBMS_RANDOM
- DBMS_UTILITUY
- UTL_FILE
- DBMS_SQL

To call each feature from PL/pgSQL, use the PERFORM or SELECT statement and qualify the feature name with the package name. For more information on the calling format, refer to the feature-specific description for each package.

In the following, explain DBMS_SQL among the supported packages. For other packages, refer to the README stored in the installation location.

See

For packages other than DBMS_SQL, refer to the following file.

- Linux:
  fujitsuEnterprisePostgresInstallDir/share/doc/extension/README.asciidoc
- Windows(R):
  fujitsuEnterprisePostgresInstallDir\doc\extension\README.asciidoc

9.5.1 DBMS_SQL

Overview

Dynamic SQL can be executed from PL/pgSQL.

Features

Feature	Description
BIND_VARIABLE	Sets values in the host variable within the SQL statement.
CLOSE_CURSOR	Closes the cursor.
COLUMN_VALUE	Retrieves the value of the column in the select list extracted with FETCH_ROWS.
DEFINE_COLUMN	Defines the column from which values are extracted and the storage destination.
EXECUTE	Executes SQL statements.
FETCH_ROWS	Positions the specified cursor at the next row and extracts values from the row.
OPEN_CURSOR	Opens a new cursor.
PARSE	Parses SQL statements.

Note

- In DBMS_SQL, the data types supported in dynamic SQL are limited, and therefore the user must consider this. The supported data types are:
  - INTEGER
  - DECIMAL
  - NUMERIC
  - REAL
  - DOUBLE PRECISION
  - CHAR(*1)
  - VARCHAR(*1)
  - NCHAR(*1)
  - NCHAR VARYING(*1)
  - TEXT
  - DATE
  - TIMESTAMP WITHOUT TIME ZONE
  - TIMESTAMP WITH TIME ZONE
  - INTERVAL(*2)
  - SMALLINT
  - BIGINT

  *1:
  The host variables with CHAR, VARCHAR, NCHAR, and NCHAR VARYING data types are treated as TEXT, to match the string function arguments and return values. Refer to "String Functions and Operators" in "Functions and Operators" in "The SQL Language" in the PostgreSQL Documentation for information on string functions.
  When specifying the arguments of the features compatible with Oracle databases NVL and/or DECODE, use CAST to convert the data types of the host variables to ensure that data types between arguments are the same.

  *2:
  When using COLUMN_VALUE to obtain an INTERVAL type value specified in the select list, use an INTERVAL type variable with a wide range such as when no interval qualifier is specified, or with a range that matches that of the variable in the select list. If an interval qualifier variable with a narrow range is specified, then the value within

the interval qualifier range will be obtained, but an error that the values outside the range have been truncated will not occur.

Example

This example illustrates where a value expression that returns an INTERVAL value is set in the select list and the result is received with COLUMN_VALUE. Note that the SQL statement operation result returns a value within the INTERVAL DAY TO SECOND range.

[Bad example]

Values of MINUTE, and those after MINUTE, are truncated, because the variable(v_interval) is INTERVAL DAY TO HOUR.

```
    v_interval     INTERVAL DAY TO HOUR;
...
    PERFORM DBMS_SQL.PARSE(cursor, 'SELECT CURRENT_TIMESTAMP - ''2010-01-01'' FROM
DUAL', 1);
...
    SELECT value INTO v_interval FROM DBMS_SQL.COLUMN_VALUE(cursor, 1, v_interval);
    result:1324 days 09:00:00
```

[Good example]

By ensuring that the variable(v_interval) is INTERVAL, the values are received correctly.

```
    v_interval     INTERVAL;
...
    PERFORM DBMS_SQL.PARSE(cursor, 'SELECT CURRENT_TIMESTAMP - ''2010-01-01'' FROM
DUAL', 1);
...
    SELECT value INTO v_interval FROM DBMS_SQL.COLUMN_VALUE(cursor, 1, v_interval);
    result:1324 days 09:04:37.530623
```

Syntax

```
{ BIND_VARIABLE(cursor, varName, val [, len ])
| CLOSE_CURSOR(cursor)
| COLUMN_VALUE(cursor, colPos, varName)
| DEFINE_COLUMN(cursor, colPos, varName [, len ])
| EXECUTE(cursor)
| FETCH_ROWS(cursor)
| OPEN_CURSOR([parm1 ])
| PARSE(cursor, sqlStmt, parm1 [, parm2, parm3, parm4 ])
}
```

9.5.1.1 Description

This section explains each feature of DBMS_SQL.

BIND_VARIABLE

- BIND_VARIABLE sets values in the host variable within the SQL statement.
- Specify the cursor number to be processed.
- Specify the name of the host variable within the SQL statement using a string for the host variable name.
- Specify the value set in the host variable. The data type of the host variable is the same as that of the value expression - it is implicitly converted in accordance with its position within the SQL statement. Refer to "A.3 Implicit Data Type Conversions" for information on implicit conversions.

- If the value is a character type, the string length is the number of characters. If the string length is not specified, the size is the total length of the string.
- It is necessary to place a colon at the beginning of the host variable in SQL statements to identify the host variable. The colon does not have to be added to the host variable names specified at BIND_VARIABLE. The following shows examples of host variable names specified with SQL statements and host variable names specified with BIND_VARIABLE:

```
PERFORM DBMS_SQL.PARSE(cursor, 'SELECT emp_name FROM emp WHERE sal > :x', 1);
```

In this example, BIND_VARIABLE will be as follows:

```
PERFORM DBMS_SQL.BIND_VARIABLE(cursor, ':x', 3500);
```

Or,

```
PERFORM DBMS_SQL.BIND_VARIABLE(cursor, 'x', 3500);
```

- The length of the host variable name can be up to 30 bytes (excluding colons).
- If the data type of the set value is string, specify the effective size of the column value as the fourth argument.

Example

If the data type of the value to be set is not a string:

```
PERFORM DBMS_SQL.BIND_VARIABLE(cursor, ':NO', 1);
```

If the data type of the value to be set is a string:

```
PERFORM DBMS_SQL.BIND_VARIABLE(cursor, ':NAME', h_memid, 5);
```

CLOSE_CURSOR

- CLOSE_CURSOR closes the cursor.
- Specify the cursor number to be processed.
- The value returned is a NULL value.

Example

```
cursor := DBMS_SQL.CLOSE_CURSOR(cursor);
```

COLUMN_VALUE

- COLUMN_VALUE retrieves the value of the column in the select list extracted with FETCH_ROWS.
- Specify the cursor number to be processed.
- Specify the position of the column of the select list in the SELECT statement. The position of the first column is 1.
- Specify the destination variable name.
- Use a SELECT statement to obtain the values of the value, column_error, and actual_length columns.
- The value column returns the value of the column specified at the column position. The data type of the variable name must match that of the column. If the data type of the column in the SELECT statement specified in PARSE is not compatible with DBMS_SQL, use CAST to convert to a compatible data type.

- The data type of the column_error column is NUMERIC. If the column value could not be set correctly in the value column, a value other than 0 will be returned:
  22001: The extracted string has been truncated
  22002: The extracted value contains a NULL value
- The data type of the actual_length column is INTEGER. If the extracted value is a character type, the number of characters will be returned (if the value was truncated, the number of characters prior to the truncation will be returned), otherwise, the number of bytes will be returned.

Example

When retrieving the value of the column, the error code, and the actual length of the column value:

```
SELECT value, column_error, actual_length INTO v_memid, v_col_err, v_act_len FROM
DBMS_SQL.COLUMN_VALUE(cursor, 1, v_memid);
```

When retrieving just the value of the column:

```
SELECT value INTO v_memid FROM DBMS_SQL.COLUMN_VALUE(cursor, 1, v_memid);
```

DEFINE_COLUMN

- DEFINE_COLUMN defines the column from which values are extracted and the storage destination.
- Specify the cursor number to be processed.
- Specify the position of the column in the select list in the SELECT statement. The position of the first column is 1.
- Specify the destination variable name. The data type should be match with the data type of the column from which the value is to be extracted. If the data type of the column in the SELECT statement specified in PARSE is not compatible with DBMS_SQL, use CAST to convert to a compatible data type.
- Specify the maximum number of characters of character type column values.
- If the data type of the column value is string, specify the effective size of the column value as the fourth argument.

Example

When the data type of the column value is not a string:

```
PERFORM DBMS_SQL.DEFINE_COLUMN(cursor, 1, v_memid);
```

When the data type of the column value is a string:

```
PERFORM DBMS_SQL.DEFINE_COLUMN(cursor, 1, v_memid, 10);
```

EXECUTE

- EXECUTE executes SQL statements.
- Specify the cursor number to be processed.
- The return value is an INTEGER type, is valid only with INSERT statement, UPDATE statement, and DELETE statement, and is the number of rows processed. Anything else is invalid.

Example

```
ret := DBMS_SQL.EXECUTE(cursor);
```

FETCH_ROWS

- FETCH_ROWS positions at the next row and extracts values from the row.
- Specify the cursor number to be processed.
- The return value is an INTEGER type and is the number of rows extracted. 0 is returned if all are extracted.
- The extracted information is retrieved with COLUMN_VALUE.

Example

```
LOOP
    IF DBMS_SQL.FETCH_ROWS(cursor) = 0 THEN
        EXIT;
    END IF;

...

END LOOP;
```

OPEN_CURSOR

- OPEN_CURSOR opens a new cursor.
- The parameter is used for compatibility with Oracle databases only, and is ignored by FUJITSU Enterprise Postgres. An INTEGER type can be specified, but it will be ignored. If migrating from an Oracle database, specify 1.
- Close unnecessary cursors by executing CLOSE_CURSOR.
- The return value is an INTEGER type and is the cursor number.

Example

```
cursor := DBMS_SQL.OPEN_CURSOR();
```

PARSE

- PARSE analyzes dynamic SQL statements.
- Specify the cursor number to be processed.
- Specify the SQL statement to be parsed.
- Parameters 1, 2, 3, and 4 are used for compatibility with Oracle databases only, and are ignored by FUJITSU Enterprise Postgres. If you are specifying values anyway, specify the following:
  - Parameter 1 is an INTEGER type. Specify 1.
  - Parameters 2 and 3 are TEXT types. Specify NULL.
  - Parameter 4 is a BOOLEAN type. Specify TRUE.

  If migrating from an Oracle database, the specified values for parameters 2, 3, and 4 do not need to be changed.
- Add a colon to the beginning of host variables in SQL statements.
- The DDL statement is executed when PARSE is issued. EXECUTE is not required for the DDL statement.
- If PARSE is called again for opened cursors, the content in the data regions within the cursors is reset, and the SQL statement is parsed anew.

Example

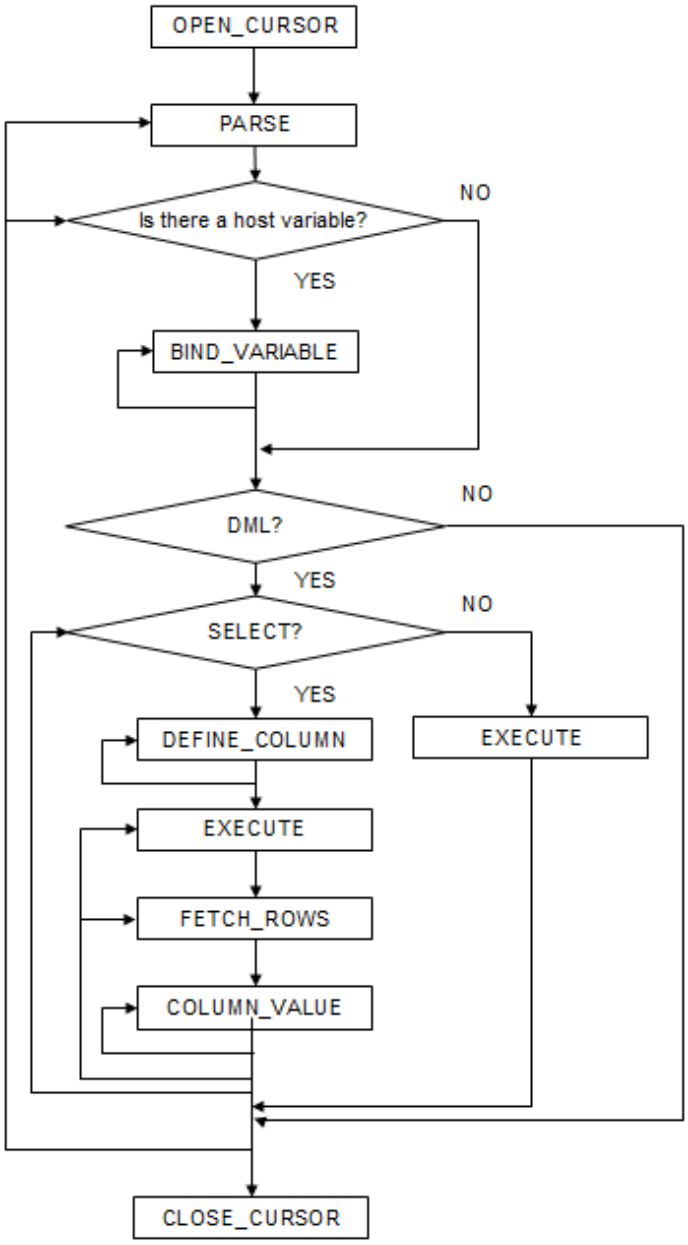
```
PERFORM DBMS_SQL.PARSE(cursor, 'SELECT memid, memnm FROM member WHERE memid = :NO', 1);
```

9.5.1.2 Example

This section explains the flow of DBMS_SQL and provides an example.

Flow of DBMS_SQL

Flow of DBMS_SQL



Example

```
CREATE FUNCTION smp_00()
RETURNS INTEGER
AS $$
DECLARE
    str_sql     VARCHAR(255);
    cursor      INTEGER;
    h_smpid     INTEGER;
    v_smpid     INTEGER;
    v_smpnm     VARCHAR(20);
    v_smpage    INTEGER;
    errcd       INTEGER;
    length      INTEGER;
    ret         INTEGER;
BEGIN
   str_sql    := 'SELECT smpid, smpnm, smpage FROM smp_tbl WHERE smpid < :H_SMPID ORDER BY
smpid';
    h_smpid     := 3;
    v_smpid     := 0;
    v_smpnm     := '';
    v_smpage    := 0;

    cursor := DBMS_SQL.OPEN_CURSOR();

    PERFORM DBMS_SQL.PARSE(cursor, str_sql, 1);

    PERFORM DBMS_SQL.BIND_VARIABLE(cursor, ':H_SMPID', h_smpid);

    PERFORM DBMS_SQL.DEFINE_COLUMN(cursor, 1, v_smpid);
    PERFORM DBMS_SQL.DEFINE_COLUMN(cursor, 2, v_smpnm, 10);
    PERFORM DBMS_SQL.DEFINE_COLUMN(cursor, 3, v_smpage);

    ret := DBMS_SQL.EXECUTE(cursor);
    loop
        if DBMS_SQL.FETCH_ROWS(cursor) = 0 then
            EXIT;
        end if;

        SELECT value,column_error,actual_length INTO v_smpid,errcd,length FROM
DBMS_SQL.COLUMN_VALUE(cursor, 1, v_smpid);
        RAISE NOTICE '------------------------------------------------------';
        RAISE NOTICE '------------------------------------------------------';
        RAISE NOTICE 'smpid       = %', v_smpid;
        RAISE NOTICE 'errcd       = %', errcd;
        RAISE NOTICE 'length      = %', length;

        SELECT value,column_error,actual_length INTO v_smpnm,errcd,length FROM
DBMS_SQL.COLUMN_VALUE(cursor, 2, v_smpnm);
        RAISE NOTICE '------------------------------------------------------';
        RAISE NOTICE 'smpnm       = %', v_smpnm;
        RAISE NOTICE 'errcd       = %', errcd;
        RAISE NOTICE 'length      = %', length;

        select value,column_error,actual_length INTO v_smpage,errcd,length FROM
DBMS_SQL.COLUMN_VALUE(cursor, 3, v_smpage);
        RAISE NOTICE '------------------------------------------------------';
        RAISE NOTICE 'smpage      = %', v_smpage;
        RAISE NOTICE 'errcd       = %', errcd;
        RAISE NOTICE 'length      = %', length;
        RAISE NOTICE '';
    end loop;
```

```
    cursor := DBMS_SQL.CLOSE_CURSOR(cursor);
    RETURN 0;
END;
$$ LANGUAGE plpgsql;
```

Chapter 10 Application Connection Switch Feature

The application connection switch feature enables automatic connection to the target server when there are multiple servers with redundant configurations.

When using this feature, specify the primary server and secondary server as the connected servers in the application connection information. A standby server can optionally be prioritized over the primary server as the target server.

If an application connection switch occurs, explicitly close the connection and then reestablish the connection or reexecute the application. Refer to "Errors when an Application Connection Switch Occurs and Corresponding Actions" of the relevant client interface for information on how to confirm the switch.

10.1 Connection Information for the Application Connection Switch Feature

To use the application connection switch feature, set the information shown below when connecting the database.

IP address or host name

Specify the IP address or host name that will be used to configure the database multiplexing system.

Port number

A port number used by each database server to listen for connections from applications.
In each client interface, multiple port numbers can be specified, however in the format shown below, for example:

host1,host2:port2

JDBC and .NET

If only one port number is specified, it will be assumed that host1: 27500 (the default value) and host2:port2 were specified.
Omit all port numbers, or specify only one per server.

Others

If only one port number is specified, it will be assumed that the same port is used for all the hosts.

Target server

From the specified connection destination server information, specify the selection sequence of the servers to which the application will connect. The values specified for the target server have the meanings shown below. If a value is omitted, "any" will be assumed.

Primary server

The primary server is selected as the connection target from the specified "IP addresses or host names". Specify this to perform tasks that can be performed only on the primary server, such as applications in line with updates, or management tasks such as REINDEX and VACUUM.

Standby server (this value can be used only when the JDBC or .NET Data Provider is used)

The standby server is selected as the connection target from the specified "IP addresses or host names". On standby server, the update will always fail. If the target server is not standby, the JDBC driver will throw an error stating that it is unable to find a server with the specified targetServerType.

Priority given to a standby server

The standby server is selected preferentially as the connection target from the specified "IP addresses or host names". If there is no standby server, the application will connect to the primary server.

Any

This method is not recommended in database multiplexing systems. This is because, although the connection destination server is selected in the specified sequence from the specified "IP addresses or host names", if the server that was successfully connected to first is the standby server, the write operations will always fail.

The table below shows the server selection order values to set for each driver:

Server selection order	JDBC drivers	.NET Data Provider	Other drivers
Primary server	"primary"	"primary"	"read-write"
Standby server	"secondary"	"standby"	-
Priority given to a standby server	"preferSecondary"	"preferStandby"	"prefer-read"
Any	"any"	"any"	"any"

SSL server certificate Common Name (CN)

To perform SSL authentication by creating the same server certificate for each server in a multiplexing system, specify the SSL server certificate Common Name (CN) in this parameter. Accordingly, SSL authentication using the CN can be performed without having to consider the names of the multiple servers contained in the multiplexing system.

10.2 Using the Application Connection Switch Feature

This section explains how to set the connection destination server using the application connection switch feature.

Of the parameters used as connection information for each client interface, only the parameters specific to the application connection switch feature are explained here. Refer to "Setup" and "Connecting to the Database" for information on the other parameters of each client interface.

10.2.1 Using the JDBC Driver

Set the following information in the connection string of the DriverManager class, or in the data source.

Table 10.1 Information to be set

Argument	Explanation
host1 host2	Specify the IP address or host name.
port1 port2	Specify the port number for the connection. The port number can be omitted. If omitted, the default is 27500.
database_name	Specify the database name.
targetServerType	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
sslmode	Specify this to encrypt communications. By default, this is disabled. The setting values for sslmode are as follows: disable: Connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
sslservercertcn	This parameter is enabled only to perform SSL authentication (sslmode=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in host.

*1: If specifying either "verify-ca" or "verify-full", the CA certificate file can be specified using connection string sslrootcert.

When using Driver Manager

Specify the following URL in the API of the DriverManager class:

```
jdbc:postgresql://host1[:port1],host2[:port2]/dbName[?targetServerType={primary |
secondary| preferSecondary | any}][&sslmode=verify-
full&sslrootcert=cACertificateFile&sslservercertcn=targetServerCertificateCN]
```

- If the target server is omitted, the default value "any" is used.
- When using IPV6, specify the host in the "[*host*]" (with square brackets) format.

  [Example]

```
jdbc:postgresql://[2001:Db8::1234]:27500,192.168.1.1:27500/dbName
```

When using the data source

Specify the properties of the data source in the following format:

```
source.setServerName("host1[:port1],host2[:port2]");
source.setTargetServerType("primary");
source.setSslmode("verify-full");
source.setSslrootcert("cACertificateFile");
source.setSslservercertcn("targetServerCertificateCN");
```

- If the port number is omitted, the value specified in the portNumber property will be used. Also, if the portNumber property is omitted, the default is 27500.
- If the target server is omitted, the value will be "any".
- When using IPV6, specify the host in the "[*host*]" (with square brackets) format.

  [Example]

```
source.setServerName("[2001:Db8::1234]:27500,192.168.1.1:27500");
```

If using the connection parameter loginTimeout, the value will be applied for the time taken attempting to connect to all of the specified hosts.

10.2.2 Using the ODBC Driver

Set the following information in the connection string or data source.

Table 10.2 Information to be set

Parameter	Explanation
Servername	Specify IP address 1 and IP address 2, or the host name, using a comma as the delimiter. Based on ODBC rules, it is recommended to enclose the whole string containing comma delimiters with {}. Format: {host1,host2}
Port	Specify the connection destination port numbers, using a comma as the delimiter. Based on ODBC rules, it is recommended to enclose the whole string containing comma delimiters with {}. Format: {port1,port2}

Parameter	Explanation
	Specify the port number corresponding to the IP address or host specified for the nth Servername as the nth Port. The port number can be omitted. If omitted, the default is 27500. If *n* server names are specified, and m ports are specified then there will be error reported. The only exceptions are where m=n or m=1. In case only one port is specified, then the same is applied for all the hosts.
target_session_attrs	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
SSLMode	Specify this to encrypt communications. By default, this is disabled. The setting values for SSLMode are as follows: disable: Connect without SSL allow: Connect without SSL, and if it fails, connect with SSL prefer: Connect with SSL, and if it fails, connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
SSLServerCertCN	This parameter is enabled only to perform SSL authentication (SSLMode=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in Servername.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT of your operating system to specify the CA certificate file as shown below.

Example)
Variable name: PGSSLROOTCERT
Variable value: *cACertificateFile*

When specifying a connection string

Specify the following connection string:

```
...;Servername={host1,host2};Port={port1,port2};[target_session_attrs={read-write |
prefer-read | any}];[ SSLMode=verify-full;SSLServerCertCN=targetServerCertificateCN]...
```

- When using IPV6, specify the host in the "*host*" format.

  [Example]

```
Servername={2001:Db8::1234,192.168.1.1};Port={27500,27500};
```

When using the data source

Specify the properties of the data source in the following format:

```
Servername={host1,host2}
Port={port1,port2}
target_session_attrs={read-write | prefer-read | any }
SSLMode=verify-full
SSLServerCertCN=targetServerCertificateCN
```

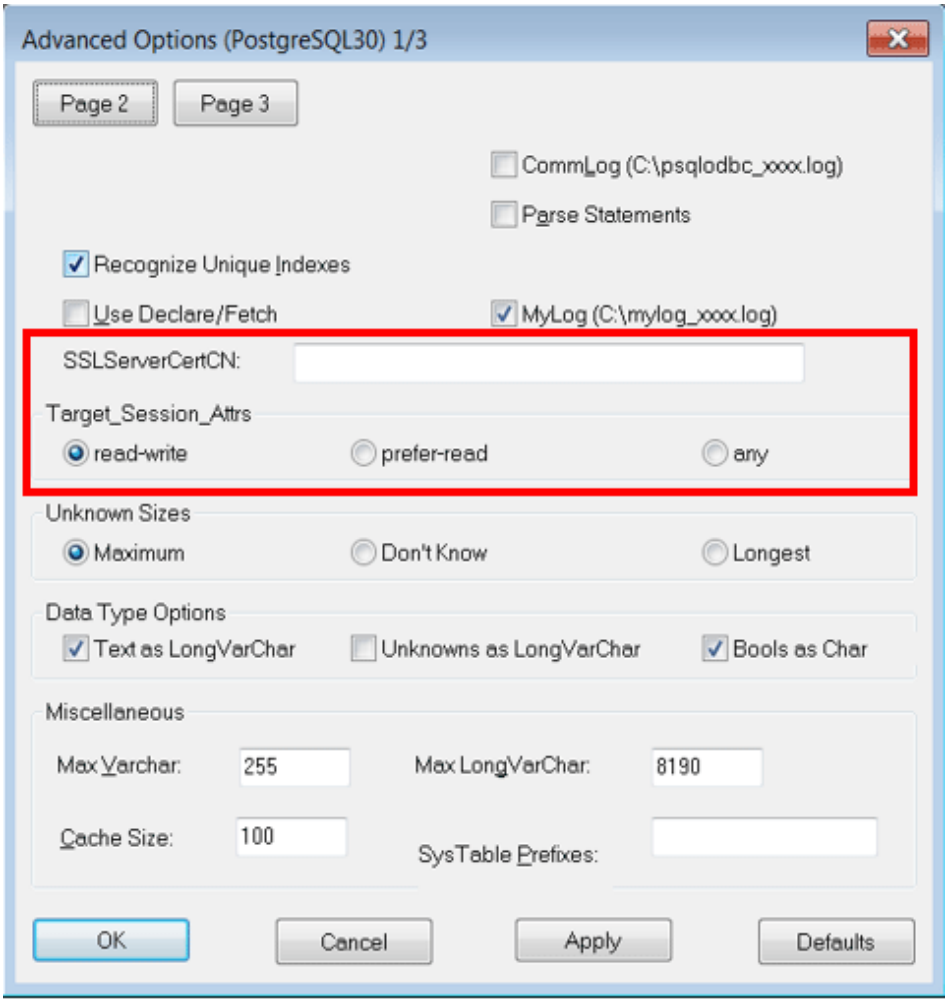
- When using IPV6, specify the host in the "*host*" format.

  [Example]

```
Servername={2001:Db8::1234,192.168.1.1}
```

Registering the data source using the ODBC Data Source Administrator

Using the ODBC Data Source Administrator, specify the items within the red border below:



Note

If using the connection parameter login_timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the login_timeout value elapses.

10.2.3 Using a .NET Data Provider

Set the following information in the connection string of NpgsqlConnection, or in the data source.

Table 10.3 Information to be set

Argument	Explanation
host1 host2	Specify the IP address or host name.
port1 port2	Specify the port number for the connection.
TargetServerType	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.

When specifying a connection string

Specify the following connection string:

```
host1[:port1],host2[:port2];[TargetServerType={TargetServerType.primary |
TargetServerType.preferStandby | TargetServerType.any}];
```

- If the port number is omitted from the host string, the value specified for the Port keyword of the connection string will be used. Refer to "4.3.4 Connection String" for information on the Port keyword.
- When using IPV6, specify the host in the "[*host*]" (with square brackets) format.
- If the target server type is omitted, the value will be any.

  [Example]

```
host=[2001:Db8::1234]:27500,192.168.1.1:27500;
```

When specifying the NpgsqlConnectionStringBuilder property, or adding a connection in TableAdapter

Specify the Host property of the data source in the following format:

```
host1[:port1],host2[:port2]
```

- If the port number is omitted from the host string, the value specified in the Port property will be used. Also, if the Port property is omitted, the default is 27500.

Specify the TargetServerType property of the data source in the following format:

```
TargetServerType.primary | TargetServerType.preferStandby | TargetServerType.any
```

- If the target server type is omitted, the value will be any.

Note

If using the connection parameter Timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the Timeout value elapses.

10.2.4 Using a Connection Service File

Set the connection parameters as follows.

Table 10.4 Information to be set

Parameter	Explanation
host	Specify the host names, using a comma as the delimiter.
hostaddr	Specify IP address 1 and IP address 2, using a comma as the delimiter.

Parameter	Explanation
port	Specify the connection destination port numbers, using a comma as the delimiter. Specify the port number for the server specified for the nth host or hostaddr as the nth port. The port number can be omitted. If omitted, the default is 27500. If *n* server names are specified, and m ports are specified then there will be error reported. The only exceptions are where m=n or m=1. In case only one port is specified, then the same is applied for all the hosts.
target_session_attrs	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
sslmode	Specify this to encrypt communications. By default, this is disabled. The setting values for sslmode are as follows: disable: Connect without SSL allow: Connect without SSL, and if it fails, connect with SSL prefer: Connect with SSL, and if it fails, connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
sslservercertcn	This parameter is enabled only to perform SSL authentication (sslmode=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in host.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT (connection parameter sslrootcert) of your operating system to specify the CA certificate file as shown below.

Example)
Variable name: PGSSLROOTCERT
Variable value: *cACertificateFile*

Note

If using the connection parameter connect_timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the connect_timeout value elapses.

Point

If using the C Library, embedded SQL or psql commands (including other client commands that specify connection destinations), it is recommended to use a connection service file to specify connection destinations.

In the connection service file, a name (service name) is defined as a set, comprising information such as connection destination information and various types of tuning information set for connections. By using the service name defined in the connection service file when connecting to databases, it is no longer necessary to modify applications when the connection information changes.

10.2.5 Using the C Library (libpq)

It is recommended that you use a connection service file. Refer to "10.2.4 Using a Connection Service File" for details.

If a connection service file will not be used, set the following information for the database connection control functions (PQconnectdbParams, PQconnectdb, and so on) or environment variables.

Table 10.5 Information to be set

Parameter (environment variable name)	Explanation
host(PGHOST)	Specify the host names, using a comma as the delimiter.
hostaddr(PGHOSTADDR)	Specify IP address 1 and IP address 2, using a comma as the delimiter.
port(PGPORT)	Specify the connection destination port numbers, using a comma as the delimiter. Specify the port number for the server specified for the nth host or hostaddr as the nth port. The port number can be omitted. If omitted, the default is 27500. If *n* server names are specified, and m ports are specified then there will be error reported. The only exceptions are where m=n or m=1. In case only one port is specified, then the same is applied for all the hosts.
target_session_attrs(PGTARGETSESSIONATTRS)	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
sslmode(PGSSLMODE)	Specify this to encrypt communications. By default, this is disabled. The setting values for sslmode are as follows: disable: Connect without SSL allow: Connect without SSL, and if it fails, connect with SSL prefer: Connect with SSL, and if it fails, connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
sslservercertcn(PGXSSLSERVERCERTCN)	This parameter is enabled only to perform SSL authentication (sslmode=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in host.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT (connection parameter sslrootcert) of your operating system to specify the CA certificate file as shown below.

Example)
Variable name: PGSSLROOTCERT
Variable value: *cACertificateFile*

When using URI

```
postgresql://host1[:port1],host2[:port2][,...]/database_name
[?target_session_attrs={read-write | prefer-read | any }]
```

- When using IPV6, specify the host in the "[*host*]" (with square brackets) format.

  [Example]

```
postgresql://postgres@[2001:Db8::1234]:27500,192.168.1.1:27500/database_name
```

When using key-value

```
host=host1[,host2] port=port1[,port2] user=user1 password=pwd1 dbname=mydb
[target_session_attrs={read-write| prefer-read | any }]
```

- When using IPV6, specify the host in the "*host*" format.

  [Example]

```
host=2001:Db8::1234,192.168.1.1 port=27500,27500
```

Note

If using the connection parameter connect_timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the connect_timeout value elapses.

Information

If using a password file (.pgpass), describe the entries matching each server.

- Example 1:

```
host1:port1:dbname:user:password
host2:port2:dbname:user:password
```

- Example 2:

```
*:port:dbname:user:password
```

10.2.6 Using Embedded SQL

It is recommended that you use a connection service file. Refer to "10.2.4 Using a Connection Service File" for details.

Point

If using a connection service file, either of the following methods is available:

- Set the service name as a string literal or host variable, as follows:

  tcp:postgresql://?service=my_service

- Set the service name in the environment variable PGSERVICE, and use CONNECT TO DEFAULT

If a connection service file will not be used, use a literal or variable to specify the connection destination server information for target in the SQL statement below:

```
EXEC SQL CONNECT TO target [AS connection-name] [USER user-name];
```

Method used

```
dbname@host1,host2[:[port1][,port2]]
tcp:postgresql://host1,host2[:[port1][,port2]] [/dbname] [?target_session_attrs={read-
write | prefer-read | any}][&sslmode=verify-
full&sslservercertcn=targetServerCertificateCN]
```

- The above format cannot be specified directly without using a literal or variable.

Table 10.6 Information to be set

Argument	Explanation
host1 host2	Specify the IP address or host name. IPv6 format addresses cannot be specified.
port1 port2	Specify the connection destination port numbers, using a comma as the delimiter. The port number can be omitted. If omitted, the default is 27500.
dbname	Specify the database name.
target_session_attrs	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
sslmode	Specify this to encrypt communications. By default, this is disabled. The setting values for sslmode are as follows: disable: Connect without SSL allow: Connect without SSL, and if it fails, connect with SSL prefer: Connect with SSL, and if it fails, connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
sslservercertcn	This parameter is enabled only to perform SSL authentication (sslmode=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in host.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT (connection parameter sslrootcert) of your operating system to specify the CA certificate file as shown below.

Example)
Variable name: PGSSLROOTCERT
Variable value: *cACertificateFile*

Point

Environment variables can also be used. Refer to "10.2.5 Using the C Library (libpq)" for information on environment variables.

Note

If using the connection parameter connect_timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the connect_timeout value elapses.

10.2.7 Using the psql Command

It is recommended that you use a connection service file. Refer to "10.2.4 Using a Connection Service File" for details.

If a connection service file will not be used, specify the following information in the psql command option/environment variable.

Table 10.7 Information to be set

Option (environment variable)	Explanation
-h/--host(PGHOST/ PGHOSTADDR)	Specify IP address 1 and IP address 2, or the host name, using a comma as the delimiter. This can also be specified for the environment variable PGHOST or PGHOSTADDR.
-p/--port(PGPORT)	Specify the connection destination port numbers, using a comma as the delimiter. This can also be specified for the environment variable PGPORT. Specify the port number corresponding to the IP address specified for the nth -h option as the nth -p option. The port number can be omitted. If omitted, the default is 27500. If *n* -h options are specified, and m -p options are specified then there will be error reported. The only exception is where m=n or m=1. In case only one port is specified, then the same is applied for all the hosts.
(PGTARGETSESSIONATTRS)	Specify the selection sequence of the servers to which the application will connect. Refer to "Target server" for details.
(PGSSLMODE)	Specify this to encrypt communications. By default, this is disabled. The setting values for PGSSLMODE are as follows: disable: Connect without SSL allow: Connect without SSL, and if it fails, connect with SSL prefer: Connect with SSL, and if it fails, connect without SSL require: Connect always with SSL verify-ca: Connect with SSL, using a certificate issued by a trusted CA (*1) verify-full: Connect with SSL, using a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
(PGXSSLSERVERCERTCN)	This environment variable is enabled only to perform SSL authentication (PGSSLMODE=verify-full). Specify the server certificate CN. If this is omitted, the value will be null, and the server certificate CN will be authenticated using the host name specified in host.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT (connection parameter sslrootcert) of your operating system to specify the CA certificate file as shown below.

Example)
Variable name: PGSSLROOTCERT
Variable value: *cACertificateFile*

Note

If using the connection parameter connect_timeout, this value is applied for connections to each of the specified hosts. If both multiplexed database servers have failed, the connection will time out when a time equal to double the connect_timeout value elapses.

Information

Use the same method as for psql commands to specify connection destination server information for other client commands used to specify connection destinations.

Chapter 11 Performance Tuning

This chapter explains how to tune application performance.

11.1 Enhanced Query Plan Stability

FUJITSU Enterprise Postgres estimates the cost of query plans based on SQL statements and database statistical information, and selects the least expensive query plan. However, like other databases, FUJITSU Enterprise Postgres does not necessarily select the most suitable query plan. For example, it may suddenly select unsuitable query plan due to changes in the data conditions.

In mission-critical systems, stable performance is more important than improved performance, and changes in query plans case to be avoided. In this situation, by stabilizing the SQL statement query plan so that it does not change, deterioration of the application performance is suppressed.

11.1.1 Optimizer Hints

This section explains the basic feature content of the optimizer hint (pg_hint_plan).

Refer to the open-source software webpage for information on pg_hint_plan.

In FUJITSU Enterprise Postgres, the optimizer hints can be specified in all application interfaces.

Description

You can specify a query plan in each SQL statement.

List of Features

The main query plans that can be specified using this feature are as follows:

- Query methods
- Join methods
- Join sequences

Query methods

Specify which method to use to query the specified table.

The main features are as follows:

- SeqScan (*tableName*)
- BitMapScan (*tableName* [*indexName* ...])
- IndexScan (*tableName* [*indexName* ...])
- IndexOnlyScan (*tableName* [*indexName* ...])

Note

- If the specified index does not exist, or is not related to the search condition column specified in the WHERE clause, for example, SeqScan will be used.
- Even if IndexOnlyScan is specified, IndexScan may be used if it is necessary to access the table because a row was updated, for example.
- If multiple query methods were specified for the same table, the method specified last will be used.

Join methods

Specify the join method.

The main features are as follows:

- NestLoop (*tableName tableName* [*tableName* ...])
- MergeJoin (*tableName tableName* [*tableName* ...])
- HashJoin (*tableName tableName* [*tableName* ...])

- These cannot be specified for view tables and subqueries.
- If multiple methods were specified for the same table combination, the method specified last will be used.

Join sequences

The tables will be joined in the specified table sequence.

Specify the information using the following method:

- Leading ((*table table*))

  The method used to specify [*table*] is as follows:

  table = *tableName* or (*table table*)

If multiple sequences were specified for the same table combination, the sequence specified last will be used.

Usage method

The use of this feature is explained below.

Method used to define this feature

Define this feature by specifying the format (block comment) " /*+ ... */".

- To specify hint clauses in each SELECT statement, for example when there are multiple SELECT statements in the SQL statement, define all hint clauses in the first block comment.

Specifying hint clauses for the emp table and the dept table

```
WITH /*+ IndexScan(emp emp_age_index) IndexScan(dept dept_deptno_index) */ age30
AS (SELECT * FROM emp WHERE age BETWEEN 30 AND 39)
SELECT * FROM age30, dept WHERE age30.deptno = dept.deptno;
```

- To specify separate hint clauses for the same object in the SQL statement, define aliases in each object, and then specify hint clauses for those aliases.

Specifying separate hint clauses for the emp table

```
WITH /*+ SeqScan(ta) IndexScan(tb) */ over100
AS (SELECT empno FROM emp ta WHERE salary > 1000000)
SELECT * FROM emp tb, over100 WHERE tb.empno = over100.empno AND tb.age < 30
```

- When using embedded SQL in C, the locations in which the hint clause block comment is specified are restricted. Refer to "6.4.2 Compiling Applications" for details.

Usage notes

- If a hint clause was specified in multiple block comments in the SQL statement, the hint clause specified in the second block comment and thereafter will be ignored.
- If characters other than those listed below appear before the hint clause in the SQL statement, they will be invalid even for hint clause block comments.
  - Space, tab, line feed
  - Letter (uppercase and lowercase), number
  - Underscore, comma
  - Brackets ()

11.1.2 Locked Statistics

This section explains the basic feature content for locked statistics (pg_dbms_stats).

Refer to the open-source software webpage for information on pg_dbms_stats.

Description

Locks the statistics.

By using this feature to lock the statistics for performance obtained in job load testing in an environment that simulates a production environment, performance degradation caused by changes to the query plan after go-live can be suppressed.

Additionally, by using the export and import features, statistics that were checked in the test environment can also be reproduced in the production environment.

List of Features

The main features that can be specified using this feature are as follows.

[Features]

Feature	Details	Description
Lock/unlock of the statistics	Lock	Locks the statistics so that the currently selected query plan remains selected.
	Unlock	Unlocks the statistics.
Backup/restore of the statistics	Backup	Backs up the current statistics.
	Restore	Restores the statistics to the point when they were backed up, and then locks them.
	Purge	Deletes backups that are no longer necessary.
Backup/restore using external files	Export	Outputs the current statistics to an external file (binary format).
	Import	Reads the statistics from an external file created by the export feature, and then locks them.

[Target object]

Target resource	Range of feature
Database	In the database
Schema	In the schema
Table	In the table
Column	ID column

Usage method

The use of this feature is explained below.

Method used to specify this feature

Specify this feature as an SQL function.

The methods used to specify the main features are shown in the table below.

Feature	Object	Function specified
Lock	Database	dbms_stats.lock_database_stats()
	Schema	dbms_stats.lock_schema_stats('*schemaName*')
	Table	dbms_stats.lock_table_stats('*schemaName.tableName*')
Unlock	Database	dbms_stats.unlock_database_stats()
	Schema	dbms_stats.unlock_schema_stats('*schemaName*')
	Table	dbms_stats.unlock_table_stats('*schemaName.tableName*')
Import	Database	dbms_stats.import_database_stats('*fullPathOfExportedFile*')
Backup	Database	dbms_stats.backup_database_stats('*commentUsedForIdentification*')
Restore	Database	[Format 1] dbms_stats.restore_database_stats('*timestamp*') [Timestamp] Specify in the same format as the time column of the backup_history table. Backups earlier than the specified time will be restored. [Format 2] dbms_stats.restore_stats(*backupId*) [Backup ID] Specify a value in the id column of the backup_history table. The specified backup will be restored.
Purge	Backup	dbms_stats.purge_stats(*backupId,flagUsedForDeletion*) [Backup ID] Specify a value in the id column of the backup_history table. [Flag used for deletion] true: The target backup is forcibly deleted. false: The target backup is deleted only when there are also backups for the entire database.

Remark 1: The export feature is executed using the COPY statement, not the SQL function.

Example

Example 1: Locking the statistics of the entire database

```
userdb=# SELECT dbms_stats.lock_database_stats();
  lock_database_stats
----------------------
  tbl1
  tbl1_pkey
```

Note that the locked information can be referenced as follows:

```
userdb=# select relname  from dbms_stats.relation_stats_locked;
  relname
----------------------
  tbl1
  tbl1_pkey
```

Example 2: Unlocking the statistics of the entire database

```
userdb=# SELECT dbms_stats.unlock_database_stats();
  unlock_database_stats
----------------------
  tbl1
  tbl1_pkey
```

Example 3: Backing up the statistics of the entire database

```
userdb=# SELECT dbms_stats.backup_database_stats('backup1');
  backup_database_stats
----------------------
                      1
```

Note that the backed up statistics can be referenced as follows:

```
userdb=# select id,comment,time,unit from dbms_stats.backup_history;
  id | comment  |             time              | unit
 ----+----------+-------------------------------+------
   1 | backup1  | 2014-03-04 11:08:40.315948+09 | d
```

The ID:1 backup "backup1" is obtained for each database at "2014-03-04 11:08:40.315948+09".
[Meaning of unit] d: database s: schema t: table c: column

Example 4: Exporting the statistics of the entire database

```
$ psql -d userdb -f export.sql
BEGIN
COMMIT
```

export.sql is the file in which the COPY statement is defined.
Refer to "export_effective_stats-<*x*>.sql_sample" for information on the content of the COPY statement. "<*x*>" indicates the product version.

"export_effective_stats-<*x*>.sql_sample" is stored as follows:
fujitsuEnterprisePostgresInstallDir/share/doc/extension

Example 5: Importing the statistics of the entire database

```
$ psql -d userdb -c  "SELECT dbms_stats.import_database_stats ('$PWD/
export_stats.dmp')"
 import_database_stats
-----------------------

(1 row)
```

Usage notes

- You must run the ANALYZE command once for the target tables of this feature. If the ANALYZE command is not run, the statistics cannot be locked.
  Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the ANALYZE command.
- To use this feature to delete an object that has locked the statistics, use the unlock feature to delete the object lock information first.
- This feature does not specify the statistics value directly. It reproduces the status that has actually occurred. For this reason, if the text format is specified in the COPY statement when the export occurs, restore will not be possible. Always use the binary format when performing the export.

Chapter 12 Scan Using a Vertical Clustered Index (VCI)

This chapter describes scanning using a VCI.

Note

This feature can only be used in Advanced Edition.

12.1 Operating Conditions

Faster aggregation can be achieved by using a VCI defined for all columns to be referenced.

This section describes the conditions under which a scan can use a VCI.

Whether to use VCI is determined based on cost estimation in the same way as normal indexes. Therefore, another execution plan will be selected if it is cheaper than a VCI even if a VCI is available.

SQL statements that can use VCIs

In addition to general SELECT statements, VCIs can be used for the SQL statements below (as long as they do not specify any of the elements listed in "SQL statements that cannot use VCIs" below):

- SELECT INTO
- CREATE TABLE AS SELECT
- CREATE MATERIALIZED VIEW ... AS SELECT
- CREATE VIEW ... AS SELECT
- COPY (SELECT ...) TO

SQL statements that cannot use VCIs

VCIs cannot be used for SQL statements that specify any of the following:

- Subquery to reference the column in which the parent query is referencing is specified
- Lock clause (such as FOR UPDATE)
- Cursor declared with WITH HOLD or scrollable
- SERIALIZABLE transaction isolation level
- Function or operator listed in "Functions and operators that do not use a VCI"
- User-defined function

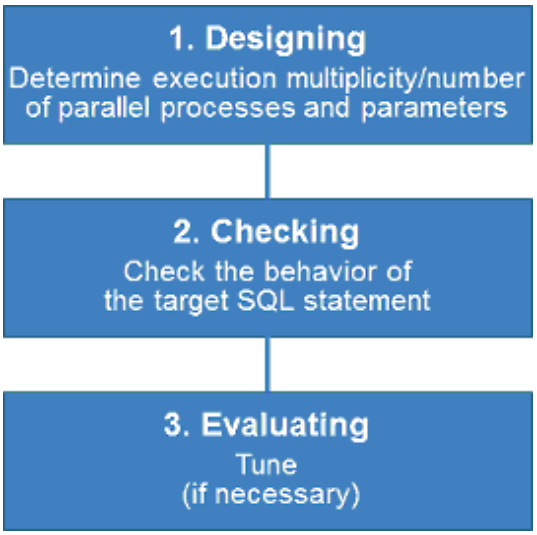
Table 12.1 Functions and operators that cannot use VCIs

Classification		Function/operator
Mathematical functions and operators	Random functions	random and setseed
String functions and operators	String functions	format (if the *format* argument is specified), regexp_matches, regexp_split_to_array and regexp_split_to_table
Date/time functions and operators	Date/time functions	age(timestamp), current_date, current_time, current_timestamp, localtime, localtimestamp, statement_timestamp and transaction_timestamp
	Delaying execution functions	pg_sleep, pg_sleep_for, and pg_sleep_until

Classification		Function/operator
Enum support functions		All functions and operators
Geometric functions and operators		All functions and operators
Network address functions and operators		All functions and operators
Text search functions and operators		All functions and operators
XML functions		All functions
JSON functions and operators		All functions and operators
Sequence manipulation functions		All functions
Array functions and operators		All functions and operators
Range functions and operators		All functions and operators
Aggregate functions	General-purpose aggregate functions	array_agg, json_agg, json_object_agg, string_agg and xmlagg
	Aggregate functions for statistics	corr, covar_pop, covar_samp, regr_avgx, regr_avgy, regr_count, regr_intercept, regr_r2, regr_slope, regr_sxx, regr_sxy and regr_syy
	Ordered-set aggregate functions	All functions
	Hypothetical-set aggregate functions	All functions
Window functions		All functions
Subquery expressions		Subquery expressions with its row constructor specified on the left side
Row and array comparisons		Row constructor and composite type comparisons
Set returning functions		All functions
System information functions		All functions
System administration functions		All functions
Trigger functions		All functions
Session information functions		current_role and current_user

12.2 Usage

This section describes how to use a VCI in line with the following steps:



12.2.1 Designing

Design as follows before using a VCI.

- Execution multiplicity and number of parallel processes
- Parameters

Execution multiplicity and number of parallel processes

Determine the maximum number of SQL statements that can be executed simultaneously and the number of parallel processes based on the number of CPU cores that can be allocated for scans that use VCI to perform aggregate processing. Design in advance the multiplicity of SQL statements for executing scans that use VCI and the number of parallel processes for scans that use VCI.

For example, if the number of CPUs that can be allocated is 32 cores, then the maximum number of SQL statements that can be executed simultaneously is 8 and the number of parallel processes is 4.

Note

L

A temporary file is created in /dev/shm or in a directory specified for the vci.smc_directory parameter as the dynamic shared memory for each SQL statement during a scan using a VCI.

W

A temporary file is created in a directory under the data storage directory or in a directory specified for the vci.smc_directory parameter as the dynamic shared memory for each SQL statement during a scan using a VCI.

Ensure that this directory has sufficient space to meet the memory requirements estimated for the execution multiplicity and number of parallel processes of SQL statements (refer to "Memory used per scanning" in "VCI Memory Requirements" in the Installation and Setup Guide for Server for details). If it does not have sufficient space when a scan is performed, SQL statements will return errors due to the insufficient memory.

Parameters

The VCI parallel scan feature cannot be used for setting parameters immediately after creating an instance.

Therefore, set the parameters below based on the values determined in "Execution multiplicity and number of parallel processes of SQL statements" above.

Parameter name	Description	Default	Value index
vci.max_parallel_degree	Maximum number of VCI parallel processes	0	Specify the number of parallel processes.

Parameter name	Description	Default	Value index
	(background processes) to be used per SQL statement.		
vci.smc_directory	Directory name in which a temporary file is created as the dynamic shared memory during a scan using a VCI.	L /dev/shm W A directory (*dataStorageDir*\\base\\pgsql_tmp) under the data storage directory	Specify a directory that has enough free space for the memory used for each query during the scan.
max_worker_processes	Maximum number of background processes that the system supports.	8	Add the value of the maximum number of SQL statements that can be executed simultaneously for scans that use VCI multiplied by vci.max_parallel_degree.

See

Refer to "Parameters" in the Operation Guide for information on the details of and how to set the parameters.

12.2.2 Checking

Execute the SQL statement with "EXPLAIN ANALYZE" to check the following:

- If a VCI was used
  "Custom Scan (VCI...)" is displayed in the plan if a VCI was used.
- Number of parallel processes
  The number of parallel processes when the SQL statement is executed is displayed in "Allocated Workers". Check that it is running the designed number of parallel processes.
- Response
  Check if the execution time displayed in "Execution time" is as estimated.

The following shows an example of the output result of EXPLAIN ANALYZE:

```
EXPLAIN ANALYZE SELECT COUNT(*) FROM test WHERE x > 10000;
                                                    QUERY
PLAN
-------------------------------------------------------------------------------------------------
------------------------
Custom Scan (VCI Aggregate)  (cost=19403.15..19403.16 rows=1 width=0) (actual
time=58.505..58.506 rows=1 loops=1)
       Allocated Workers: 4
   ->  Custom Scan (VCI Scan) using test_x_idx on test (cost=0.00..16925.00 rows=991261
width=0) (never executed)
         Filter: (x > 10000)
Planning time: 0.151 ms
Execution time: 86.910 ms
(6 rows)
```

Note

A cost output by the execution plan that uses a VCI may be inaccurate. A VCI works if all or part of the best execution plan when the SQL statement was executed is replaced with an execution plan that uses a VCI. If the cost of the execution plan to be replaced is lower than a certain value (vci.cost_threshold parameter), it will not be replaced or recalculated. Therefore, the cost of the original execution plan is output as is.

12.2.3 Evaluating

If the results in "12.2.2 Checking" is any of the following, tune accordingly:

If a VCI is not used

- Check if the "12.1 Operating Conditions" are met.
- Check if vci.enable is set to "on".
- A VCI may not be appropriately used when statistics are outdated, such as immediately after inserting a large amount of data. In such cases, execute the VACUUM ANALYZE statement or the ANALYZE statement.
- A VCI is not used if there is insufficient memory for VCI scan. This may occur during time-consuming transactions involving tables for which VCIs were defined. Set vci.log_query to "on", and check if either "could not use VCI: local ROS size (%zu) exceeds limit (%zu)" or "out of memory during local ROS generation" is output. If it is, then increase the value of the vci.max_local_ros.

Response is not as expected

Tuning may improve response. Check the following:

- If vci.max_parallel_degree is not set or is set to 0, set an appropriate value according to "12.2.1 Designing".
- If there is a margin in the CPU usage, increase the value of vci.max_parallel_degree and check again. In addition, if the value that of max_worker_processes is lower than the maximum number of SQL statements that can be executed simultaneously for parallel scan multiplied by vci.max_parallel_degree, increase it and check again.

12.3 Usage Notes

This section provides notes on using VCI.

- Regardless of whether VCI is used, the content of the result does not change. However, records may be returned in a different order if the ORDER BY clause is not specified.
- To reduce resource consumption, edit postgresql.conf or use the SET statement to enable/disable vci.enable when you use this feature only for specific times or jobs (SQL applications).
- The optimizer hint (pg_hint_plan) cannot be specified for a VCI. The hint clause is ignored if it is specified.
- If a plan other than VCI is specified for the optimizer hint (pg_hint_plan), a VCI may be used. Therefore, if you specify a query plan with the hint clause, use the SET statement to set vci.enable to "off".
- The message below may be output when a scan that uses VCI is performed on the streaming replication standby server:

```
"LOG: recovery has paused"
"HINT: Execute pg_wal_replay_resume() to continue."
```

  This message is output because application of the WAL to the VCI temporarily pauses due to the scan being performed.

- Even if a scan is performed using a VCI, information in the idx_scan, idx_tup_read, and idx_tup_fetch columns of the collected statistics views, pg_stat_all_indexes and pg_stat_user_indexes, will not be updated.

- Currently, it is not possible to replace the query plan for parallel aggregation with the query plan using VCI. Therefore, if you create a VCI on a column of a partition table and aggregate (sum () etc.) on that column, one of the following plans will be selected. Use different setting parameters according to the situation of the target table.

  - Plan of the parallel aggregations using scan methods other than VCI scan

    It is selected when max_parallel_workers_per_gather is 1 or more.

```
explain select sum(value) from test;
                                          QUERY PLAN
-----------------------------------------------------------------------------------------
 Finalize Aggregate  (cost=99906.30..99906.31 rows=1 width=8)
   ->  Gather  (cost=99906.08..99906.29 rows=2 width=8)
         Workers Planned: 2
         ->  Partial Aggregate  (cost=98906.08..98906.09 rows=1 width=8)
               ->  Parallel Append  (cost=0.00..94739.83 rows=1666500 width=4)
                   ->  Parallel Seq Scan on test_1  (cost=0.00..43203.67 rows=833250
width=4)
                   ->  Parallel Seq Scan on test_2  (cost=0.00..43203.67 rows=833250
width=4)
```

    This plan is fast when the number of records to be aggregated (number of records that hit the search conditions) is very large. This is because the benefit of parallelizing aggregation is important, not the performance of scanning. For example, each parallel worker will perform a sequential scan and aggregate most of the scanned records.

  - Plan that aggregates VCI scan results by a single aggregator node

    It is selected by setting max_parallel_workers_per_gather to 0 and not creating a query plan of parallel aggregate.

```
explain select sum(value) from test;
                                       QUERY PLAN
-----------------------------------------------------------------------------------------
 Aggregate  (cost=145571.00..145571.01 rows=1 width=8)
   ->  Append  (cost=0.00..135572.00 rows=3999600 width=4)
         ->  Custom Scan (VCI Scan) using test_1_id_value_idx on test_1
(cost=0.00..57787.00 rows=1999800 width=4)
               Allocated Workers: 2
         ->  Custom Scan (VCI Scan) using test_2_id_value_idx on test_2
(cost=0.00..57787.00 rows=1999800 width=4)
               Allocated Workers: 2
```

    This plan is fast when the number of aggregated items is not large or when the size of the aggregated column is smaller than the record size. This is because the scan performance is more important, so it is faster to aggregate the results of VCI scans of each partition.

- Originally, if there is only one partition to be accessed, the following VCI aggregation plan can be used. Below is an example of scanning only one partition with partition pruning.

```
explain select sum(value) from test where id < 1000001;
                                       QUERY PLAN
-----------------------------------------------------------------------------------------
 Custom Scan (VCI Aggregate)  (cost=62786.50..62786.51 rows=1 width=8)
   Allocated Workers: 2
   ->  Custom Scan (VCI Scan) using test_1_id_value_idx on test_1  (cost=0.00..57787.00
rows=1999800 width=4)
         Filter: (id < 1000001)
```

  However, the current planner does not try to choose VCI aggregation because it creates a plan for parallel aggregation if the table is partitioned. So in this case, set max_parallel_workers_per_gather to 0 to force the planner to choose VCI aggregation.

Appendix A Precautions when Developing Applications

This appendix describes precautions when developing applications with FUJITSU Enterprise Postgres.

A.1 Precautions when Using Functions and Operators

This section describes notes for using functions and operators.

A.1.1 General rules of Functions and Operators

This section describes general rules for using functions and operators. Ensure the general rules are followed when using functions and operators to develop applications.

General rules

- Specify the stated numbers for arguments when specifying numbers for arguments in functions.
- Specify the stated data types when specifying data types for functions. If you use a data type other than the stated data types, use CAST to explicitly convert the data type.
- Specify data types that can be compared when specifying data types for operators. If you use a data type that cannot be compared, use CAST to explicitly convert the data type.

See

Refer to "Functions and Operators" under "The SQL Language" in the PostgreSQL Documentation for information on the functions and operators available with FUJITSU Enterprise Postgres.

A.1.2 Errors when Developing Applications that Use Functions and/or Operators

This section provides examples of problems that may occur when developing applications that use functions and/or operators, and describes how to deal with them.

The error "Function ***** does not exist" occurs when executing SQL

The following error will occur when executing an SQL statement that does not abide by the general rules for functions:

```
ERROR:  Function ****** does not exist
```

Note: "*****" denotes the function for which the error occurred, and the data type of its arguments.

The cause of the error will be one of the following:

- The specified function does not exist.
- The wrong number of arguments or wrong argument data type was specified

Corrective action

Check the following points and correct any errors:

- Check if there are any errors in the specified function name, number of arguments, or argument data type, and revise accordingly.
- Check the argument data type of the function displayed in the message. If an unintended data type is displayed, use a function such as CAST to convert it.

The error "Operator does not exist" occurs when executing SQL

The following error will occur when executing an SQL statement that specifies a data type in the operator that cannot be compared:

```
ERROR:  Operator does not exist: *****
```

Note: "*****" denotes the operator for which the error occurred, and the data type of the specified value.

Corrective action

Ensure the data type of the expressions specified on the left and right sides of the operator can be compared. If required, revise to ensure these data types can be compared by using a function such as CAST to explicitly convert them.

A.2 Notes when Using Temporary Tables

In standard SQL, a temporary table can be defined in advance to enable an empty temporary table to be created automatically when the application connects to the database. However, in FUJITSU Enterprise Postgres, a temporary table must be created when the application connects to the database by explicitly using the CREATE TABLE statement.

If the same temporary table is repeatedly created and deleted during the same session, the system table might expand, and memory usage might increase. To prevent this, specify the CREATE TABLE statement to ensure the temporary table is reused.

For example, in cases where a temporary table would be created and deleted for repeatedly executed transactions, specify the CREATE TABLE statement as shown below:

- Specify "IF NOT EXISTS" to create a temporary table only if none exists when the transaction starts.
- Specify "ON COMMIT DELETE ROWS" to ensure all rows are deleted when the transaction ends.

See

Refer to "SQL Commands" under "Reference" in the PostgreSQL Documentation for information on the CREATE TABLE statement.

Examples of SQL using a temporary table are shown below:

Example of bad use (creating and deleting a temporary table)

```
BEGIN;
CREATE TEMPORARY TABLE mytable(col1 CHAR(4), col2 INTEGER) ON COMMIT DROP;
     (mytable processes)

COMMIT;
```

Example of good use (reusing a temporary table)

```
BEGIN;
CREATE TEMPORARY TABLE IF NOT EXISTS mytable(col1 CHAR(4), col2 INTEGER) ON COMMIT
DELETE ROWS;
     (mytable processes)

COMMIT;
```

A.3 Implicit Data Type Conversions

An implicit data type conversion refers to a data type conversion performed automatically by FUJITSU Enterprise Postgres, without the need to explicitly specify the data type to convert to.

The combination of possible data type conversions differs, depending on whether the expression in the conversion source is a literal.

For non-literals, data types can only be converted to other types within the same range.

For literals, character string literal types can be converted to the target data type. Numeric literals are implicitly converted to specific numeric types. These implicitly converted numeric literals can then have their types converted to match the conversion target data type within the numeric type range. For bit character string literals, only the bit column data type can be specified. The following shows the range of type conversions for literals.

Table A.1 Data type combinations that contain literals and can be converted implicitly

Conversion target		Conversion source		
		Character literal (*1)	Numeric literal(*2)	Bit character string literal
Numeric type	SMALLINT	Y	N	N
	INTEGER	Y	Y (*3)	N
	BIGINT	Y	Y (*4)	N
	DECIMAL	Y	Y (*5)	N
	NUMERIC	Y	Y (*5)	N
	REAL	Y	N	N
	DOUBLE PRECISION	Y	N	N
	SMALLSERIAL	Y	N	N
	SERIAL	Y	Y (*3)	N
	BIGSERIAL	Y	Y (*4)	N
Currency type	MONEY	Y	N	N
Character type	CHAR	Y	N	N
	VARCHAR	Y	N	N
	NCHAR	Y	N	N
	NCHAR VARYING	Y	N	N
	TEXT	Y	N	N
Binary data type	BYTEA	Y	N	N
Date/time type	TIMESTAMP WITHOUT TIME ZONE	Y	N	N
	TIMESTAMP WITH TIME ZONE	Y	N	N
	DATE	Y	N	N
	TIME WITHOUT TIME ZONE	Y	N	N
	TIME WITH TIME ZONE	Y	N	N
	INTERVAL	Y	N	N
Boolean type	BOOLEAN	Y	N	N
Geometric type	POINT	Y	N	N
	LSEG	Y	N	N
	BOX	Y	N	N

Conversion target		Conversion source		
		Character literal (*1)	Numeric literal(*2)	Bit character string literal
	PATH	Y	N	N
	POLYGON	Y	N	N
	CIRCLE	Y	N	N
Network address type	CIDR	Y	N	N
	INET	Y	N	N
	MACADDR	Y	N	N
	MACADDR8	Y	N	N
Bit string type	BIT	Y	N	Y
	BIT VARYING	Y	N	Y
Text search type	TSVECTOR	Y	N	N
	TSQUERY	Y	N	N
UUID type	UUID	Y	N	N
XML type	XML	Y	N	N
JSON type	JSON	Y	N	N

Y: Can be converted
N: Cannot be converted

*1: Only strings that can be converted to the data type of the conversion target can be specified (such as "1" if the conversion target is a numeric type)

*2: "Y" indicates specific numeric types that are converted first.

*3: Integers that can be expressed as INTEGER types can be specified

*4: Integers that cannot be expressed as INTEGER types, but can be expressed as BIGINT types, can be specified

*5: Integers that cannot be expressed as INTEGER or BIGINT types, but that can be expressed as NUMERIC types, or numeric literals that contain a decimal point or the exponent symbol (e), can be specified

Implicit data type conversions can be used when comparing or storing data.

The conversion rules differ, depending on the reason for converting. Purpose-specific explanations are provided below.

A.3.1 Function Argument

Value expressions specified in a function argument will be converted to the data type of that function argument.

See

Refer to "Functions and Operators" under "The SQL Language" in the PostgreSQL Documentation for information on data types that can be specified in function arguments.

A.3.2 Operators

Comparison operators, BETWEEN, IN

Combinations of data types that can be compared using comparison operators, BETWEEN, or IN are shown below.

Table A.2 Combinations of comparable data type

Left side	Right side		
	Numeric type	Character string type	Date/time type
Numeric type	Y	N	N
Character type	N	Y	N
Date/time type	N	N	Y

Y: Can be compared
N: Cannot be compared

When strings with different lengths are compared, the shorter one is padded with spaces to make the lengths match.

When numeric values with different precisions are compared, data will be converted to the type with the higher precision.

Set operation and CASE also follow the same rules.

Other operators

Value expressions specified in operators will be converted to data types that are valid for that operator.

Refer to "Functions and Operators" under "The SQL Language" in the PostgreSQL Documentation for information on data types that can be specified in operators.

A.3.3 Storing Values

Value expressions specified in the VALUES clause of the INSERT statement or the SET clause of the UPDATE statement will be converted to the data type of the column in which they will be stored.

A.4 Notes on Using Index

This section explains the notes on using the following indexes:

- SP-GiST index

A.4.1 SP-GiST Index

If more than 2 concurrent updates are performed on a table in which the SP-GiST index is defined, applications may stop responding. When this occur, all system processes including the Check Pointer process will also be in the state of no response. For these reasons, use of the SP-GiST index is not recommended.

A.5 Notes on Using Multibyte Characters in Definition Names

Do not use multibyte characters in database names or user names if using a Windows database server.

Multibyte characters must not be used in database names or user names on non-Windows database servers, because certain conditions may apply or it may not be possible to connect to some clients.

Related notes and constraints are described below.

1) Configuring the client encoding system

The client encoding system must be configured when the names are created.

See

Refer to "Character Set Support" in "Server Administration" in the PostgreSQL Documentation for information on how to configure the client encoding system.

2) Encoding system of names used for connection

Ensure that the encoding system of names used for connection is the same as that of the database that was connected when these names were created.

The reasons for this are as follows:

- Storage system for names in FUJITSU Enterprise Postgres

  The system catalog saves encoded names by using the encoding system of the database at the time the names were created.

- Encoding conversion policy when connected

  When connected, names sent from the client are matched with names in the system catalog without performing encoding conversion.

Accordingly, if the database that was connected when the names were defined uses the EUC_JP encoding system, but the database name is specified using UTF-8 encoding, then the database will be considered to be non-existent.

3) Connection constraints

The table below shows the connection constraints for each client type, based on the following assumptions:

- The conditions described in 1) and 2) above are satisfied.
- The database name and user names use the same encoding system.

Client type	Client operating system	
	Windows(R)	Linux
JDBC driver	Cannot be connected	Cannot be connected
ODBC driver	Cannot be connected	No connection constraints
.NET Data Provider	Can only connect when the encoding system used for definitions is UTF-8	-
SQLEmbedded SQL in C	Can only connect when the connection service file (pg_service.conf) is used	No connection constraints
psql command	Can only connect when the connection service file (pg_service.conf) is used	No connection constraints

Appendix B Conversion Procedures Required due to Differences from Oracle Database

This appendix explains how to convert from an Oracle database to FUJITSU Enterprise Postgres, within the scope noted in "Chapter 9 Compatibility with Oracle Databases" from the following perspectives:

- Feature differences
- Specification differences

This document assumes that the version of the Oracle database to be converted is 7-10.2g.

B.1 Outer Join Operator (Perform Outer Join)

Features

In the WHERE clause conditional expression, by adding the plus sign (+), which is the outer join operator, to the column of the table you want to add as a table join, it is possible to achieve an outer join that is the same as a joined table (OUTER JOIN).

B.1.1 Comparing with the ^= Comparison Operator

Oracle database

```
SELECT *
  FROM t1, t2
  WHERE t1.col1(+) ^= t2.col1;
```

Note: col1 is assumed to be CHAR(4) type

FUJITSU Enterprise Postgres

```
SELECT *
  FROM t1, t2
  WHERE t1.col1(+) != t2.col1;
```

Note: col1 is assumed to be CHAR(4) type

Feature differences

Oracle database

The ^= comparison operator can be specified.

FUJITSU Enterprise Postgres

The ^= comparison operator cannot be specified.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "^=" is used.
2. Ensure that the keyword, "(+)", is either on the right or left-hand side.
3. Change "^=" to " !=".

B.2 DECODE (Compare Values and Return Corresponding Results)

Features

DECODE compares values of the conversion target value expression and the search values one by one, and if the values of the conversion target value expression and the search values match, a corresponding result value is returned.

B.2.1 Comparing Numeric Data of Character String Types and Numeric Characters

Oracle database

```
SELECT DECODE( col1,
               1000, 'ITEM-A',
               2000, 'ITEM-B',
               'ITEM-C')
  FROM t1;
```

Note: col1 is assumed to be CHAR(4) type

FUJITSU Enterprise Postgres

```
SELECT DECODE( CAST(col1 AS INTEGER),
               1000, 'ITEM-A',
               2000, 'ITEM-B',
               'ITEM-C')
  FROM t1;
```

Note: col1 is assumed to be CHAR(4) type

Feature differences

Oracle database

When the value expression is a string and the search value is a numeric, the string value will be converted to the data type of the comparison target numeric, so that they can be compared.

FUJITSU Enterprise Postgres

If the conversion target value expression is a string value, then no search value can be specified with numbers.

Conversion procedure

Since the data type that can be specified for the conversion target value expression is unknown, use CAST to explicitly convert the conversion target value expression (col1 in the example) to a numeric (INTEGER type in the example).

B.2.2 Obtaining Comparison Result from more than 50 Conditional Expressions

Oracle database

```
SELECT DECODE(col1,
               1,'A',
               2,'B',
               ...
               78,'BZ',
               NULL,'UNKNOWN',
               'OTHER')
   FROM t1;
```

Note: col1 is assumed to be INTEGER type

FUJITSU Enterprise Postgres

```
SELECT CASE
           WHEN col1 = 1 THEN 'A'
           WHEN col1 = 2 THEN 'B'
           ...
           WHEN col1 = 78 THEN 'BZ'
           WHEN col1 IS NULL THEN 'UNKNOWN'
           ELSE 'OTHER'
         END
    FROM t1;
```

Note: col1 is assumed to be INTEGER type

Feature differences

Oracle database

Search value with a maximum of 127 items (up to 255 arguments in total) can be specified.

FUJITSU Enterprise Postgres

Search value with a maximum of 49 items (up to 100 arguments in total) only can be specified.

Conversion procedure

Convert to the CASE expression using the following procedure:

1. Specify the DECODE conversion target value expression (col1 in the first argument, in the example) and the search value (1 in the second argument, in the example) for the CASE expression search condition. Specify the DECODE result value ('A' in the third argument, in the example) for the CASE expression THEN (WHEN col1 = 1 THEN 'A', in the example). Note that if the search value is NULL, specify "IS NULL" for the search condition for the CASE expression.
2. If the DECODE default value ('OTHER' in the last argument, in the example) is specified, specify the default value for the CASE expression ELSE (ELSE 'OTHER', in the example).

B.2.3 Obtaining Comparison Result from Values with Different Data Types

Oracle database

```
SELECT DECODE( col1,
               '1000', 'A',
               '2000', 1,
               'OTHER')
FROM t1;
```

Note: col1 is assumed to be CHAR(4) type

FUJITSU Enterprise Postgres

```
SELECT DECODE( col1,
              '1000', 'A',
              '2000', '1',
              'OTHER')
FROM t1;
```

Note: col1 is assumed to be CHAR(4) type

Feature differences

Oracle database

The data types of all result values are converted to the data type of the first result value.

FUJITSU Enterprise Postgres

Results in an error.

Conversion procedure

Convert using the following procedure:

1. Check the literal data type for the first result value specified.
2. Change the literals specified for each result value to the literal data type checked in the step 1.

B.3 SUBSTR (Extract a String of the Specified Length from Another String)

Features

SUBSTR returns the number of characters specified in the third argument (starting from the position specified in the second argument) from the string specified in the first argument.

Refer to "9.2.1 Notes on SUBSTR" for details on precautions when using SUBSTR.

B.3.1 Specifying a Value Expression with a Data Type Different from the One that can be Specified for Function Arguments

Oracle database

```
SELECT SUBSTR( col1,
               1,
               col2)
  FROM DUAL;
```

Note: col1 and col2 are assumed to be CHAR type

FUJITSU Enterprise Postgres

```
CREATE CAST (CHAR AS INTEGER) WITH INOUT AS IMPLICIT;

SELECT SUBSTR( col1,
               1,
               col2)
  FROM DUAL;
# No changes to SELECT statement;
```

Note: col1 and col2 are assumed to be CHAR type

Feature differences

Oracle database

If the type can be converted to a data type that can be specified for function arguments, conversion is performed implicitly.

FUJITSU Enterprise Postgres

If the data types are different from each other, or if loss of significance occurs, implicit conversion is not performed.

Conversion procedure

Since the data type of the string length is clear, first execute the following CREATE CAST only once so that the CHAR type value (col2 in the example) specified for the string length is implicitly converted to INTEGER type.

```
CREATE CAST (CHAR AS INTEGER) WITH INOUT AS IMPLICIT;
```

B.3.2 Extracting a String with the Specified Format from a Datetime Type Value

Oracle database

```
SELECT SUBSTR( CURRENT_TIMESTAMP,
               1,
               8)
  FROM DUAL;
```

FUJITSU Enterprise Postgres

```
SELECT SUBSTR( TO_CHAR(CURRENT_TIMESTAMP,
               'DD-MON-YY HH.MI.SS.US PM')
                1,
                8)
  FROM DUAL;
```

Feature differences

Oracle database

A datetime value such as CURRENT_TIMESTAMP can be specified for character value expressions.

FUJITSU Enterprise Postgres

A datetime value such as CURRENT_TIMESTAMP cannot be specified for character value expressions.

Conversion procedure

First, specify TO_CHAR for the SUBSTR character value expression.
Specify datetime type (CURRENT_TIMESTAMP, in the example) in firstArg of TO_CHAR, and specify the format template pattern ('DD-MON-YY HH.MI.SS.US PM', in the example) for secondArg to match with the result of SUBSTR before conversion.

TO_CHAR specification format: TO_CHAR(*firstArg, secondArg*)

Information

Refer to "Data Type Formatting Functions" in the PostgreSQL Documentation for information on format template patterns that can be specified for TO_CHAR in FUJITSU Enterprise Postgres.

B.3.3 Concatenating a String Value with a NULL value

Oracle database

```
SELECT SUBSTR( col1 || col2,
               2,
               5)
  FROM t1;
```

Note: col1 and col2 are assumed to be character string type, and col2 may contain NULL

FUJITSU Enterprise Postgres

```
SELECT SUBSTR( col1 || NVL(col2, '')
               2,
               5)
  FROM t1;
```

Note: col1 and col2 are assumed to be character string type, and col2 may contain NULL

Feature differences

Oracle database

NULL is handled as an empty string, and strings are joined.

FUJITSU Enterprise Postgres

NULL is not handled as an empty string, and the result of joining the strings becomes NULL.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "||" is used.
2. Check if any of the value expressions can contain NULL - if they can, then execute step 3.
3. Modify to NVL(*valExpr,*'').

B.4 NVL (Replace NULL)

Features

NVL converts NULL values.

B.4.1 Obtaining Result from Arguments with Different Data Types

Oracle database

```
SELECT NVL( col1,
            col2)
  FROM t1;
```

Note: col1 is assumed to be VARCHAR(100) type, and col2 is assumed to be CHAR(100) type

FUJITSU Enterprise Postgres

```
SELECT NVL( col1,
            CAST(col2 AS VARCHAR(100)))
  FROM t1;
```

Note: col1 is assumed to be VARCHAR(100) type, and col2 is assumed to be CHAR(100) type

Feature differences

Oracle database

Value expressions with different data types can be specified. If the first argument is a string value, then VARCHAR2 is returned, and if it is a numeric, then a numeric type with greater range is returned.

FUJITSU Enterprise Postgres

Value expressions with different data types cannot be specified.

Conversion procedure

Since the data types that can be specified for the expressions in the two arguments are unknown, use the following steps to convert:

1. Check the data types specified for each of the two expressions.
2. Using the data type that is to be received as a result, explicitly convert the other argument with CAST.

B.4.2 Operating on Datetime/Numeric, Including Adding Number of Days to a Particular Day

Oracle database

```
SELECT NVL( col1 + 10, CURRENT_DATE)
  FROM t1;
```

Note: col1 is assumed to be TIMESTAMP WITHOUT TIME ZONE type or TIMESTAMP WITH TIME ZONE type

FUJITSU Enterprise Postgres

```
SELECT NVL( CAST(col1 AS DATE) + 10, CURRENT_DATE)
  FROM t1;
```

Note: col1 is assumed to be TIMESTAMP WITHOUT TIME ZONE type or TIMESTAMP WITH TIME ZONE type

Feature differences

Oracle database

Numbers can be operated (added to or subtracted from) with either TIMESTAMP WITHOUT TIME ZONE type or TIMESTAMP WITH TIME ZONE type. Operation result will be DATE type.

FUJITSU Enterprise Postgres

Numbers cannot be operated (added to or subtracted from) with neither TIMESTAMP WITHOUT TIME ZONE type nor TIMESTAMP WITH TIME ZONE type. However, numbers can be operated (added to or subtracted from) with DATE type.

Conversion procedure

Convert using the following procedure:

1. Search locations where the keyword "+" or "-" is used in addition or subtraction, and check if these operations are between numbers and TIMESTAMP WITHOUT TIME ZONE type or TIMESTAMP WITH TIME ZONE type.
2. If they are, use CAST to explicitly convert TIMESTAMP WITHOUT TIME ZONE type or TIMESTAMP WITH TIME ZONE type to DATE type.

B.4.3 Calculating INTERVAL Values, Including Adding Periods to a Date

Oracle database

```
SELECT NVL( CURRENT_DATE + (col1 * 1.5), col2)
  FROM t1;
```

Note: col1 and col2 are assumed to be INTERVAL YEAR TO MONTH types

FUJITSU Enterprise Postgres

```
SELECT NVL( CURRENT_DATE +
        CAST(col1 * 1.5 AS
```

```
          INTERVAL YEAR TO MONTH), col2)
  FROM t1;
```

Note: col1 and col2 are assumed to be INTERVAL YEAR TO MONTH types

Feature differences

Oracle database

INTERVAL YEAR TO MONTH type multiplication and division result in INTERVAL YEAR TO MONTH type and any fraction (number of days) will be truncated.

FUJITSU Enterprise Postgres

INTERVAL YEAR TO MONTH type multiplication and division result in INTERVAL type and fractions (number of days) will not be truncated.

Conversion procedure

Convert using the following procedure:

1. Search locations where the keywords "*" or "/" are used in multiplication or division, and check if the specified value is INTERVAL YEAR TO MONTH type.
2. If the value is INTERVAL YEAR TO MONTH type, use CAST to explicitly convert the operation result to INTERVAL YEAR TO MONTH type.

B.5 DBMS_OUTPUT (Output Messages)

Features

DBMS_OUTPUT sends messages to clients such as psql from PL/pgSQL.

B.5.1 Outputting Messages Such As Process Progress Status

Oracle database

```
set serveroutput on;...(1)

DECLARE
  v_col1        CHAR(20);
  v_col2        INTEGER;
  CURSOR c1 IS
    SELECT col1, col2 FROM t1;
BEGIN
  DBMS_OUTPUT.PUT_LINE('-- BATCH_001 Start --');
  OPEN c1;
  DBMS_OUTPUT.PUT_LINE('-- LOOP Start --');
  LOOP
    FETCH c1 INTO v_col1, v_col2;
    EXIT WHEN c1%NOTFOUND;
    DBMS_OUTPUT.PUT('.');
  END LOOP;
  DBMS_OUTPUT.NEW_LINE; ...(2)
  DBMS_OUTPUT.PUT_LINE('-- LOOP End --');
  CLOSE c1;

  DBMS_OUTPUT.PUT_LINE('-- BATCH_001 End --');


EXCEPTION
  WHEN OTHERS THEN
     DBMS_OUTPUT.PUT_LINE('-- SQL Error --');
     DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
```

```
END;
/
```

FUJITSU Enterprise Postgres

```
DO $$
DECLARE
    v_col1      CHAR(20);
    v_col2      INTEGER;
    c1 CURSOR FOR
        SELECT col1, col2 FROM t1;
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE); ...(1)
    PERFORM DBMS_OUTPUT.ENABLE(NULL); ...(1)

    PERFORM DBMS_OUTPUT.PUT_LINE('-- BATCH_001 Start --');

    OPEN c1;
    PERFORM DBMS_OUTPUT.PUT_LINE('-- LOOP Start --');
    LOOP
        FETCH c1 INTO v_col1, v_col2;
        EXIT WHEN FOUND = false;
        PERFORM DBMS_OUTPUT.PUT('.');
    END LOOP;
    PERFORM DBMS_OUTPUT.NEW_LINE(); ...(2)

    PERFORM DBMS_OUTPUT.PUT_LINE('-- LOOP End --');
    CLOSE c1;

    PERFORM DBMS_OUTPUT.PUT_LINE('-- BATCH_001 End --');

EXCEPTION
    WHEN OTHERS THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- SQL Error --');
        PERFORM DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
END;
$$
;
```

(1) SERVEROUTPUT/ENABLE

Specification differences

Oracle database

Use SET statement and specify SERVEROUTPUT ON.

FUJITSU Enterprise Postgres

Specify DBMS_SQL.SERVEROUTPUT(TRUE).

Conversion procedure

Convert using the following procedure:

1. Check if a SET SERVEROUTPUT statement is specified before the PL/SQL block of a stored procedure.
2. If a SET SERVEROUTPUT statement is specified, specify DBMS_SQL.SERVEROUTPUT straight after BEGIN of PL/pgSQL. If ON is specified to have messages output to a window, then specify TRUE. If OFF is specified, then specify FALSE.
3. Specify DBMS_SQL.ENABLE only if SET SERVEROUTPUT is ON. The values to be specified for the argument are as follows:
   - If SIZE is specified for the SET SERVEROUTPUT statement, specify this size for the argument.

- If SIZE is not specified for the SET SERVEROUTPUT statement, then specify 2000 for Oracle10.1g or earlier, NULL for Oracle10.2g or later.

If DBMS_SQL.ENABLE is specified for the PL/SQL block of the stored procedure, specify the same value as that argument.

(2) NEW_LINE

Specification differences

Oracle database

If there is no argument for *packageName.featureName*, parenthesis can be omitted.

FUJITSU Enterprise Postgres

Even if there is no argument for *packageName.featureName*, parenthesis cannot be omitted.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_OUTPUT.NEW_LINE" is used in the stored procedure.
2. If there is no parenthesis after *packageName.featureName*, add the parenthesis.

B.5.2 Receiving a Return Value from a Procedure (PL/SQL) Block (For GET_LINES)

Oracle database

```
set serveroutput off;

DECLARE
    v_num        INTEGER;
BEGIN

    DBMS_OUTPUT.DISABLE; ...(3)
    DBMS_OUTPUT.ENABLE(20000); ...(4)
    DBMS_OUTPUT.PUT_LINE('-- ITEM CHECK --');


    SELECT count(*) INTO v_num FROM t1;

    IF v_num = 0 THEN
        DBMS_OUTPUT.PUT_LINE('-- NO ITEM --');

    ELSE
        DBMS_OUTPUT.PUT_LINE('-- IN ITEM(' || v_num || ') --');
    END IF;
END;
/

set serveroutput on;

DECLARE
    v_buffs      DBMSOUTPUT_LINESARRAY; ...(5)
    v_num        INTEGER := 10;
BEGIN

    DBMS_OUTPUT.GET_LINES(v_buffs, v_num); ...(5)

    FOR i IN 1..v_num LOOP
        DBMS_OUTPUT.PUT_LINE('LOG : ' || v_buffs(i)); ...(5)
```

```
    END LOOP;
END;
/
```

FUJITSU Enterprise Postgres

```
DO $$
DECLARE
    v_num        INTEGER;
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(FALSE);
    PERFORM DBMS_OUTPUT.DISABLE(); ...(3)
    PERFORM DBMS_OUTPUT.ENABLE(20000); ...(4)
PERFORM DBMS_OUTPUT.PUT_LINE('-- ITEM CHECK --');

    SELECT count(*) INTO v_num FROM t1;

    IF v_num = 0 THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- NO ITEM --');
    ELSE
        PERFORM DBMS_OUTPUT.PUT_LINE('-- IN ITEM(' || v_num || ') --');
    END IF;
END;
$$
;

DO $$
DECLARE
    v_buffs      VARCHAR[]; ...(5)
    v_num        INTEGER := 10;
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);
    SELECT lines, numlines INTO v_buffs, v_num FROM DBMS_OUTPUT.GET_LINES(v_num); ...(5)

    FOR i IN 1..v_num LOOP
        PERFORM DBMS_OUTPUT.PUT_LINE('LOG : ' || v_buffs[i]); ...(5)
    END LOOP;
END;
$$
;
```

(3) DISABLE

Same as the NEW_LINE in the DBMS_OUTPUT package. Refer to NEW_LINE for information on specification differences and conversion procedures associated with specification differences.

(4) ENABLE

Same as NEW_LINE in the DBMS_OUTPUT package. Refer to NEW_LINE for information on specification differences and conversion procedures associated with specification differences.

(5) GET_LINES

Specification format for Oracle database

DBMS_OUTPUT.GET_LINES(*firstArg, secondArg*)

Specification differences

Oracle database

Obtained values are received with variables specified for arguments.

FUJITSU Enterprise Postgres

Since obtained values are the search results for DBMS_OUTPUT.GET_LINES, they are received with variables specified for the INTO clause of the SELECT statement.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_OUTPUT.GET_LINES" is used in the stored procedure.
2. Change the data type (DBMSOUTPUT_LINESARRAY in the example) of the variable (v_buffs in the example) specified as *firstArg* of DBMS_OUTPUT.GET_LINES into a VARCHAR type array (VARCHAR[] in the example).
3. Replace the DBMS_OUTPUT.GET_LINES location called with a SELECT INTO statement.
   - Use the literal "lines, numlines" in the select list.
   - Specify *firstArg* (v_buffs in the example) and *secondArg* (v_num in the example) configured in DBMS_OUTPUT.GET_LINES, in the INTO clause.
   - Use DBMS_OUTPUT.GET_LINES in the FROM clause. Specify only *secondArg* (v_num in the example) before modification.
4. Identify the location that references *firstArg* (v_buffs in the example), and change it to the PL/pgSQL array reference format (v_buffs[i] in the example).

B.5.3 Receiving a Return Value from a Procedure (PL/SQL) Block (For GET_LINE)

Oracle database

```
set serveroutput on;

DECLARE
    v_buff1       VARCHAR2(100);
    v_buff2       VARCHAR2(1000);
    v_num        INTEGER;
BEGIN

    v_buff2 := '';
    LOOP
        DBMS_OUTPUT.GET_LINE(v_buff1, v_num); ...(6)
        EXIT WHEN v_num = 1;
        v_buff2 := v_buff2 || v_buff1;
    END LOOP;

    DBMS_OUTPUT.PUT_LINE(v_buff2);
END;
/
```

Note: Only the process to obtain a value is stated

FUJITSU Enterprise Postgres

```
DO $$
DECLARE
    v_buff1       VARCHAR(100);
    v_buff2       VARCHAR(1000);
    v_num        INTEGER;
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);
    v_buff2 := '';
    LOOP
```

```
        SELECT line, status INTO v_buff1, v_num FROM DBMS_OUTPUT.GET_LINE(); ...(6)
        EXIT WHEN v_num = 1;
        v_buff2 := v_buff2 || v_buff1;
    END LOOP;

    PERFORM DBMS_OUTPUT.PUT_LINE(v_buff2);
END;
$$
;
```

Note: Only the process to obtain a value is stated

(6) GET_LINE

Specification format for Oracle database

DBMS_OUTPUT.GET_LINE(*firstArg, secondArg*)

Specification differences

Oracle database

Obtained values are received with variables specified for arguments.

FUJITSU Enterprise Postgres

Since obtained values are the search results for DBMS_OUTPUT.GET_LINES, they are received with variables specified for the INTO clause of the SELECT statement.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_OUTPUT.GET_LINE" is used in the stored procedure.
2. Replace the DBMS_OUTPUT.GET_LINE location called with a SELECT INTO statement.
   - Use the literal "line, status" in the select list.
   - Specify *firstArg* (v_buff1 in the example) and *secondArg* (v_num in the example) configured in DBMS_OUTPUT.GET_LINE, in the INTO clause.
   - Use DBMS_OUTPUT.GET_LINE in the FROM clause. Although arguments are not specified, parenthesis must be specified.

B.6 UTL_FILE (Perform File Operation)

Features

UTL_FILE reads and writes text files from PL/pgSQL.

B.6.1 Registering a Directory to Load and Write Text Files

Oracle database

```
[Oracle9i or earlier]
Configure the following with initialization parameter
   UTL_FILE_DIR='/home/fsep' ...(1)

[Oracle9.2i or later]
   Configure the following with CREATE DIRECTORY statement
   CREATE DIRECTORY DIR AS '/home/fsep'; ...(1)
```

FUJITSU Enterprise Postgres

```
INSERT INTO UTL_FILE.UTL_FILE_DIR(dir)
       VALUES('/home/fsep'); ...(1)
```

(1) UTL_FILE_DIR/CREATE DIRECTORY

Feature differences

Oracle database

Configure the directory to be operated, using the CREATE DIRECTORY statement or the initialization parameter UTL_FILE_DIR.

FUJITSU Enterprise Postgres

The directory to be operated cannot be configured using the CREATE DIRECTORY statement or the initialization parameter UTL_FILE_DIR.

Conversion procedure

Configure the target directory information in the UTL_FILE.UTL_FILE_DIR table using the INSERT statement. Note that this conversion procedure should be performed only once before executing the PL/pgSQL function.

- When using the initialization parameter UTL_FILE_DIR:

  1. Check the initialization parameter UTL_FILE_DIR value ('/home/fsep' in the example).
  2. Using the INSERT statement, specify and execute the directory name checked in step 1.
     - Specify UTL_FILE.UTL_FILE_DIR(dir) for the INTO clause.
     - Using the character string literal ('/home/fsep' in the example), specify the target directory name for the VALUES clause.
     - If multiple directories are specified, execute the INSERT statement for each directory.

- When using the CREATE DIRECTORY statement:

  1. Check the directory name ('/home/fsep' in the example) registered with the CREATE DIRECTORY statement. To check, log in SQL*Plus as a user with DBA privileges, and execute "show ALL_DIRECTORIES;".
  2. Using the INSERT statement, specify and execute the directory name checked in step 1. Same steps are used to specify the INSERT statement as when using the initialization parameter UTL_FILE_DIR.

B.6.2 Checking File Information

Oracle database

```
CREATE PROCEDURE read_file(fname VARCHAR2) AS


    v_file      UTL_FILE.FILE_TYPE;
    v_exists    BOOLEAN;
    v_length    NUMBER;
    v_bsize     INTEGER;
    v_rbuff     VARCHAR2(1024);
BEGIN


    UTL_FILE.FGETATTR('DIR', fname, v_exists, v_length, v_bsize); ...(2)


    IF v_exists <> true THEN
        DBMS_OUTPUT.PUT_LINE('-- FILE NOT FOUND --');
        RETURN;
    END IF;
```

```
    DBMS_OUTPUT.PUT_LINE('-- FILE DATA --');

    v_file := UTL_FILE.FOPEN('DIR', fname, 'r', 1024); ...(3)
    FOR i IN 1..3 LOOP
        UTL_FILE.GET_LINE(v_file, v_rbuff, 1024); ...(4)
        DBMS_OUTPUT.PUT_LINE(v_rbuff);
    END LOOP;
    DBMS_OUTPUT.PUT_LINE('... more');
    DBMS_OUTPUT.PUT_LINE('-- READ END --');

    UTL_FILE.FCLOSE(v_file); ...(5)
    RETURN;

EXCEPTION
    WHEN NO_DATA_FOUND THEN
        DBMS_OUTPUT.PUT_LINE('-- FILE END --');

        UTL_FILE.FCLOSE(v_file);
        RETURN;
    WHEN OTHERS THEN
        DBMS_OUTPUT.PUT_LINE('-- SQL Error --');

        DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        UTL_FILE.FCLOSE_ALL; ...(6)
        RETURN;
END;
/

set serveroutput on

call read_file('file01.txt');
```

FUJITSU Enterprise Postgres

```
CREATE FUNCTION read_file(fname VARCHAR) RETURNS void AS $$
DECLARE
    v_file      UTL_FILE.FILE_TYPE;
    v_exists    BOOLEAN;
    v_length    NUMERIC;
    v_bsize     INTEGER;
    v_rbuff     VARCHAR(1024);
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);

    SELECT fexists, file_length, blocksize
       INTO v_exists, v_length, v_bsize
       FROM UTL_FILE.FGETATTR('/home/fsep', fname); ...(2)
    IF v_exists <> true THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- FILE NOT FOUND --');
        RETURN;
    END IF;

    PERFORM DBMS_OUTPUT.PUT_LINE('-- FILE DATA --');
    v_file := UTL_FILE.FOPEN('/home/fsep', fname, 'w', 1024); ...(3)
    FOR i IN 1..3 LOOP
        v_rbuff := UTL_FILE.GET_LINE(v_file, 1024); ...(4)
        PERFORM DBMS_OUTPUT.PUT_LINE(v_rbuff);
    END LOOP;
    PERFORM DBMS_OUTPUT.PUT_LINE('... more');
    PERFORM DBMS_OUTPUT.PUT_LINE('-- READ END --');

    v_file := UTL_FILE.FCLOSE(v_file); ...(5)
```

```
    RETURN;

EXCEPTION
    WHEN NO_DATA_FOUND THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- FILE END --');
        v_file := UTL_FILE.FCLOSE(v_file);
        RETURN;
    WHEN OTHERS THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- SQL Error --');
        PERFORM DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        PERFORM UTL_FILE.FCLOSE_ALL(); ...(6)
        RETURN;
END;
$$
LANGUAGE plpgsql;

SELECT read_file('file01.txt');
```

(2) FGETATTR

Specification format for Oracle database

UTL_FILE.FGETATTR(*firstArg, secondArg*, *thirdArg*, *fourthArg*, *fifthArg*)

Feature differences

Oracle database

If using a CREATE DIRECTORY statement (Oracle9.2i or later), specify a directory object name for the directory name.

FUJITSU Enterprise Postgres

A directory object name cannot be specified for the directory name.

Specification differences

Oracle database

Obtained values are received with variables specified for arguments.

FUJITSU Enterprise Postgres

Since obtained values are the search results for UTL_FILE.FGETATTR, they are received with variables specified for the INTO clause of the SELECT statement.

Conversion procedure

Convert using the following procedure. Refer to UTL_FILE_DIR/CREATE DIRECTORY for information on how to check if the directory object name corresponds to the actual directory name.

1. Locate the places where the keyword "UTL_FILE.FOPEN" is used in the stored procedure.
2. Check the actual directory name ('/home/fsep' in the example) that corresponds to the directory object name ('DIR' in the example).
3. Replace the directory object name ('DIR' in the example) in *firstArg* with the actual directory name ('/home/fsep' in the example) verified in step 2.
4. Replace the UTL_FILE.FGETATTR location called with a SELECT INTO statement.
   - Use the literal "fexists, file_length, blocksize" in the select list.
   - Specify *thirdArg*, *fourthArg*, and *fifthArg* (v_exists, v_length, v_bsize, in the example) specified for UTL_FILE.FGETATTR to the INTO clause in the same order as that of the arguments.
   - Use UTL_FILE.FGETATTR in the FROM clause. Specify only the actual directory name for *firstArg* ('/home/fsep' in the example) and *secondArg* (fname in the example) before modification for the arguments.

(3) FOPEN

Specification format for Oracle

UTL_FILE.FOPEN(*firstArg, secondArg*, *thirdArg*, *fourthArg*, *fifthArg*)

Feature differences

Oracle database

If using a CREATE DIRECTORY statement (Oracle9.2i or later), specify a directory object name for the directory name.

FUJITSU Enterprise Postgres

A directory object name cannot be specified for the directory name.

Conversion procedure

Convert using the following procedure. Refer to UTL_FILE_DIR/CREATE DIRECTORY for information on how to check if the directory object name corresponds to the actual directory name.

1. Locate the places where the keyword "UTL_FILE.FOPEN" is used in the stored procedure.
2. Check the actual directory name ('/home/fsep' in the example) that corresponds to the directory object name ('DIR' in the example).
3. Replace the directory object name ('DIR' in the example) in *firstArg* with the actual directory name ('/home/fsep' in the example) checked in step 1.

(4) GET_LINE

Specification format for Oracle database

UTL_FILE.GET_LINE(*firstArg, secondArg*, *thirdArg*, *fourthArg*)

Specification differences

Oracle database

Obtained values are received with variables specified for arguments.

FUJITSU Enterprise Postgres

Since obtained values are the returned value of UTL_FILE.GET_LINE, they are received with variables specified for substitution statement.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "UTL_FILE.GET_LINE" is used in the stored procedure.
2. Replace the UTL_FILE.GET_LINE location called with a value assignment (:=).
   - On the left-hand side, specify *secondArg* (v_rbuff in the example) specified for UTL_FILE.GET_LINE.
   - Use UTL_FILE.GET_LINE in the right-hand side. Specify only *firstArg* (v_file in the example) and *thirdArg* (1024 in the example) before modification.

(5) FCLOSE

Specification format for Oracle database

UTL_FILE.FCLOSE(*firstArg*)

Specification differences

Oracle database

After closing, the file handler specified for the argument becomes NULL.

FUJITSU Enterprise Postgres

After closing, set the file handler to NULL by assigning the return value of UTL_FILE.FCLOSE to it.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "UTL_FILE.FCLOSE" is used in the stored procedure.
2. Replace the UTL_FILE.FCLOSE location called with a value assignment (:=) so that the file handler (v_file in the example) becomes NULL.
   - On the left-hand side, specify the argument (v_file in the example) specified for UTL_FILE.FCLOSE.
   - Use UTL_FILE.FCLOSE in the right-hand side. For the argument, specify the same value (v_file in the example) as before modification.

(6) FCLOSE_ALL

Same as NEW_LINE in the DBMS_OUTPUT package. Refer to NEW_LINE in the DBMS_OUTPUT for information on specification differences and conversion procedures associated with specification differences.

B.6.3 Copying Files

Oracle database

```
CREATE PROCEDURE copy_file(fromname VARCHAR2, toname VARCHAR2) AS
BEGIN


    UTL_FILE.FCOPY('DIR1', fromname, 'DIR2', toname, 1, NULL); ...(7)

    RETURN;

EXCEPTION
    WHEN OTHERS THEN
        DBMS_OUTPUT.PUT_LINE('-- SQL Error --');

        DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        RETURN;
END;
/

set serveroutput on

call copy_file('file01.txt','file01_bk.txt');
```

FUJITSU Enterprise Postgres

```
CREATE FUNCTION copy_file(fromname VARCHAR, toname VARCHAR) RETURNS void AS $$
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);

    PERFORM UTL_FILE.FCOPY('/home/fsep', fromname, '/home/backup', toname, 1, NULL); ...(7)
    RETURN;

EXCEPTION
    WHEN OTHERS THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- SQL Error --');
        PERFORM DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        RETURN;
END;
```

```
$$
LANGUAGE plpgsql;


SELECT copy_file('file01.txt','file01_bk.txt');
```

(7) FCOPY

Specification format for Oracle database

UTL_FILE.FCOPY(*firstArg, secondArg*, *thirdArg*, *fourthArg, fifthArg, sixthArg*)

Feature differences

Oracle database

If using a CREATE DIRECTORY statement (Oracle9.2i or later), specify a directory object name for the directory name.

FUJITSU Enterprise Postgres

A directory object name cannot be specified for the directory name.

Conversion procedure

Convert using the following procedure. Refer to UTL_FILE_DIR/CREATE DIRECTORY for information on how to check if the directory object name corresponds to the actual directory name.

1. Locate the places where the keyword "UTL_FILE.FCOPY" is used in the stored procedure.
2. Check the actual directory names ('/home/fsep' and '/home/backup', in the example) that correspond to the directory object names ('DIR1' and 'DIR2', in the example) of *firstArg* and *thirdArg* argument.
3. Replace the directory object name ('DIR1' and 'DIR2', in the example) with the actual directory names ('/home/fsep' in the example) checked in step 1.

B.6.4 Moving/Renaming Files

Oracle database

```
CREATE PROCEDURE move_file(fromname VARCHAR2, toname VARCHAR2) AS
BEGIN


    UTL_FILE.FRENAME('DIR1', fromname, 'DIR2', toname, FALSE); ...(8)
    RETURN;

EXCEPTION
    WHEN OTHERS THEN
        DBMS_OUTPUT.PUT_LINE('-- SQL Error --');

        DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        RETURN;
END;
/

set serveroutput on

call move_file('file01.txt','file02.txt');
```

FUJITSU Enterprise Postgres

```
CREATE FUNCTION move_file(fromname VARCHAR, toname VARCHAR) RETURNS void AS $$
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);
```

```
    PERFORM UTL_FILE.FRENAME('/home/fsep', fromname, '/home/backup', toname, FALSE); ...(8)
    RETURN;

EXCEPTION
    WHEN OTHERS THEN
        PERFORM DBMS_OUTPUT.PUT_LINE('-- SQL Error --');
        PERFORM DBMS_OUTPUT.PUT_LINE('ERROR : ' || SQLERRM );
        RETURN;
END;
$$
LANGUAGE plpgsql;


SELECT move_file('file01.txt','file02.txt');
```

(8) FRENAME

Same as FCOPY for the UTL_FILE package. Refer to FCOPY in the UTL_FILE package for information on specification differences and conversion procedures associated with specification differences.

B.7 DBMS_SQL (Execute Dynamic SQL)

Features

For DBMS_SQL, dynamic SQL can be executed from PL/pgSQL.

B.7.1 Searching Using a Cursor

Oracle database

```
CREATE PROCEDURE search_test(h_where CLOB) AS


    str_sql     CLOB;
    v_cnt       INTEGER;
    v_array     DBMS_SQL.VARCHAR2A;
    v_cur       INTEGER;
    v_smpid     INTEGER;
    v_smpnm     VARCHAR2(20);
    v_addbuff   VARCHAR2(20);
    v_smpage    INTEGER;
    errcd       INTEGER;
    length      INTEGER;
    ret         INTEGER;
BEGIN

   str_sql    := 'SELECT smpid, smpnm FROM smp_tbl WHERE ' || h_where || ' ORDER BY smpid';
    v_smpid     := 0;
    v_smpnm     := '';
    v_smpage    := 0;

    v_cur := DBMS_SQL.OPEN_CURSOR; ...(1)

    v_cnt :=
      CEIL(DBMS_LOB.GETLENGTH(str_sql)/1000);
    FOR idx IN 1 .. v_cnt LOOP
        v_array(idx) :=
            DBMS_LOB.SUBSTR(str_sql,
                            1000,
                            (idx-1)*1000+1);
```

```
    END LOOP;
    DBMS_SQL.PARSE(v_cur, v_array, 1, v_cnt, FALSE, DBMS_SQL.NATIVE); ...(2)

    DBMS_SQL.DEFINE_COLUMN(v_cur, 1, v_smpid);

    DBMS_SQL.DEFINE_COLUMN(v_cur, 2, v_smpnm, 10);


    ret := DBMS_SQL.EXECUTE(v_cur);
    LOOP
        v_addbuff := '';

        IF DBMS_SQL.FETCH_ROWS(v_cur) = 0 THEN
            EXIT;
        END IF;

        DBMS_OUTPUT.PUT_LINE('------------------------------------------------------------');
        DBMS_SQL.COLUMN_VALUE(v_cur, 1, v_smpid, errcd, length); ...(3)




        IF errcd = 1405 THEN ...(3)

          DBMS_OUTPUT.PUT_LINE('smpid       = (NULL)');
        ELSE
          DBMS_OUTPUT.PUT_LINE('smpid       = ' || v_smpid);
        END IF;

        DBMS_SQL.COLUMN_VALUE(v_cur, 2, v_smpnm, errcd, length);

        IF errcd = 1406 THEN
          v_addbuff := '... [len=' || length || ']';
        END IF;
        IF errcd = 1405 THEN
          DBMS_OUTPUT.PUT_LINE('v_smpnm     = (NULL)');
        ELSE
          DBMS_OUTPUT.PUT_LINE('v_smpnm     = ' || v_smpnm || v_addbuff );
        END IF;

DBMS_OUTPUT.PUT_LINE('------------------------------------------------------------');

        DBMS_OUTPUT.NEW_LINE;
    END LOOP;

    DBMS_SQL.CLOSE_CURSOR(v_cur); ...(4)

    RETURN;
END;
/

Set serveroutput on

call search_test('smpid < 100');
```

FUJITSU Enterprise Postgres

```
CREATE FUNCTION search_test(h_where text) RETURNS void AS $$
DECLARE
    str_sql     text;


    v_cur       INTEGER;
```

```
    v_smpid     INTEGER;
    v_smpnm     VARCHAR(20);
    v_addbuff   VARCHAR(20);
    v_smpage    INTEGER;
    errcd       INTEGER;
    length      INTEGER;
    ret         INTEGER;
BEGIN
    PERFORM DBMS_OUTPUT.SERVEROUTPUT(TRUE);
   str_sql    := 'SELECT smpid, smpnm FROM smp_tbl WHERE ' || h_where || ' ORDER BY smpid';
    v_smpid     := 0;
    v_smpnm     := '';
    v_smpage    := 0;

    v_cur := DBMS_SQL.OPEN_CURSOR(); ...(1)

    PERFORM DBMS_SQL.PARSE(v_cur, str_sql, 1); ...(2)
    PERFORM DBMS_SQL.DEFINE_COLUMN(v_cur, 1, v_smpid);
    PERFORM DBMS_SQL.DEFINE_COLUMN(v_cur, 2, v_smpnm, 10);

    ret := DBMS_SQL.EXECUTE(v_cur);
    LOOP
        v_addbuff := '';

        IF DBMS_SQL.FETCH_ROWS(v_cur) = 0 THEN
            EXIT;
        END IF;

        PERFORM
DBMS_OUTPUT.PUT_LINE('-----------------------------------------------------------');
        SELECT value,column_error,actual_length
          INTO v_smpid, errcd, length
          FROM DBMS_SQL.COLUMN_VALUE(v_cur,
                                     1,
                                     v_smpid); ...(3)
        IF errcd = 22002 THEN ...(3)
          PERFORM DBMS_OUTPUT.PUT_LINE('smpid       = (NULL)');
        ELSE
          PERFORM DBMS_OUTPUT.PUT_LINE('smpid       = ' || v_smpid);
        END IF;

        SELECT value,column_error,actual_length INTO v_smpnm, errcd, length FROM
DBMS_SQL.COLUMN_VALUE(v_cur, 2, v_smpnm);
        IF errcd = 22001 THEN
          v_addbuff := '... [len=' || length || ']';
        END IF;
        IF errcd = 22002 THEN
          PERFORM DBMS_OUTPUT.PUT_LINE('v_smpnm     = (NULL)');
        ELSE
          PERFORM DBMS_OUTPUT.PUT_LINE('v_smpnm     = ' || v_smpnm || v_addbuff );
        END IF;

        PERFORM
DBMS_OUTPUT.PUT_LINE('-----------------------------------------------------------');
        PERFORM DBMS_OUTPUT.NEW_LINE();
    END LOOP;

    v_cur := DBMS_SQL.CLOSE_CURSOR(v_cur); ...(4)
    RETURN;
END;
$$
LANGUAGE plpgsql;
```

```
SELECT search_test('smpid < 100');
```

(1) OPEN_CURSOR

Same as NEW_LINE in the DBMS_OUTPUT package. Refer to NEW_LINE in the DBMS_OUTPUT package for information on specification differences and conversion procedures associated with specification differences.

(2) PARSE

Specification format for Oracle database

DBMS_SQL.PARSE(*firstArg, secondArg*, *thirdArg*, *fourthArg*, *fifthArg*)

Feature differences

Oracle database

SQL statements can be specified with string table types (VARCHAR2A type, VARCHAR2S type). Specify this for *secondArg*.

DBMS_SQL.NATIVE, DBMS_SQL.V6, DBMS_SQL.V7 can be specified for processing SQL statements.

FUJITSU Enterprise Postgres

SQL statements cannot be specified with string table types.

DBMS_SQL.NATIVE, DBMS_SQL.V6, DBMS_SQL.V7 cannot be specified for processing SQL statements.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_SQL.PARSE" is used in the stored procedure.
2. Check the data type of the SQL statement specified for *secondArg* (v_array in the example).
   - If the data type is either DBMS_SQL.VARCHAR2A type or DBMS_SQL.VARCHAR2S type, then it is a table type specification. Execute step 3 and continue the conversion process.
   - If the data type is neither DBMS_SQL.VARCHAR2A type nor DBMS_SQL.VARCHAR2S type, then it is a string specification. Execute step 7 and continue the conversion process.
3. Check the SQL statement (str_sql in the example) before it was divided into DBMS_SQL.VARCHAR2A type and DBMS_SQL.VARCHAR2S type.
4. Delete the sequence of the processes (processes near FOR idx in the example) where SQL is divided into DBMS_SQL.VARCHAR2A type and DBMS_SQL.VARCHAR2S type.
5. Replace *secondArg* with the SQL statement (str_sql in the example) before it is divided, that was checked in step 2.
6. Delete *thirdArg*, *fourthArg*, and *fifthArg* (v_cnt, FALSE, DBMS_SQL.NATIVE, in the example).
7. If DBMS_SQL.NATIVE, DBMS_SQL.V6, and DBMS_SQL.V7 are specified, then replace *thirdArg* with a numeric literal 1.
   - If either DBMS_SQL.VARCHAR2A type or DBMS_SQL.VARCHAR2S type is used, then *sixthArg* becomes relevant.
   - If neither DBMS_SQL.VARCHAR2A type nor DBMS_SQL.VARCHAR2S type is used, then *thirdArg* becomes relevant.

(3) COLUMN_VALUE

Specification format for Oracle database

DBMS_SQL.COLUMN_VALUE(*firstArg, secondArg*, *thirdArg*, *fourthArg*, *fifthArg*)

Feature differences

Oracle database

The following error codes are returned for column_error.

- 1406: fetched column value was truncated
- 1405: fetched column value is NULL

FUJITSU Enterprise Postgres

The following error codes are returned for column_error.

- 22001: string_data_right_truncation
- 22002: null_value_no_indicator_parameter

Specification differences

Oracle database

Obtained values are received with variables specified for arguments.

FUJITSU Enterprise Postgres

Since obtained values are the search results for DBMS_SQL.COLUMN_VALUE, they are received with variables specified for the INTO clause of the SELECT statement.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_SQL.COLUMN_VALUE" is used in the stored procedure.
2. Replace the DBMS_SQL.COLUMN_VALUE location called with a SELECT INTO statement.
   - Check the number of arguments (v_smpid, errcd, and length in the example) specified after *secondArg* (1 in the example) of DBMS_SQL.COLUMN_VALUE.
   - Specify "value", "column_error", and "actual_length" in the select list, according to the number of arguments checked in the previous step (for example, if only *thirdArg* is specified, then specify "value" only.)
   - Specify *thirdArg*, *fourthArg*, and *fifthArg* (v_smpid, errcd, length in the example) configured for DBMS_SQL.COLUMN_VALUE, for the INTO clause.
   - Use DBMS_SQL.COLUMN_VALUE in the FROM clause. Specify *firstArg*, *secondArg*, and *thirdArg* (v_cur, 1, v_smpid, in the example) before modification.
3. If the *fourthArg* (column_error value in the example) is used, then check the location of the target variable (errcd in the example).
4. If a decision process is performed in the location checked, then modify the values used in the decision process as below:
   - 1406 to 22001
   - 1405 to 22002

(4) CLOSE_CURSOR

Specification format for Oracle database

DBMS_SQL.CLOSE_CURSOR(*firstArg*)

Specification differences

Oracle database

After closing, the cursor specified in *firstArg* becomes NULL.

FUJITSU Enterprise Postgres

After closing, set the cursor to NULL by assigning the return value of DBMS_SQL.CLOSE_CURSOR to it.

Conversion procedure

Convert using the following procedure:

1. Locate the places where the keyword "DBMS_SQL.CLOSE_CURSOR" is used in the stored procedure.
2. Set the cursor to NULL by assigning (:=) the return value of DBMS_SQL.CLOSE_CURSOR to it.
   - On the left-hand side, specify the argument (v_cur in the example) specified for DBMS_SQL.CLOSE_CURSOR.
   - Use DBMS_SQL.CLOSE_CURSOR in the right-hand side. For the argument, specify the same value (v_cur in the example) as before modification.

Appendix C Tables Used by the Features Compatible with Oracle Databases

This chapter describes the tables used by the features compatible with Oracle databases.

C.1 UTL_FILE.UTL_FILE_DIR

Register the directory handled by the UTL_FILE package in the UTL_FILE.UTL_FILE_DIR table.

Name	Type	Description
dir	text	Name of the directory handled by the UTL_FILE package

Appendix D ECOBPG - Embedded SQL in COBOL

This appendix describes application development using embedded SQL in COBOL.

D.1 Precautions when Using Functions and Operators

An embedded SQL program consists of code written in an ordinary programming language, in this case COBOL, mixed with SQL commands in specially marked sections. To build the program, the source code (*.pco) is first passed through the embedded SQL preprocessor, which converts it to an ordinary COBOL program (*.cob), and afterwards it can be processed by a COBOL compiler. (For details about the compiling and linking see "D.9 Processing Embedded SQL Programs".) Converted ECOBPG applications call functions in the libpq library through the embedded SQL library (ecpglib), and communicate with the PostgreSQL server using the normal frontend-backend protocol.

Embedded SQL has advantages over other methods for handling SQL commands from COBOL code. First, it takes care of the tedious passing of information to and from variables in your C program. Second, the SQL code in the program is checked at build time for syntactical correctness. Third, embedded SQL in COBOL is specified in the SQL standard and supported by many other SQL database systems. The PostgreSQL implementation is designed to match this standard as much as possible, and it is usually possible to port embedded SQL programs written for other SQL databases to PostgreSQL with relative ease.

As already stated, programs written for the embedded SQL interface are normal COBOL programs with special code inserted to perform database-related actions. This special code always has the form:

```
EXEC SQL ... END-EXEC
```

These statements syntactically take the place of a COBOL statement. Depending on the particular statement, they can appear at the data division or at the procedure division. Actual executable SQLs need to be placed at the procedure division, and host variable declarations need to be placed at data division. However, the precompiler does not validate their placements. Embedded SQL statements follow the case-sensitivity rules of normal SQL code, and not those of COBOL.

For COBOL code notation, "fixed' or "variable" can be used. In each line, columns 1 to 6 constitute the line number area, and column 7 is the indicator area. Embedded SQL programs also should be placed in area B (column 12 and beyond).

Note that sample code in this document omits indents for each area.

ECOBPG processes or outputs programs according to the COBOL code notation. COBOL code notation is specified using the ecobpg command. Note, however, that the following restrictions apply:

- For "fixed" notation, area B is from columns 12 to 72. Characters in column 73 and beyond are deleted in the precompiled source.
- For "variable" notation, area B is from column 12 to the last column of that record (up to column 251). Characters in column 252 and beyond are deleted in the precompiled source.

ECOBPG accepts as many COBOL statements as possible. Note, however, that the following restrictions apply:

- In declaring host variable section, you can't use debug line.
- Outside of declaring host variable section, you can use debug line, but you can't contain any SQL in debug lines.
- In declaring host variable section, you can't use commas or semicolons as separator. Use space instead.
- EXEC SQL VAR command, it can be used in ECPG, is not available in ECOBPG. Use REDEFINE clause of COBOL instead.

The following sections explain all the embedded SQL statements.

D.2 Managing Database Connections

This section describes how to open, close, and switch database connections.

D.2.1 Connecting to the Database Server

One connects to a database using the following statement:

```
EXEC SQL CONNECT TO target [AS connection-name] [USER user-name] END-EXEC.
```

The target can be specified in the following ways:

- dbname[@hostname][:port]
- tcp:postgresql://hostname[:port][/dbname][?options]
- unix:postgresql://hostname[:port][/dbname][?options]
- an SQL string literal containing one of the above forms
- a reference to a character variable containing one of the above forms (see examples)
- DEFAULT

If you specify the connection target literally (that is, not through a variable reference) and you don't quote the value, then the case-insensitivity rules of normal SQL are applied. In that case you can also double-quote the individual parameters separately as needed. In practice, it is probably less error-prone to use a (single-quoted) string literal or a variable reference. The connection target DEFAULT initiates a connection to the default database under the default user name. No separate user name or connection name can be specified in that case.

There are also different ways to specify the user name:

- username
- username/password
- username IDENTIFIED BY password
- username USING password

As above, the parameters username and password can be an SQL identifier, an SQL string literal, or a reference to a character variable.

The connection-name is used to handle multiple connections in one program. It can be omitted if a program uses only one connection. The most recently opened connection becomes the current connection, which is used by default when an SQL statement is to be executed (see later in this chapter).

Here are some examples of CONNECT statements:

```
EXEC SQL CONNECT TO mydb@sql.mydomain.com END-EXEC.
```

```
EXEC SQL CONNECT TO tcp:postgresql://sql.mydomain.com/mydb AS myconnection USER john END-
EXEC.
```

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 TARGET PIC X(25).
01 USER PIC X(5).
EXEC SQL END DECLARE SECTION END-EXEC.
 ...
MOVE "mydb@sql.mydomain.com" TO TARGET.
MOVE "john" TO USER.
EXEC SQL CONNECT TO :TARGET USER :USER END-EXEC.
```

The last form makes use of the variant referred to above as character variable reference. For this purpose, only fixed-length string(no VARYING) variable can be used. Trailing spaces are ignored. You will see in later sections how COBOL variables can be used in SQL statements when you prefix them with a colon.

Be advised that the format of the connection target is not specified in the SQL standard. So if you want to develop portable applications, you might want to use something based on the last example above to encapsulate the connection target string somewhere.

D.2.2 Choosing a Connection

SQL statements in embedded SQL programs are by default executed on the current connection, that is, the most recently opened one. If an application needs to manage multiple connections, then there are two ways to handle this.

The first option is to explicitly choose a connection for each SQL statement, for example:

```
EXEC SQL AT connection-name SELECT ... END-EXEC.
```

This option is particularly suitable if the application needs to use several connections in mixed order.

If your application uses multiple threads of execution, they cannot share a connection concurrently. You must either explicitly control access to the connection (using mutexes) or use a connection for each thread. If each thread uses its own connection, you will need to use the AT clause to specify which connection the thread will use.

The second option is to execute a statement to switch the current connection. That statement is:

```
EXEC SQL SET CONNECTION connection-name END-EXEC.
```

This option is particularly convenient if many statements are to be executed on the same connection. It is not thread-aware.

Here is an example program managing multiple database connections:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 DBNAME PIC X(7).
EXEC SQL END DECLARE SECTION END-EXEC.

    EXEC SQL CONNECT TO testdb1 AS con1 USER testuser END-EXEC.
    EXEC SQL CONNECT TO testdb2 AS con2 USER testuser END-EXEC.
    EXEC SQL CONNECT TO testdb3 AS con3 USER testuser END-EXEC.

*   This query would be executed in the last opened database "testdb3".
    EXEC SQL SELECT current_database() INTO :DBNAME END-EXEC.
    DISPLAY "current=" DBNAME " (should be testdb3)".

*   Using "AT" to run a query in "testdb2"
    EXEC SQL AT con2 SELECT current_database() INTO :DBNAME END-EXEC.
    DISPLAY "current=" DBNAME " (should be testdb2)".

*   Switch the current connection to "testdb1".
    EXEC SQL SET CONNECTION con1 END-EXEC.

    EXEC SQL SELECT current_database() INTO :DBNAME END-EXEC.
    DISPLAY "current=" DBNAME " (should be testdb1)".

    EXEC SQL DISCONNECT ALL END-EXEC.
```

This example would produce this output:

```
current=testdb3 (should be testdb3)
current=testdb2 (should be testdb2)
current=testdb1 (should be testdb1)
```

D.2.3 Closing a Connection

To close a connection, use the following statement:

```
EXEC SQL DISCONNECT [connection] END-EXEC.
```

The connection can be specified in the following ways:

- connection-name
- DEFAULT
- CURRENT
- ALL

If no connection name is specified, the current connection is closed.

It is good style that an application always explicitly disconnect from every connection it opened.

D.3 Running SQL Commands

Any SQL command can be run from within an embedded SQL application. Below are some examples of how to do that.

D.3.1 Executing SQL Statements

Creating a table:

```
EXEC SQL CREATE TABLE foo (number integer, ascii char(16)) END-EXEC.
EXEC SQL CREATE UNIQUE INDEX num1 ON foo(number) END-EXEC.
EXEC SQL COMMIT END-EXEC.
```

Inserting rows:

```
EXEC SQL INSERT INTO foo (number, ascii) VALUES (9999, 'doodad') END-EXEC.
EXEC SQL COMMIT END-EXEC.
```

Deleting rows:

```
EXEC SQL DELETE FROM foo WHERE number = 9999 END-EXEC.
EXEC SQL COMMIT END-EXEC.
```

Updates:

```
EXEC SQL UPDATE foo
    SET ascii = 'foobar'
    WHERE number = 9999 END-EXEC.
EXEC SQL COMMIT END-EXEC.
```

SELECT statements that return a single result row can also be executed using EXEC SQL directly. To handle result sets with multiple rows, an application has to use a cursor; see "D.3.2 Using Cursors" below. (As a special case, an application can fetch multiple rows at once into an array host variable; see "Arrays".)

Single-row select:

```
EXEC SQL SELECT foo INTO :FooBar FROM table1 WHERE ascii = 'doodad' END-EXEC.
```

Also, a configuration parameter can be retrieved with the SHOW command:

```
EXEC SQL SHOW search_path INTO :var END-EXEC.
```

The tokens of the form :something are *host variables*, that is, they refer to variables in the COBOL program. They are explained in "D.4 Using Host Variables".

D.3.2 Using Cursors

To retrieve a result set holding multiple rows, an application has to declare a cursor and fetch each row from the cursor. The steps to use a cursor are the following: declare a cursor, open it, fetch a row from the cursor, repeat, and finally close it.

Select using cursors:

```
EXEC SQL DECLARE foo_bar CURSOR FOR
    SELECT number, ascii FROM foo
    ORDER BY ascii END-EXEC.
EXEC SQL OPEN foo_bar END-EXEC.
EXEC SQL FETCH foo_bar INTO :FooBar, :DooDad END-EXEC.
...
EXEC SQL CLOSE foo_bar END-EXEC.
EXEC SQL COMMIT END-EXEC.
```

For more details about declaration of the cursor, see "D.11.4 DECLARE", and refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on FETCH command.

Note: The ECOBPG DECLARE command does not actually cause a statement to be sent to the PostgreSQL backend. The cursor is opened in the backend (using the backend's DECLARE command) at the point when the OPEN command is executed.

D.3.3 Managing Transactions

In the default mode, statements are committed only when EXEC SQL COMMIT is issued. The embedded SQL interface also supports autocommit of transactions (similar to libpq behavior) via the -t command-line option to ecobpg or via the EXEC SQL SET AUTOCOMMIT TO ON statement. In autocommit mode, each command is automatically committed unless it is inside an explicit transaction block. This mode can be explicitly turned off using EXEC SQL SET AUTOCOMMIT TO OFF.

See

Refer to "ecpg" in "PostgreSQL Client Applications" in the PostgreSQL Documentation for information on -t command-line option to ecobpg.

The following transaction management commands are available:

EXEC SQL COMMIT END-EXEC

Commit an in-progress transaction.

EXEC SQL ROLLBACK END-EXEC

Roll back an in-progress transaction.

EXEC SQL SET AUTOCOMMIT TO ON END-EXEC

Enable autocommit mode.

EXEC SQL SET AUTOCOMMIT TO OFF END-EXEC

Disable autocommit mode. This is the default.

D.3.4 Prepared Statements

When the values to be passed to an SQL statement are not known at compile time, or the same statement is going to be used many times, then prepared statements can be useful.

The statement is prepared using the command PREPARE. For the values that are not known yet, use the placeholder "?":

```
EXEC SQL PREPARE stmt1 FROM "SELECT oid, datname FROM pg_database WHERE oid = ?" END-EXEC.
```

If a statement returns a single row, the application can call EXECUTE after PREPARE to execute the statement, supplying the actual values for the placeholders with a USING clause:

```
EXEC SQL EXECUTE stmt1 INTO :dboid, :dbname USING 1 END-EXEC.
```

If a statement returns multiple rows, the application can use a cursor declared based on the prepared statement. To bind input parameters, the cursor must be opened with a USING clause:

```
EXEC SQL PREPARE stmt1 FROM "SELECT oid,datname FROM pg_database WHERE oid > ?" END-EXEC.
EXEC SQL DECLARE foo_bar CURSOR FOR stmt1 END-EXEC.

* when end of result set reached, break out of while loop
EXEC SQL WHENEVER NOT FOUND GOTO FETCH-END END-EXEC.

EXEC SQL OPEN foo_bar USING 100 END-EXEC.
...
PERFORM NO LIMIT
    EXEC SQL FETCH NEXT FROM foo_bar INTO :dboid, :dbname END-EXEC
END-PERFORM.

FETCH-END.
EXEC SQL CLOSE foo_bar END-EXEC.
```

When you don't need the prepared statement anymore, you should deallocate it:

```
EXEC SQL DEALLOCATE PREPARE name END-EXEC.
```

For more details about PREPARE, see "D.11.10 PREPARE". Also see "D.5 Dynamic SQL" for more details about using placeholders and input parameters.

D.4 Using Host Variables

In "D.3 Running SQL Commands" you saw how you can execute SQL statements from an embedded SQL program. Some of those statements only used fixed values and did not provide a way to insert user-supplied values into statements or have the program process the values returned by the query. Those kinds of statements are not really useful in real applications. This section explains in detail how you can pass data between your COBOL program and the embedded SQL statements using a simple mechanism called host variables. In an embedded SQL program we consider the SQL statements to be guests in the COBOL program code which is the host language. Therefore the variables of the COBOL program are called host variables.

Another way to exchange values between PostgreSQL backends and ECOBPG applications is the use of SQL descriptors, described in "D.6 Using Descriptor Areas".

D.4.1 Overview

Passing data between the COBOL program and the SQL statements is particularly simple in embedded SQL. Instead of having the program paste the data into the statement, which entails various complications, such as properly quoting the value, you can simply write the name of a COBOL variable into the SQL statement, prefixed by a colon. For example:

```
EXEC SQL INSERT INTO sometable VALUES (:v1, 'foo', :v2) END-EXEC.
```

This statements refers to two COBOL variables named v1 and v2 and also uses a regular SQL string literal, to illustrate that you are not restricted to use one kind of data or the other.

This style of inserting COBOL variables in SQL statements works anywhere a value expression is expected in an SQL statement.

D.4.2 Declare Sections

To pass data from the program to the database, for example as parameters in a query, or to pass data from the database back to the program, the COBOL variables that are intended to contain this data need to be declared in specially marked sections, so the embedded SQL preprocessor is made aware of them.

This section starts with:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
```

and ends with:

```
EXEC SQL END DECLARE SECTION END-EXEC.
```

Between those lines, there must be normal COBOL variable declarations, such as:

```
01 INTX PIC S9(9) COMP VALUE 4.
01 FOO PIC X(15).
01 BAR PIC X(15).
```

As you can see, you can optionally assign an initial value to the variable. The variable's scope is determined by the location of its declaring section within the program.

You can have as many declare sections in a program as you like.

The declarations are also echoed to the output file as normal COBOL variables, so there's no need to declare them again. Variables that are not intended to be used in SQL commands can be declared normally outside these special sections.

The definition of a group item also must be listed inside a DECLARE section. Otherwise the preprocessor cannot handle these types since it does not know the definition.

D.4.3 Retrieving Query Results

Now you should be able to pass data generated by your program into an SQL command. But how do you retrieve the results of a query? For that purpose, embedded SQL provides special variants of the usual commands SELECT and FETCH. These commands have a special INTO clause that specifies which host variables the retrieved values are to be stored in. SELECT is used for a query that returns only single row, and FETCH is used for a query that returns multiple rows, using a cursor.

Here is an example:

```
*
* assume this table:
* CREATE TABLE test (a int, b varchar(50));
*

 EXEC SQL BEGIN DECLARE SECTION END-EXEC.
 01 V1 PIC S9(9).
 01 V2 PIC X(50) VARYING.
 EXEC SQL END DECLARE SECTION END-EXEC.

 ...

 EXEC SQL SELECT a, b INTO :V1, :V2 FROM test END-EXEC.
```

So the INTO clause appears between the select list and the FROM clause. The number of elements in the select list and the list after INTO (also called the target list) must be equal.

Here is an example using the command FETCH:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 V1 PIC S9(9).
01 V2 PIC X(50) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

 ...

EXEC SQL DECLARE foo CURSOR FOR SELECT a, b FROM test END-EXEC.

 ...

PERFORM WITH
    ...
    EXEC SQL FETCH NEXT FROM foo INTO :V1, :V2 END-EXEC
```

```
    ...
END-PERFORM.
```

Here the INTO clause appears after all the normal clauses.

D.4.4 Type Mapping

When ECOBPG applications exchange values between the PostgreSQL server and the COBOL application, such as when retrieving query results from the server or executing SQL statements with input parameters, the values need to be converted between PostgreSQL data types and host language variable types (specifically COBOL language data types). One of the main points of ECOBPG is that it takes care of this automatically in most cases.

In this respect, there are two kinds of data types: Some simple PostgreSQL data types, such as integer and text, can be read and written by the application directly. Other PostgreSQL data types, such as timestamp and date can only be accessed through character strings. special library functions does not exist in ecobpg. (pgtypes, exists in ECPG, for COBOL is not implemented yet)

"Table D.1 Mapping Between PostgreSQL Data Types and COBOL Variable Types" shows which PostgreSQL data types correspond to which COBOL data types. When you wish to send or receive a value of a given PostgreSQL data type, you should declare a COBOL variable of the corresponding COBOL data type in the declare section.

Table D.1 Mapping Between PostgreSQL Data Types and COBOL Variable Types

PostgreSQL data type	COBOL Host variable type
smallint	PIC S9([1-4]) {BINARY|COMP|COMP-5}
integer	PIC S9([5-9]) {BINARY|COMP|COMP-5}
bigint	PIC S9([10-18]) {BINARY|COMP|COMP-5}
decimal	PIC S9(m)V9(n) PACKED-DECIMAL PIC 9(m)V9(n) DISPLAY (*1) PIC S9(m)V9(n) DISPLAY PIC S9(m)V9(n) DISPLAY SIGN TRAILING [SEPARATE] PIC S9(m)V9(n) DISPLAY SIGN LEADING [SEPARATE]
numeric	(same with decimal)
real	COMP-1
double precision	COMP-2
small serial	PIC S9([1-4]) {BINARY|COMP|COMP-5}
serial	PIC S9([1-9]) {BINARY|COMP|COMP-5}
bigserial	PIC S9([10-18]) {BINARY|COMP|COMP-5}
oid	PIC 9(9) {BINARY|COMP|COMP-5}
character(*n*), varchar(*n*), text	PIC X(*n*), PIC X(*n*) VARYING
name	PIC X(NAMEDATALEN)
boolean	BOOL(*2)
bytea	BYTEA(n)
other types(e.g. timestamp)	PIC X(*n*), PIC X(*n*) VARYING
*1: If no USAGE is specified, host variable is regarded as DISPLAY. *2: Type definition is added automatically on pre-compiling. Body of BOOL is PIC X(1). '1' for true and '0' for false. You can use some pattern of digits for integer(see table), but if database sends big number with more digits than specified, behavior is undefined.	

PostgreSQL data type	COBOL Host variable type
VALUE clause can't be used with VARYING. (Can be used with other types) REDEFINE clause can be used, but it won't be validated on pre-compilation (The COBOL compiler will do this).	

Handling Character Strings

To handle SQL character string data types, such as varchar and text, there is a possible way to declare the host variables.

The way is using the PIC X(*n*) VARYING type (we call it VARCHAR type from now on), which is a special type provided by ECOBPG. The definition on type VARCHAR is converted into a group item consists of named variables. A declaration like:

```
01 VAR PIC X(180) VARYING.
```

is converted into:

```
01 VAR.
49 LEN PIC S9(4) COMP-5.
49 ARR PIC X(180).
```

if --varchar-with-named-member option is used, it is converted into:

```
01 VAR.
49 VAR-LEN PIC S9(4) COMP-5.
49 VAR-ARR PIC X(180).
```

You can use level 1 to 48 for VARCHAR. Don't use level 49 variable right after VARCHAR variable. To use a VARCHAR host variable as an input for SQL statement, LEN must be set the length of the string included in ARR.

To use a VARCHAR host variable as an output of SQL statement, the variable must be declared in a sufficient length. If the length is insufficient, it can cause a buffer overrun.

PIC X(*n*) and VARCHAR host variables can also hold values of other SQL types, which will be stored in their string forms.

Accessing Special Data Types

ECOBPG doesn't have special support for date, timestamp, and interval types.
(ECPG has pgtypes, but ECOBPG doesn't.)
You can use PIC X(*n*) or VARCHAR for DB I/O with these types. See "Data Types" section in PostgreSQL's document.

bytea

Handling of bytea types is similar to VARCHAR. The definition of an array of type bytea is converted into a group item consists of named variables.

A declaration like:

```
01 var bytea(100).
```

is converted into:

```
01 var .
49 LEN PIC S9(9) COMP-5 .
49 ARR PIC X(100) .
```

if bytea-with-named-member option is used, it is converted into:

```
01 var .
49 var-LEN PIC S9(9) COMP-5 .
49 var-ARR PIC X(100) .
```

The data item ARR holds binary format data. Unlike VARCHAR, it is not affected by the locale or character encoding when processing data.

Other usage and prohibitions are the same as VARCHAR.

Note

The bytea variable can only be used if byta_output is set to hex.

Host Variables with Nonprimitive Types

As a host variable you can also use arrays, typedefs, and group items.

Arrays

To create and use array variables, OCCURENCE syntax is provided by COBOL.

The typical use case is to retrieve multiple rows from a query result without using a cursor. Without an array, to process a query result consisting of multiple rows, it is required to use a cursor and the FETCH command. But with array host variables, multiple rows can be received at once. The length of the array has to be defined to be able to accommodate all rows, otherwise a buffer overrun will likely occur.

Following example scans the pg_database system table and shows all OIDs and names of the available databases:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 GROUP-ITEM.
    05 DBID PIC S9(9) COMP OCCURS 8.
    05 DBNAME PIC X(16) OCCURS 8.
01 I PIC S9(9) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.


    EXEC SQL CONNECT TO testdb END-EXEC.

*   Retrieve multiple rows into arrays at once.
    EXEC SQL SELECT oid,datname INTO :DBID, :DBNAME FROM pg_database END-EXEC.

    PERFORM VARYING I FROM 1 BY 1 UNTIL I > 8
        DISPLAY "oid=" DBID(I) ", dbname=" DBNAME(I)
    END-PERFORM.

    EXEC SQL COMMIT END-EXEC.
    EXEC SQL DISCONNECT ALL END-EXEC.
```

You can use member of array as simple host variable by specifying subscript of array. For specifying subscript, use C-style "[1]", not COBOL-style "(1)". But subscript starts with 1, according to COBOL syntax.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 GROUP-ITEM.
    05 DBID PIC S9(9) COMP OCCURS 8.
EXEC SQL END DECLARE SECTION END-EXEC.

    EXEC SQL CONNECT TO testdb END-EXEC.

    EXEC SQL SELECT oid INTO :DBID[1] FROM pg_database WHERE oid=1 END-EXEC.

        DISPLAY "oid=" DBID(1)

    EXEC SQL COMMIT END-EXEC.
    EXEC SQL DISCONNECT ALL END-EXEC.
```

Group Item

A group item whose subordinate item names match the column names of a query result, can be used to retrieve multiple columns at once. The group item enables handling multiple column values in a single host variable.

The following example retrieves OIDs, names, and sizes of the available databases from the pg_database system table by using the pg_database_size() function. In this example, a group item variable dbinfo_t with members whose names match each column in the SELECT result is used to retrieve one result row without putting multiple host variables in the FETCH statement.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 DBINFO-T TYPEDEF.
       02 OID PIC S9(9) COMP.
       02 DATNAME PIC X(65).
       02 DBSIZE PIC S9(18) COMP.

    01 DBVAL TYPE DBINFO-T.
EXEC SQL END DECLARE SECTION END-EXEC.


    EXEC SQL DECLARE cur1 CURSOR FOR SELECT oid, datname, pg_database_size(oid) AS size
FROM pg_database END-EXEC.
    EXEC SQL OPEN cur1 END-EXEC.

*   when end of result set reached, break out of loop
    EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

    PERFORM NO LIMIT
*        Fetch multiple columns into one structure.
        EXEC SQL FETCH FROM cur1 INTO :DBVAL END-EXEC

*        Print members of the structure.
        DISPLAY "oid=" OID ", datname=" DATNAME ", size=" DBSIZE
    END-PERFORM.

    END-FETCH.
    EXEC SQL CLOSE cur1 END-EXEC.
```

group item host variables "absorb" as many columns as the group item as subordinate items. Additional columns can be assigned to other host variables. For example, the above program could also be restructured like this, with the size variable outside the group item:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 DBINFO-T TYPEDEF.
       02 OID PIC S9(9) COMP.
       02 DATNAME PIC X(65).

    01 DBVAL TYPE DBINFO-T.
    01 DBSIZE PIC S9(18) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.


    EXEC SQL DECLARE cur1 CURSOR FOR SELECT oid, datname, pg_database_size(oid) AS size
FROM pg_database END-EXEC.
    EXEC SQL OPEN cur1 END-EXEC.

*   when end of result set reached, break out of loop
    EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

    PERFORM NO LIMIT
*       Fetch multiple columns into one structure.
        EXEC SQL FETCH FROM cur1 INTO :DBVAL, :DBSIZE END-EXEC

*       Print members of the structure.
        DISPLAY "oid=" OID ", datname=" DATNAME ", size=" DBSIZE
    END-PERFORM
```

```
    FETCH-END.
    EXEC SQL CLOSE cur1 END-EXEC.
```

You can use only non-nested group items for host variable of SQL statement. Declaration of nested group items are OK, but you must specify non-nested part of group items for SQL. (VARCHAR, is translated to group item on pre-compilation, is not considered as offense of this rule.) When using inner item of group item in SQL, use C-struct like period separated syntax(not COBOL's A OF B). Here is example.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 NESTED-GROUP.
  02 CHILD1.
    03 A PIC X(10).
    03 B PIC S9(9) COMP.
  02 CHILD2.
    03 A PIC X(10).
    03 B PIC S9(9) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.

* This SQL is valid. CHILD1 has no nested group items.
EXEC SQL SELECT * INTO :NESTED-GROUP.CHILD1 FROM TABLE1 END-EXEC.
```

For specifying basic item of group items, full specification is not needed if the specification is enough for identifying the item. This is from COBOL syntax. For more detail, see resources of COBOL syntax.

TYPEDEF

Use the typedef keyword to map new types to already existing types.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 MYCHARTYPE TYPEDEF PIC X(40).
    01 SERIAL-T TYPEDEF PIC S9(9) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.
```

Note that you could also use:

```
EXEC SQL TYPE SERIAL-T IS PIC S9(9) COMP-5. END-EXEC.
```

This declaration does not need to be part of a declare section.

D.4.5 Handling Nonprimitive SQL Data Types

This section contains information on how to handle nonscalar and user-defined SQL-level data types in ECOBPG applications. Note that this is distinct from the handling of host variables of nonprimitive types, described in the previous section.

Arrays

SQL-level arrays are not directly supported in ECOBPG. It is not possible to simply map an SQL array into a COBOL array host variable. This will result in undefined behavior. Some workarounds exist, however.

If a query accesses elements of an array separately, then this avoids the use of arrays in ECOBPG. Then, a host variable with a type that can be mapped to the element type should be used. For example, if a column type is array of integer, a host variable of type PIC S9(9) COMP can be used. Also if the element type is varchar or text, a host variable of type VARCHAR can be used.

Here is an example. Assume the following table:

```
CREATE TABLE t3 (
    ii integer[]
);

testdb=> SELECT * FROM t3;
     ii
-------------
 {1,2,3,4,5}
(1 row)
```

The following example program retrieves the 4th element of the array and stores it into a host variable of type PIC S9(9) COMP-5:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 II PIC S9(9) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.


EXEC SQL DECLARE cur1 CURSOR FOR SELECT ii[4] FROM t3 END-EXEC.
EXEC SQL OPEN cur1 END-EXEC.


EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.


PERFORM NO LIMIT
    EXEC SQL FETCH FROM cur1 INTO :II  END-EXEC
    DISPLAY "ii=" II
END-PERFORM.

END-FETCH.
EXEC SQL CLOSE cur1 END-EXEC.
```

To map multiple array elements to the multiple elements in an array type host variables each element of array column and each element of the host variable array have to be managed separately, for example:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 GROUP-ITEM.
    05 II_A PIC S9(9) COMP OCCURS 8.
EXEC SQL END DECLARE SECTION END-EXEC.

EXEC SQL DECLARE cur1 CURSOR FOR SELECT ii[1], ii[2], ii[3], ii[4] FROM t3 END-EXEC.
EXEC SQL OPEN cur1 END-EXEC.

EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
    EXEC SQL FETCH FROM cur1 INTO :II_A[1], :II_A[2], :II_A[3], :II_A[4] END-EXEC
    ...
END-PERFORM.
```

Note again that.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 GROUP-ITEM.
    05 II_A PIC S9(9) COMP OCCURS 8.
EXEC SQL END DECLARE SECTION END-EXEC.

EXEC SQL DECLARE cur1 CURSOR FOR SELECT ii FROM t3 END-EXEC.
EXEC SQL OPEN cur1 END-EXEC.
```

```
EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
*    WRONG
     EXEC SQL FETCH FROM cur1 INTO :II_A END-EXEC
     ...
END-PERFORM.
```

would not work correctly in this case, because you cannot map an array type column to an array host variable directly.

Another workaround is to store arrays in their external string representation in host variables of type VARCHAR. For more details about this representation.

See

Refer to "Arrays" in "Tutorial" in the PostgreSQL Documentation for information more details about this representation.

Note that this means that the array cannot be accessed naturally as an array in the host program (without further processing that parses the text representation).

Composite Types

Composite types are not directly supported in ECOBPG, but an easy workaround is possible. The available workarounds are similar to the ones described for arrays above: Either access each attribute separately or use the external string representation.

For the following examples, assume the following type and table:

```
CREATE TYPE comp_t AS (intval integer, textval varchar(32));
CREATE TABLE t4 (compval comp_t);
INSERT INTO t4 VALUES ( (256, 'PostgreSQL') );
```

The most obvious solution is to access each attribute separately. The following program retrieves data from the example table by selecting each attribute of the type comp_t separately:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 INTVAL PIC S9(9) COMP.
01 TEXTVAL PIC X(33) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

* Put each element of the composite type column in the SELECT list.
EXEC SQL DECLARE cur1 CURSOR FOR SELECT (compval).intval, (compval).textval FROM t4 END-
EXEC.
EXEC SQL OPEN cur1 END-EXEC.

EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
*    Fetch each element of the composite type column into host variables.
     EXEC SQL FETCH FROM cur1 INTO :INTVAL, :TEXTVAL END-EXEC

     DISPLAY "intval=" INTVAL ", textval=" ARR OF TEXTVAL
END-PERFORM.

END-FETCH.
EXEC SQL CLOSE cur1 END-EXEC.
```

To enhance this example, the host variables to store values in the FETCH command can be gathered into one group item. For more details about the host variable in the group item form, see "Group Item". To switch to the group item, the example can be modified as below. The two host variables, intval and textval, become subordinate items of the comp_t group item, and the group item is specified on the FETCH command.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 COMP-T TYPEDEF.
    02 INTVAL PIC S9(9) COMP.
    02 TEXTVAL PIC X(33) VARYING.

01 COMPVAL TYPE COMP-T.
EXEC SQL END DECLARE SECTION END-EXEC.

* Put each element of the composite type column in the SELECT list.
EXEC SQL DECLARE cur1 CURSOR FOR SELECT (compval).intval, (compval).textval FROM t4 END-
EXEC.
EXEC SQL OPEN cur1 END-EXEC.
EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
*   Put all values in the SELECT list into one structure.
    EXEC SQL FETCH FROM cur1 INTO :COMPVAL END-EXEC

    DISPLAY "intval=" INTVAL ", textval=" ARR OF TEXTVAL
END-PERFORM.

END-FETCH.
EXEC SQL CLOSE cur1 END-EXEC.
```

Although a group item is used in the FETCH command, the attribute names in the SELECT clause are specified one by one. This can be enhanced by using a * to ask for all attributes of the composite type value.

```
...
EXEC SQL DECLARE cur1 CURSOR FOR SELECT (compval).* FROM t4 END-EXEC.
EXEC SQL OPEN cur1 END-EXEC.
EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
*   Put all values in the SELECT list into one structure.
    EXEC SQL FETCH FROM cur1 INTO :COMPVAL END-EXEC

    DISPLAY "intval=" INTVAL ", textval=" ARR OF TEXTVAL
END-PERFORM.
```

This way, composite types can be mapped into structures almost seamlessly, even though ECOBPG does not understand the composite type itself.

Finally, it is also possible to store composite type values in their external string representation in host variables of type VARCHAR. But that way, it is not easily possible to access the fields of the value from the host program.

User-defined Base Types

New user-defined base types are not directly supported by ECOBPG. You can use the external string representation and host variables of type VARCHAR, and this solution is indeed appropriate and sufficient for many types.

Here is an example using the data type complex.

See

Refer to "User-defined Types" in "Server Programming" in the PostgreSQL Documentation for information on the data type complex.

The external string representation of that type is (%lf,%lf), which is defined in the functions complex_in() and complex_out() functions. The following example inserts the complex type values (1,1) and (3,3) into the columns a and b, and select them from the table after that.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 A PIC X(64) VARYING.
    01 B PIC X(64) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

EXEC SQL INSERT INTO test_complex VALUES ('(1,1)', '(3,3)') END-EXEC.

EXEC SQL DECLARE cur1 CURSOR FOR SELECT a, b FROM test_complex END-EXEC.
EXEC SQL OPEN cur1 END-EXEC.

EXEC SQL WHENEVER NOT FOUND GOTO END-FETCH END-EXEC.

PERFORM NO LIMIT
    EXEC SQL FETCH FROM cur1 INTO :A, :B END-EXEC
    DISPLAY "a=" ARR OF A ", b=" ARR OF B
END-PERFORM.

END-FETCH.
EXEC SQL CLOSE cur1 END-EXEC.
```

Another workaround is avoiding the direct use of the user-defined types in ECOBPG and instead create a function or cast that converts between the user-defined type and a primitive type that ECOBPG can handle. Note, however, that type casts, especially implicit ones, should be introduced into the type system very carefully.

For example:

```
CREATE FUNCTION create_complex(r double precision, i double precision) RETURNS complex
LANGUAGE SQL
IMMUTABLE
AS $$ SELECT $1 * complex '(1,0)' + $2 * complex '(0,1)' $$;
```

After this definition, the following:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 A COMP-2.
01 B COMP-2.
01 C COMP-2.
01 D COMP-2.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE 1 TO A.
MOVE 2 TO B.
MOVE 3 TO C.
MOVE 4 TO D.

EXEC SQL INSERT INTO test_complex VALUES (create_complex(:A, :B), create_complex(:C, :D))
END-EXEC.
```

has the same effect as

```
EXEC SQL INSERT INTO test_complex VALUES ('(1,2)', '(3,4)') END-EXEC.
```

D.4.6 Indicators

The examples above do not handle null values. In fact, the retrieval examples will raise an error if they fetch a null value from the database. To be able to pass null values to the database or retrieve null values from the database, you need to append a second host variable specification to each host variable that contains data. This second host variable is called the *indicator* and contains a flag that tells whether the datum is null, in which case the value of the real host variable is ignored. Here is an example that handles the retrieval of null values correctly:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 VAL PIC X(50) VARYING.
01 VAL_IND PIC S9(9) COMP-5.
```

```
EXEC SQL END DECLARE SECTION END-EXEC.

 ...

EXEC SQL SELECT b INTO :VAL :VAL_IND FROM test1 END-EXEC.
```

The indicator variable val_ind will be zero if the value was not null, and it will be negative if the value was null.

The indicator has another function: if the indicator value is positive, it means that the value is not null, but it was truncated when it was stored in the host variable.

D.5 Dynamic SQL

In many cases, the particular SQL statements that an application has to execute are known at the time the application is written. In some cases, however, the SQL statements are composed at run time or provided by an external source. In these cases you cannot embed the SQL statements directly into the COBOL source code, but there is a facility that allows you to call arbitrary SQL statements that you provide in a string variable.

D.5.1 Executing Statements without a Result Set

The simplest way to execute an arbitrary SQL statement is to use the command EXECUTE IMMEDIATE. For example:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 STMT PIC X(30) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE "CREATE TABLE test1 (...);" TO ARR OF STMT.
COMPUTE LEN OF STMT = FUNCTION STORED-CHAR-LENGTH (ARR OF STMT).
EXEC SQL EXECUTE IMMEDIATE :STMT END-EXEC.
```

EXECUTE IMMEDIATE can be used for SQL statements that do not return a result set (e.g., DDL, INSERT, UPDATE, DELETE). You cannot execute statements that retrieve data (e.g., SELECT) this way. The next section describes how to do that.

D.5.2 Executing a Statement with Input Parameters

A more powerful way to execute arbitrary SQL statements is to prepare them once and execute the prepared statement as often as you like. It is also possible to prepare a generalized version of a statement and then execute specific versions of it by substituting parameters. When preparing the statement, write question marks where you want to substitute parameters later. For example:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 STMT PIC X(40) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE "INSERT INTO test1 VALUES(?, ?);" TO ARR OF STMT.
COMPUTE LEN OF STMT = FUNCTION STORED-CHAR-LENGTH (ARR OF STMT).
EXEC SQL PREPARE MYSTMT FROM :STMT END-EXEC.
 ...
EXEC SQL EXECUTE MYSTMT USING 42, 'foobar' END-EXEC.
```

When you don't need the prepared statement anymore, you should deallocate it:

```
EXEC SQL DEALLOCATE PREPARE name END-EXEC.
```

D.5.3 Executing a Statement with a Result Set

To execute an SQL statement with a single result row, EXECUTE can be used. To save the result, add an INTO clause.

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 STMT PIC X(50) VARYING.
```

```
01 V1 PIC S9(9) COMP.
01 V2 PIC S9(9) COMP.
01 V3 PIC X(50) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE "SELECT a, b, c FROM test1 WHERE a > ?" TO ARR OF STMT.
COMPUTE LEN OF STMT = FUNCTION STORED-CHAR-LENGTH (ARR OF STMT).
EXEC SQL PREPARE MYSTMT FROM :STMT END-EXEC.
 ...
EXEC SQL EXECUTE MYSTMT INTO :V1, :V2, :V3 USING 37 END-EXEC.
```

An EXECUTE command can have an INTO clause, a USING clause, both, or neither.

If a query is expected to return more than one result row, a cursor should be used, as in the following example. (See "D.3.2 Using Cursors" for more details about the cursor.)

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 DBANAME PIC X(128) VARYING.
01 DATNAME PIC X(128) VARYING.
01 STMT PIC X(200) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE "SELECT u.usename as dbaname, d.datname
-             "  FROM pg_database d, pg_user u
-             "  WHERE d.datdba = u.usesysid"
TO ARR OF STMT.
COMPUTE LEN OF STMT = FUNCTION STORED-CHAR-LENGTH (ARR OF STMT).

EXEC SQL CONNECT TO testdb AS con1 USER testuser END-EXEC.

EXEC SQL PREPARE STMT1 FROM :STMT END-EXEC.

EXEC SQL DECLARE cursor1 CURSOR FOR STMT1 END-EXEC.
EXEC SQL OPEN cursor1 END-EXEC.

EXEC SQL WHENEVER NOT FOUND GOTO FETCH-END END-EXEC.

PERFORM NO LIMIT
    EXEC SQL FETCH cursor1 INTO :DBANAME,:DATNAME END-EXEC
    DISPLAY "dbaname=" ARR OF DBANAME ", datname=" ARR OF DATNAME
END-PERFORM.

FETCH-END.

EXEC SQL CLOSE cursor1 END-EXEC.

EXEC SQL COMMIT END-EXEC.
EXEC SQL DISCONNECT ALL END-EXEC.
```

D.6 Using Descriptor Areas

An SQL descriptor area is a more sophisticated method for processing the result of a SELECT, FETCH or a DESCRIBE statement. An SQL descriptor area groups the data of one row of data together with metadata items into one data group item. The metadata is particularly useful when executing dynamic SQL statements, where the nature of the result columns might not be known ahead of time. PostgreSQL provides a way to use Descriptor Areas: the named SQL Descriptor Areas.

D.6.1 Named SQL Descriptor Areas

A named SQL descriptor area consists of a header, which contains information concerning the entire descriptor, and one or more item descriptor areas, which basically each describe one column in the result row.

Before you can use an SQL descriptor area, you need to allocate one:

```
EXEC SQL ALLOCATE DESCRIPTOR identifier END-EXEC.
```

The identifier serves as the "variable name" of the descriptor area. When you don't need the descriptor anymore, you should deallocate it:

```
EXEC SQL DEALLOCATE DESCRIPTOR identifier END-EXEC.
```

To use a descriptor area, specify it as the storage target in an INTO clause, instead of listing host variables:

```
EXEC SQL FETCH NEXT FROM mycursor INTO SQL DESCRIPTOR mydesc END-EXEC.
```

If the result set is empty, the Descriptor Area will still contain the metadata from the query, i.e. the field names.

For not yet executed prepared queries, the DESCRIBE statement can be used to get the metadata of the result set:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 SQL-STMT PIC X(30) VARYING.
EXEC SQL END DECLARE SECTION END-EXEC.

MOVE "SELECT * FROM table1" TO ARR OF SQL-STMT.
COMPUTE LEN OF SQL-STMT = FUNCTION STORED-CHAR-LENGTH ( ARR OF SQL-STMT ) .
EXEC SQL PREPARE STMT1 FROM :SQL-STMT END-EXEC.
EXEC SQL DESCRIBE STMT1 INTO SQL DESCRIPTOR MYDESC END-EXEC.
```

Before PostgreSQL 9.0, the SQL keyword was optional, so using DESCRIPTOR and SQL DESCRIPTOR produced named SQL Descriptor Areas. Now it is mandatory, omitting the SQL keyword is regarded as the syntax that produces SQLDA Descriptor Areas. However, ecobpg does not support SQLDA and it causes an error.

In DESCRIBE and FETCH statements, the INTO and USING keywords can be used to similarly: they produce the result set and the metadata in a Descriptor Area.

Now how do you get the data out of the descriptor area? You can think of the descriptor area as a group item with named fields. To retrieve the value of a field from the header and store it into a host variable, use the following command:

```
EXEC SQL GET DESCRIPTOR name :hostvar = field END-EXEC.
```

Currently, there is only one header field defined: COUNT, which tells how many item descriptor areas exist (that is, how many columns are contained in the result). The host variable needs to be of an integer type as PIC S9(9) COMP-5. To get a field from the item descriptor area, use the following command:

```
EXEC SQL GET DESCRIPTOR name VALUE num :hostvar = field END-EXEC.
```

num can be a host variable containing an integer as PIC S9(9) COMP-5.
hostvar must be PIC S9(9) COMP-5 if type of the field is integer. Possible fields are:

CARDINALITY (integer)

number of rows in the result set

DATA

actual data item (therefore, the data type of this field depends on the query)

DATETIME_INTERVAL_CODE (integer)

When TYPE is 9, DATETIME_INTERVAL_CODE will have a value of 1 for DATE, 2 for TIME, 3 for TIMESTAMP, 4 for TIME WITH TIME ZONE, or 5 for TIMESTAMP WITH TIME ZONE.

DATETIME_INTERVAL_PRECISION (integer)

not implemented

INDICATOR (integer)

the indicator (indicating a null value or a value truncation)

KEY_MEMBER (integer)

not implemented

LENGTH (integer)

length of the datum in characters

NAME (string)

name of the column

NULLABLE (integer)

not implemented

OCTET_LENGTH (integer)

length of the character representation of the datum in bytes

PRECISION (integer)

precision (for type numeric)

RETURNED_LENGTH (integer)

length of the datum in characters

RETURNED_OCTET_LENGTH (integer)

length of the character representation of the datum in bytes

SCALE (integer)

scale (for type numeric)

TYPE (integer)

numeric code of the data type of the column

In EXECUTE, DECLARE and OPEN statements, the effect of the INTO and USING keywords are different. A Descriptor Area can also be manually built to provide the input parameters for a query or a cursor and USING SQL DESCRIPTOR name is the way to pass the input parameters into a parametrized query. The statement to build a named SQL Descriptor Area is below:

```
EXEC SQL SET DESCRIPTOR name VALUE num field = :hostvar END-EXEC.
```

PostgreSQL supports retrieving more than one record in one FETCH statement and storing the data in host variables in this case assumes that the variable is an array. E.g.:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
01 GROUP-ITEM.
    05 IDNUM PIC S9(9) COMP OCCURS 5.
EXEC SQL END DECLARE SECTION END-EXEC.

EXEC SQL FETCH 5 FROM mycursor INTO SQL DESCRIPTOR mydesc END-EXEC.

EXEC SQL GET DESCRIPTOR mydesc VALUE 1 :IDNUM = DATA END-EXEC.
```

D.7 Error Handling

This section describes how you can handle exceptional conditions and warnings in an embedded SQL program. There are two nonexclusive facilities for this.

- Callbacks can be configured to handle warning and error conditions using the WHENEVER command.
- Detailed information about the error or warning can be obtained from the sqlca variable.

D.7.1 Setting Callbacks

One simple method to catch errors and warnings is to set a specific action to be executed whenever a particular condition occurs. In general:

```
EXEC SQL WHENEVER condition action END-EXEC.
```

condition can be one of the following:

SQLERROR

The specified action is called whenever an error occurs during the execution of an SQL statement.

SQLWARNING

The specified action is called whenever a warning occurs during the execution of an SQL statement.

NOT FOUND

The specified action is called whenever an SQL statement retrieves or affects zero rows. (This condition is not an error, but you might be interested in handling it specially.)

action can be one of the following:

CONTINUE

This effectively means that the condition is ignored. This is the default.

GOTO label
GO TO label

Jump to the specified label (using a COBOL goto statement).

SQLPRINT

Print a message to standard error. This is useful for simple programs or during prototyping. The details of the message cannot be configured.

STOP

Call STOP, which will terminate the program.

CALL name usingargs
DO name usingargs

Call the specified functions with the following characters including arguments. Thus, syntaxes (including compiler depending) are able to be placed as well as the arguments. Though, there are some limitation as following:

- You can't use RETURNING, ON EXCEPTION or OVER FLOW clauses.
- In the called subprogram, you must specify CONTINUE for every action with WHENEVER statement.

The SQL standard only provides for the actions CONTINUE and GOTO (and GO TO).

Here is an example that you might want to use in a simple program. It prints a simple message when a warning occurs and aborts the program when an error happens:

```
EXEC SQL WHENEVER SQLWARNING SQLPRINT END-EXEC.
EXEC SQL WHENEVER SQLERROR STOP END-EXEC.
```

The statement EXEC SQL WHENEVER is a directive of the SQL preprocessor, not a COBOL statement. The error or warning actions that it sets apply to all embedded SQL statements that appear below the point where the handler is set, unless a different action was set for the same condition between the first EXEC SQL WHENEVER and the SQL statement causing the condition, regardless of the flow of control in the COBOL program. So neither of the two following COBOL program excerpts will have the desired effect:

```
*
*   WRONG
*
    ...
    IF VERBOSE = 1 THEN
        EXEC SQL WHENEVER SQLWARNING SQLPRINT END-EXEC
    END-IF.
```

```
    ...
    EXEC SQL SELECT ... END-EXEC.
    ...
*
*   WRONG
*
    ...
    CALL SET-ERROR-HANDLER.
*        (and execute "EXEC SQL WHENEVER SQLERROR STOP" in SET-ERROR-HANDLER)
    ...
    EXEC SQL SELECT ... END-EXEC.
    ...
```

D.7.2 sqlca

For more powerful error handling, the embedded SQL interface provides a global variable with the name sqlca (SQL communication area) that has the following group item:

```
01  sqlca_t.
    10 sqlcaid PIC X(8).
    10 sqlabc PIC S9(9) COMP-5.
    10 sqlcode PIC S9(9) COMP-5.
    10 sqlerrm.
        20 sqlerrml PIC S9(9) COMP-5.
        20 sqlerrmc PIC X(150).
    10 sqlerrp PIC X(8).
    10 sqlerrd PIC S9(9) COMP-5 OCCURS 6.
    10 sqlwarn PIC X(8).
    10 sqlstate PIC X(5).
```

(In a multithreaded program, every thread automatically gets its own copy of sqlca. This works similarly to the handling of the standard C global variable errno.)

sqlca covers both warnings and errors. If multiple warnings or errors occur during the execution of a statement, then sqlca will only contain information about the last one.

If no error occurred in the last SQL statement, SQLCODE will be 0 and SQLSTATE will be "00000". If a warning or error occurred, then SQLCODE will be negative and SQLSTATE will be different from "00000". A positive SQLCODE indicates a harmless condition, such as that the last query returned zero rows. SQLCODE and SQLSTATE are two different error code schemes; details appear below.

If the last SQL statement was successful, then SQLERRD(2) contains the OID of the processed row, if applicable, and SQLERRD(3) contains the number of processed or returned rows, if applicable to the command.

In case of an error or warning, SQLERRMC will contain a string that describes the error. The field SQLERRML contains the length of the error message that is stored in SQLERRMC (the result of FUNCTION STORED-CHAR-LENGTH. Note that some messages are too long to fit in the fixed-size sqlerrmc array; they will be truncated.

In case of a warning, the 3rd character of SQLWARN is set to W. (In all other cases, it is set to something different from W.) If the 2nd character of SQLWARN is set to W, then a value was truncated when it was stored in a host variable. The 1st character of SQLWARN is set to W if any of the other elements are set to indicate a warning.

The fields sqlcaid, sqlcabc, sqlerrp, and the remaining elements of sqlerrd and sqlwarn currently contain no useful information.

The structure sqlca is not defined in the SQL standard, but is implemented in several other SQL database systems. The definitions are similar at the core, but if you want to write portable applications, then you should investigate the different implementations carefully.

Here is one example that combines the use of WHENEVER and sqlca, printing out the contents of sqlca when an error occurs. This is perhaps useful for debugging or prototyping applications, before installing a more "user-friendly" error handler.

```
EXEC SQL WHENEVER SQLERROR GOTO PRINT_SQLCA END-EXEC.

PRINT_SQLCA.
```

```
    DISPLAY "==== sqlca ====".
    DISPLAY "SQLCODE: " SQLCODE.
    DISPLAY "SQLERRML: " SQLERRML.
    DISPLAY "SQLERRMC: " SQLERRMC.
    DISPLAY "SQLERRD: " SQLERRD(1) " " SQLERRD(2) " " SQLERRD(3)" " SQLERRD(4) " "
SQLERRD(5) " " SQLERRD(6).
    DISPLAY "SQLSTATE: " SQLSTATE.
    DISPLAY "===============".
```

The result could look as follows (here an error due to a misspelled table name):

```
==== sqlca ====
sqlcode: -000000400
SQLERRML: +000000064
SQLERRMC: relation "pg_databasep" does not exist (10292) on line 93
sqlerrd: +000000000 +000000000 +000000000 +000000000 +000000000 +000000000
sqlstate: 42P01
===============
```

D.7.3 SQLSTATE vs. SQLCODE

The fields SQLSTATE and SQLCODE are two different schemes that provide error codes. Both are derived from the SQL standard, but SQLCODE has been marked deprecated in the SQL-92 edition of the standard and has been dropped in later editions. Therefore, new applications are strongly encouraged to use SQLSTATE.

SQLSTATE is a five-character array. The five characters contain digits or upper-case letters that represent codes of various error and warning conditions. SQLSTATE has a hierarchical scheme: the first two characters indicate the general class of the condition, the last three characters indicate a subclass of the general condition. A successful state is indicated by the code 00000. The SQLSTATE codes are for the most part defined in the SQL standard. The PostgreSQL server natively supports SQLSTATE error codes; therefore a high degree of consistency can be achieved by using this error code scheme throughout all applications.

Refer to "PostgreSQL Error Codes" in "Appendixes" in the PostgreSQL Documentation for further information.

SQLCODE, the deprecated error code scheme, is a simple integer. A value of 0 indicates success, a positive value indicates success with additional information, and a negative value indicates an error. The SQL standard only defines the positive value +100, which indicates that the last command returned or affected zero rows, and no specific negative values. Therefore, this scheme can only achieve poor portability and does not have a hierarchical code assignment. Historically, the embedded SQL processor for PostgreSQL has assigned some specific SQLCODE values for its use, which are listed below with their numeric value and their symbolic name. Remember that these are not portable to other SQL implementations. To simplify the porting of applications to the SQLSTATE scheme, the corresponding SQLSTATE is also listed. There is, however, no one-to-one or one-to-many mapping between the two schemes (indeed it is many-to-many), so you should consult the global SQLSTATE in each case.

Refer to "PostgreSQL Error Codes" in "Appendixes" in the PostgreSQL Documentation.

These are the assigned SQLCODE values:

0

Indicates no error. (SQLSTATE 00000)

100

This is a harmless condition indicating that the last command retrieved or processed zero rows, or that you are at the end of the cursor. (SQLSTATE 02000)

When processing a cursor in a loop, you could use this code as a way to detect when to abort the loop, like this:

```
PERFORM NO LIMIT
    EXEC SQL FETCH ... END-EXEC
    IF SQLCODE = 100 THEN
        GO TO FETCH-END
    END-IF
END-PERFORM.
```

But WHENEVER NOT FOUND GOTO ... effectively does this internally, so there is usually no advantage in writing this out explicitly.

-12

Indicates that your virtual memory is exhausted. The numeric value is defined as -ENOMEM. (SQLSTATE YE001)

-200

Indicates the preprocessor has generated something that the library does not know about. Perhaps you are running incompatible versions of the preprocessor and the library. (SQLSTATE YE002)

-201

This means that the command specified more host variables than the command expected. (SQLSTATE 07001 or 07002)

-202

This means that the command specified fewer host variables than the command expected. (SQLSTATE 07001 or 07002)

-203

This means a query has returned multiple rows but the statement was only prepared to store one result row (for example, because the specified variables are not arrays). (SQLSTATE 21000)

-204

The host variable is of type signed int and the datum in the database is of a different type and contains a value that cannot be interpreted as a signed int. The library uses strtol() for this conversion. (SQLSTATE 42804)

-205

The host variable is of type unsigned int and the datum in the database is of a different type and contains a value that cannot be interpreted as an unsigned int. The library uses strtoul() for this conversion. (SQLSTATE 42804)

-206

The host variable is of type float and the datum in the database is of another type and contains a value that cannot be interpreted as a float. The library uses strtod() for this conversion. (SQLSTATE 42804)

-207

The host variable is of type DECIMAL and the datum in the database is of another type and contains a value that cannot be interpreted as a DECIMAL or DISPLAY value. For the case of DISPLAY, this error happens if values in the database is too large for converting to DISPLAY value. (SQLSTATE 42804)

-208

The host variable is of type interval and the datum in the database is of another type and contains a value that cannot be interpreted as an interval value. (SQLSTATE 42804)

-209

The host variable is of type date and the datum in the database is of another type and contains a value that cannot be interpreted as a date value. (SQLSTATE 42804)

-210

The host variable is of type timestamp and the datum in the database is of another type and contains a value that cannot be interpreted as a timestamp value. (SQLSTATE 42804)

-211

This means the host variable is of type bool and the datum in the database is neither 't' nor 'f'. (SQLSTATE 42804)

-212

The statement sent to the PostgreSQL server was empty. (This cannot normally happen in an embedded SQL program, so it might point to an internal error.) (SQLSTATE YE002)

-213

A null value was returned and no null indicator variable was supplied. (SQLSTATE 22002)

-214

An ordinary variable was used in a place that requires an array. (SQLSTATE 42804)

-215

The database returned an ordinary variable in a place that requires array value. (SQLSTATE 42804)

-220

The program tried to access a connection that does not exist. (SQLSTATE 08003)

-221

The program tried to access a connection that does exist but is not open. (This is an internal error.) (SQLSTATE YE002)

-230

The statement you are trying to use has not been prepared. (SQLSTATE 26000)

-240

The descriptor specified was not found. The statement you are trying to use has not been prepared. (SQLSTATE 33000)

-241

The descriptor index specified was out of range. (SQLSTATE 07009)

-242

An invalid descriptor item was requested. (This is an internal error.) (SQLSTATE YE002)

-243

During the execution of a dynamic statement, the database returned a numeric value and the host variable was not numeric. (SQLSTATE 07006)

-244

During the execution of a dynamic statement, the database returned a non-numeric value and the host variable was numeric. (SQLSTATE 07006)

-400

Some error caused by the PostgreSQL server. The message contains the error message from the PostgreSQL server.

-401

The PostgreSQL server signaled that we cannot start, commit, or rollback the transaction. (SQLSTATE 08007)

-402

The connection attempt to the database did not succeed. (SQLSTATE 08001)

-403

Duplicate key error, violation of unique constraint. (SQLSTATE 23505)

-404

A result for the subquery is not single row. (SQLSTATE 21000)

-602

An invalid cursor name was specified. (SQLSTATE 34000)

-603

Transaction is in progress. (SQLSTATE 25001)

-604

There is no active (in-progress) transaction. (SQLSTATE 25P01)

-605

An existing cursor name was specified. (SQLSTATE 42P03)

D.8 Preprocessor Directives

Several preprocessor directives are available that modify how the ecobpg preprocessor parses and processes a file.

D.8.1 Including Files

To include an external file into your embedded SQL program, use:

```
EXEC SQL INCLUDE filename END-EXEC.
EXEC SQL INCLUDE <filename> END-EXEC.
EXEC SQL INCLUDE "filename" END-EXEC.
```

The embedded SQL preprocessor will look for a file named filename.pco, preprocess it, and include it in the resulting COBOL output. Thus, embedded SQL statements in the included file are handled correctly.

By default, the ecobpg preprocessor will search a file at the current directory. This behavior can be changed by the ecobpg commandline option.

First, the preprocessor tries to locate a file by specified file name at the current directory. If it fails and the file name does not end with .pco, the preprocessor also tries to locate a file with the suffix at the same directory.

The difference between EXEC SQL INCLUDE and COPY statement is whether precompiler processes embedded SQLs in the file, or not. If the file contains embedded SQLs, use EXEC SQL INCLUDE.

Note

The include file name is case-sensitive, even though the rest of the EXEC SQL INCLUDE command follows the normal SQL case-sensitivity rules.

D.8.2 The define and undef Directives

Similar to the directive #define that is known from C, embedded SQL has a similar concept:

```
EXEC SQL DEFINE name END-EXEC.
EXEC SQL DEFINE name value END-EXEC.
```

So you can define a name:

```
EXEC SQL DEFINE HAVE_FEATURE END-EXEC.
```

And you can also define constants:

```
EXEC SQL DEFINE MYNUMBER 12 END-EXEC.
EXEC SQL DEFINE MYSTRING 'abc' END-EXEC.
```

Use undef to remove a previous definition:

```
EXEC SQL UNDEF MYNUMBER END-EXEC.
```

Note that a constant in the SQL statement is only replaced by EXEC SQL DEFINE. The replacement may change the number of characters in a line, but ecobpg does not validate it after the replacement. Pay attention to the limitation of the number of characters in a line.

D.8.3 ifdef, ifndef, else, elif, and endif Directives

You can use the following directives to compile code sections conditionally:

```
EXEC SQL ifdef name END-EXEC.
```

Checks a name and processes subsequent lines if name has been created with EXEC SQL define name.

```
EXEC SQL ifndef name END-EXEC.
```

Checks a name and processes subsequent lines if name has not been created with EXEC SQL define name.

```
EXEC SQL else END-EXEC.
```

Starts processing an alternative section to a section introduced by either EXEC SQL ifdef name or EXEC SQL ifndef name.

```
EXEC SQL elif name END-EXEC.
```

Checks name and starts an alternative section if name has been created with EXEC SQL define name.

```
EXEC SQL endif END-EXEC.
```

Ends an alternative section.

Example:

```
EXEC SQL ifndef TZVAR END-EXEC.
EXEC SQL SET TIMEZONE TO 'GMT' END-EXEC.
EXEC SQL elif TZNAME END-EXEC.
EXEC SQL SET TIMEZONE TO TZNAME END-EXEC.
EXEC SQL else END-EXEC.
EXEC SQL SET TIMEZONE TO TZVAR END-EXEC.
EXEC SQL endif END-EXEC.
```

D.9 Processing Embedded SQL Programs

Now that you have an idea how to form embedded SQL COBOL programs, you probably want to know how to compile them. Before compiling you run the file through the embedded SQL COBOL preprocessor, which converts the SQL statements you used to special function calls. After compiling, you must link with a special library that contains the needed functions. These functions fetch information from the arguments, perform the SQL command using the libpq interface, and put the result in the arguments specified for output.

The preprocessor program is called ecobpg and is included in a normal PostgreSQL installation. Embedded SQL programs are typically named with an extension .pco. If you have a program file called prog1.pco, you can preprocess it by simply calling:

```
ecobpg prog1.pco
```

This will create a file called prog1.cob. If your input files do not follow the suggested naming pattern, you can specify the output file explicitly using the -o option.

The preprocessed file can be compiled normally, following the usage of the compiler.

The generated COBOL source files include library files from the PostgreSQL installation, so if you installed PostgreSQL in a location that is not searched by default, you have to add an option such as -I/usr/local/pgsql/include to the compilation command line.

To link an embedded SQL program, you need to include the libecpg library.

Again, you might have to add an option for library search like -L/usr/local/pgsql/lib to that command line.

If you manage the build process of a larger project using make, it might be convenient to include the following implicit rule to your makefiles:

```
ECOBPG = ecobpg

%.cob: %.pco
        $(ECOBPG) $<
```

The complete syntax of the ecobpg command is detailed in "D.12.1 ecobpg".

Currently, ecobpg does not support multi threading.

D.10 Large Objects

Large objects are not supported by ECOBPG.

If you need to access large objects, use large objects interfaces of libpq instead.

D.11 Embedded SQL Commands

This section describes all SQL commands that are specific to embedded SQL.

Command	Description
ALLOCATE DESCRIPTOR	Allocate an SQL descriptor area
CONNECT	Establish a database connection
DEALLOCATE DESCRIPTOR	Deallocate an SQL descriptor area
DECLARE	Define a cursor
DESCRIBE	Obtain information about a prepared statement or result set
DISCONNECT	Terminate a database connection
EXECUTE IMMEDIATE	Dynamically prepare and execute a statement
GET DESCRIPTOR	Get information from an SQL descriptor area
OPEN	Open a dynamic cursor
PREPARE	Prepare a statement for execution
SET AUTOCOMMIT	Set the autocommit behavior of the current session
SET CONNECTION	Select a database connection
SET DESCRIPTOR	Set information in an SQL descriptor area
TYPE	Define a new data type
VAR	Define a variable
WHENEVER	Specify the action to be taken when an SQL statement causes a specific class condition to be raised

See

Refer to the SQL commands listed in "SQL Commands" under "Reference" in the PostgreSQL Documentation, which can also be used in embedded SQL, unless stated otherwise.

D.11.1 ALLOCATE DESCRIPTOR

Name

ALLOCATE DESCRIPTOR -- allocate an SQL descriptor area

Synopsis

```
ALLOCATE DESCRIPTOR name
```

Description

ALLOCATE DESCRIPTOR allocates a new named SQL descriptor area, which can be used to exchange data between the PostgreSQL server and the host program.

Descriptor areas should be freed after use using the DEALLOCATE DESCRIPTOR command.

Parameters

name

A name of SQL descriptor. This can be an SQL identifier or a host variable.

Examples

```
EXEC SQL ALLOCATE DESCRIPTOR mydesc END-EXEC.
```

Compatibility

ALLOCATE DESCRIPTOR is specified in the SQL standard.

See Also

DEALLOCATE DESCRIPTOR, GET DESCRIPTOR, SET DESCRIPTOR

D.11.2 CONNECT

Name

CONNECT -- establish a database connection

Synopsis

```
CONNECT TO connection_target [ AS connection_name ] [ USER connection_user_name ]

CONNECT TO DEFAULT

CONNECT connection_user_name

DATABASE connection_target
```

Description

The CONNECT command establishes a connection between the client and the PostgreSQL server.

Parameters

connection_target

connection_target specifies the target server of the connection on one of several forms.

[database_name] [@host] [:port]

Connect over TCP/IP

unix:postgresql://host [:port] / [database_name] [?connection_option]

Connect over Unix-domain sockets

tcp:postgresql://host [:port] / [database_name] [?connection_option]

Connect over TCP/IP

SQL string constant

containing a value in one of the above forms

host variable

host variable of fixed-length string (trailing spaces are ignored) containing a value in one of the above forms

connection_name

An optional identifier for the connection, so that it can be referred to in other commands. This can be an SQL identifier or a host variable.

connection_user_name

The user name for the database connection.

This parameter can also specify user name and password, using one the forms user_name/password, user_name IDENTIFIED BY password, or user_name USING password.

User name and password can be SQL identifiers, string constants, or host variables (fixed-length string, trailing spaces are ignored).

DEFAULT

Use all default connection parameters, as defined by libpq.

Examples

Here a several variants for specifying connection parameters:

```
EXEC SQL CONNECT TO "connectdb" AS main END-EXEC.
EXEC SQL CONNECT TO "connectdb" AS second END-EXEC.
EXEC SQL CONNECT TO "unix:postgresql://localhost/connectdb" AS main USER connectuser END-
EXEC.
EXEC SQL CONNECT TO 'connectdb' AS main END-EXEC.
EXEC SQL CONNECT TO 'unix:postgresql://localhost/connectdb' AS main USER :user END-EXEC.
EXEC SQL CONNECT TO :dbn AS :idt END-EXEC.
EXEC SQL CONNECT TO :dbn USER connectuser USING :pw END-EXEC.
EXEC SQL CONNECT TO @localhost AS main USER connectdb END-EXEC.
EXEC SQL CONNECT TO REGRESSDB1 as main END-EXEC.
EXEC SQL CONNECT TO connectdb AS :idt END-EXEC.
EXEC SQL CONNECT TO connectdb AS main USER connectuser/connectdb END-EXEC.
EXEC SQL CONNECT TO connectdb AS main END-EXEC.
EXEC SQL CONNECT TO connectdb@localhost AS main END-EXEC.
EXEC SQL CONNECT TO tcp:postgresql://localhost/ USER connectdb END-EXEC.
EXEC SQL CONNECT TO tcp:postgresql://localhost/connectdb USER connectuser IDENTIFIED BY
connectpw END-EXEC.
EXEC SQL CONNECT TO tcp:postgresql://localhost:20/connectdb USER connectuser IDENTIFIED BY
connectpw END-EXEC.
EXEC SQL CONNECT TO unix:postgresql://localhost/ AS main USER connectdb END-EXEC.
EXEC SQL CONNECT TO unix:postgresql://localhost/connectdb AS main USER connectuser END-
EXEC.
EXEC SQL CONNECT TO unix:postgresql://localhost/connectdb USER connectuser IDENTIFIED BY
"connectpw" END-EXEC.
EXEC SQL CONNECT TO unix:postgresql://localhost/connectdb USER connectuser USING
"connectpw" END-EXEC.
EXEC SQL CONNECT TO unix:postgresql://localhost/connectdb?connect_timeout=14 USER
connectuser END-EXEC.
```

Here is an example program that illustrates the use of host variables to specify connection parameters:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
*   database name
    01 DBNAME PIC X(6).
*   connection user name
```

```
    01 USER PIC X(8).
*   connection string
    01 CONNECTION PIC X(38).

    01 VER PIC X(256).
EXEC SQL END DECLARE SECTION END-EXEC.

    MOVE "testdb" TO DBNAME.
    MOVE "testuser" TO USER.
    MOVE "tcp:postgresql://localhost:5432/testdb" TO CONNECTION.

    EXEC SQL CONNECT TO :DBNAME USER :USER END-EXEC.
    EXEC SQL SELECT version() INTO :VER END-EXEC.
    EXEC SQL DISCONNECT END-EXEC.


    DISPLAY "version: " VER.

    EXEC SQL CONNECT TO :CONNECTION USER :USER END-EXEC.
    EXEC SQL SELECT version() INTO :VER END-EXEC.
    EXEC SQL DISCONNECT END-EXEC.

    DISPLAY "version: " VER.
```

Compatibility

CONNECT is specified in the SQL standard, but the format of the connection parameters is implementation-specific.

See Also

DISCONNECT, SET CONNECTION

D.11.3 DEALLOCATE DESCRIPTOR

Name

DEALLOCATE DESCRIPTOR -- deallocate an SQL descriptor area

Synopsis

```
DEALLOCATE DESCRIPTOR name
```

Description

DEALLOCATE DESCRIPTOR deallocates a named SQL descriptor area.

Parameters

name

The name of the descriptor which is going to be deallocated. This can be an SQL identifier or a host variable.

Examples

EXEC SQL DEALLOCATE DESCRIPTOR mydesc END-EXEC.

Compatibility

DEALLOCATE DESCRIPTOR is specified in the SQL standard.

See Also

ALLOCATE DESCRIPTOR, GET DESCRIPTOR, SET DESCRIPTOR

D.11.4 DECLARE

Name

DECLARE -- define a cursor

Synopsis

```
DECLARE cursor_name [ BINARY ] [ INSENSITIVE ] [ [ NO ] SCROLL ] CURSOR [ { WITH | WITHOUT }
HOLD ] FOR prepared_name

DECLARE cursor_name [ BINARY ] [ INSENSITIVE ] [ [ NO ] SCROLL ] CURSOR [ { WITH | WITHOUT }
HOLD ] FOR query
```

Description

DECLARE declares a cursor for iterating over the result set of a prepared statement. This command has slightly different semantics from the direct SQL command DECLARE: Whereas the latter executes a query and prepares the result set for retrieval, this embedded SQL command merely declares a name as a "loop variable" for iterating over the result set of a query; the actual execution happens when the cursor is opened with the OPEN command.

Parameters

cursor_name

A cursor name. This can be an SQL identifier or a host variable.

prepared_name

The name of a prepared query, either as an SQL identifier or a host variable.

query

A SELECT or VALUES command which will provide the rows to be returned by the cursor.

For the meaning of the cursor options, see DECLARE.

See

Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the SELECT, VALUES and DECLARE command.

Examples

Examples declaring a cursor for a query:

```
EXEC SQL DECLARE C CURSOR FOR SELECT * FROM My_Table END-EXEC.
EXEC SQL DECLARE C CURSOR FOR SELECT Item1 FROM T END-EXEC.
EXEC SQL DECLARE cur1 CURSOR FOR SELECT version() END-EXEC.
```

An example declaring a cursor for a prepared statement:

```
EXEC SQL PREPARE stmt1 AS SELECT version() END-EXEC.
EXEC SQL DECLARE cur1 CURSOR FOR stmt1 END-EXEC.
```

Compatibility

DECLARE is specified in the SQL standard.

See Also

OPEN, CLOSE, DECLARE

See

Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the CLOSE and DECLARE command.

D.11.5 DESCRIBE

Name

DESCRIBE -- obtain information about a prepared statement or result set

Synopsis

```
DESCRIBE [ OUTPUT ] prepared_name USING SQL DESCRIPTOR descriptor_name

DESCRIBE [ OUTPUT ] prepared_name INTO SQL DESCRIPTOR descriptor_name
```

Description

DESCRIBE retrieves metadata information about the result columns contained in a prepared statement, without actually fetching a row.

Parameters

prepared_name

The name of a prepared statement. This can be an SQL identifier or a host variable.

descriptor_name

A descriptor name. It can be an SQL identifier or a host variable.

Examples

```
EXEC SQL ALLOCATE DESCRIPTOR mydesc END-EXEC.
EXEC SQL PREPARE stmt1 FROM :sql_stmt END-EXEC.
EXEC SQL DESCRIBE stmt1 INTO SQL DESCRIPTOR mydesc END-EXEC.
EXEC SQL GET DESCRIPTOR mydesc VALUE 1 :charvar = NAME END-EXEC.
EXEC SQL DEALLOCATE DESCRIPTOR mydesc END-EXEC.
```

Compatibility

DESCRIBE is specified in the SQL standard.

See Also

ALLOCATE DESCRIPTOR, GET DESCRIPTOR

D.11.6 DISCONNECT

Name

DISCONNECT -- terminate a database connection

Synopsis

```
DISCONNECT connection_name

DISCONNECT [ CURRENT ]

DISCONNECT DEFAULT
```

```
DISCONNECT ALL
```

Description

DISCONNECT closes a connection (or all connections) to the database.

Parameters

connection_name

A database connection name established by the CONNECT command.

CURRENT

Close the "current" connection, which is either the most recently opened connection, or the connection set by the SET CONNECTION command. This is also the default if no argument is given to the DISCONNECT command.

DEFAULT

Close the default connection.

ALL

Close all open connections.

Examples

```
    EXEC SQL CONNECT TO testdb AS DEFAULT USER testuser END-EXEC.
    EXEC SQL CONNECT TO testdb AS con1 USER testuser END-EXEC.
    EXEC SQL CONNECT TO testdb AS con2 USER testuser END-EXEC.
    EXEC SQL CONNECT TO testdb AS con3 USER testuser END-EXEC.

*   close con3
    EXEC SQL DISCONNECT CURRENT END-EXEC.
*   close DEFAULT
    EXEC SQL DISCONNECT DEFAULT END-EXEC.
*   close con2 and con1
    EXEC SQL DISCONNECT ALL END-EXEC.
```

Compatibility

DISCONNECT is specified in the SQL standard.

See Also

CONNECT, SET CONNECTION

D.11.7 EXECUTE IMMEDIATE

Name

EXECUTE IMMEDIATE -- dynamically prepare and execute a statement

Synopsis

```
EXECUTE IMMEDIATE string
```

Description

EXECUTE IMMEDIATE immediately prepares and executes a dynamically specified SQL statement, without retrieving result rows.

Parameters

string

A literal string or a host variable containing the SQL statement to be executed.

Examples

Here is an example that executes an INSERT statement using EXECUTE IMMEDIATE and a host variable named command:

```
MOVE "INSERT INTO test (name, amount, letter) VALUES ('db: ''r1''', 1, 'f')" TO ARR OF cmd.
COMPUTE LEN OF cmd = FUNCTION STORED-CHAR-LENGTH(ARR OF cmd).
EXEC SQL EXECUTE IMMEDIATE :cmd END-EXEC.
```

Compatibility

EXECUTE IMMEDIATE is specified in the SQL standard.

D.11.8 GET DESCRIPTOR

Name

GET DESCRIPTOR -- get information from an SQL descriptor area

Synopsis

```
GET DESCRIPTOR descriptor_name :hostvariable = descriptor_header_item [, ... ]

GET DESCRIPTOR descriptor_name VALUE column_number :hostvariable = descriptor_item [, ... ]
```

Description

GET DESCRIPTOR retrieves information about a query result set from an SQL descriptor area and stores it into host variables. A descriptor area is typically populated using FETCH or SELECT before using this command to transfer the information into host language variables.

This command has two forms: The first form retrieves descriptor "header" items, which apply to the result set in its entirety. One example is the row count. The second form, which requires the column number as additional parameter, retrieves information about a particular column. Examples are the column name and the actual column value.

Parameters

descriptor_name

A descriptor name.

descriptor_header_item

A token identifying which header information item to retrieve. Only COUNT, to get the number of columns in the result set, is currently supported.

column_number

The number of the column about which information is to be retrieved. The count starts at 1.

descriptor_item

A token identifying which item of information about a column to retrieve. See Section 33.7.1 for a list of supported items.

hostvariable

A host variable that will receive the data retrieved from the descriptor area.

Examples

An example to retrieve the number of columns in a result set:

```
EXEC SQL GET DESCRIPTOR d :d_count = COUNT END-EXEC.
```

An example to retrieve a data length in the first column:

```
EXEC SQL GET DESCRIPTOR d VALUE 1 :d_returned_octet_length = RETURNED_OCTET_LENGTH END-
EXEC.
```

An example to retrieve the data body of the second column as a string:

```
EXEC SQL GET DESCRIPTOR d VALUE 2 :d_data = DATA END-EXEC.
```

Here is an example for a whole procedure of executing SELECT current_database(); and showing the number of columns, the column data length, and the column data:

```
EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 D-COUNT PIC S9(9) COMP-5.
    01 D-DATA PIC X(1024).
    01 D-RETURNED-OCTET-LENGTH PIC S9(9) COMP.
EXEC SQL END DECLARE SECTION END-EXEC.

    EXEC SQL CONNECT TO testdb AS con1 USER testuser END-EXEC.
    EXEC SQL ALLOCATE DESCRIPTOR d END-EXEC.

*   Declare, open a cursor, and assign a descriptor to the cursor
    EXEC SQL DECLARE cur CURSOR FOR SELECT current_database() END-EXEC.
    EXEC SQL OPEN cur END-EXEC.
    EXEC SQL FETCH NEXT FROM cur INTO SQL DESCRIPTOR d END-EXEC.

*   Get a number of total columns
    EXEC SQL GET DESCRIPTOR d :D-COUNT = COUNT END-EXEC.
    DISPLAY "d_count                = " D-COUNT.

*   Get length of a returned column
    EXEC SQL GET DESCRIPTOR d VALUE 1 :D-RETURNED-OCTET-LENGTH = RETURNED_OCTET_LENGTH END-
EXEC.
    DISPLAY "d_returned_octet_length = " D-RETURNED-OCTET-LENGTH.

*   Fetch the returned column as a string
    EXEC SQL GET DESCRIPTOR d VALUE 1 :D-DATA = DATA END-EXEC.
    DISPLAY "d_data                  = " D-DATA.

*   Closing
    EXEC SQL CLOSE cur END-EXEC.
    EXEC SQL COMMIT END-EXEC.

    EXEC SQL DEALLOCATE DESCRIPTOR d END-EXEC.
    EXEC SQL DISCONNECT ALL END-EXEC.
```

When the example is executed, the result will look like this:

```
d_count                = +000000001
d_returned_octet_length = +000000006
d_data                 = testdb
```

Compatibility

GET DESCRIPTOR is specified in the SQL standard.

See Also

ALLOCATE DESCRIPTOR, SET DESCRIPTOR

D.11.9 OPEN

Name

OPEN -- open a dynamic cursor

Synopsis

```
OPEN cursor_name

OPEN cursor_name USING value [, ... ]

OPEN cursor_name USING SQL DESCRIPTOR descriptor_name
```

Description

OPEN opens a cursor and optionally binds actual values to the placeholders in the cursor's declaration. The cursor must previously have been declared with the DECLARE command. The execution of OPEN causes the query to start executing on the server.

Parameters

cursor_name

The name of the cursor to be opened. This can be an SQL identifier or a host variable.

value

A value to be bound to a placeholder in the cursor. This can be an SQL constant, a host variable, or a host variable with indicator.

descriptor_name

The name of a descriptor containing values to be bound to the placeholders in the cursor. This can be an SQL identifier or a host variable.

Examples

```
EXEC SQL OPEN a END-EXEC.
EXEC SQL OPEN d USING 1, 'test' END-EXEC.
EXEC SQL OPEN c1 USING SQL DESCRIPTOR mydesc END-EXEC.
EXEC SQL OPEN :curname1 END-EXEC.
```

Compatibility

OPEN is specified in the SQL standard.

See Also

DECLARE, CLOSE

Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the CLOSE command.

D.11.10 PREPARE

Name

PREPARE -- prepare a statement for execution

Synopsis

```
PREPARE name FROM string
```

Description

PREPARE prepares a statement dynamically specified as a string for execution. This is different from the direct SQL statement PREPARE, which can also be used in embedded programs. The EXECUTE command is used to execute either kind of prepared statement.

Parameters

prepared_name

An identifier for the prepared query.

string

A literal string or a host variable containing a preparable statement, one of the SELECT, INSERT, UPDATE, or DELETE.

Examples

```
MOVE "SELECT * FROM test1 WHERE a = ? AND b = ?" TO ARR OF STMT.
COMPUTE LEN OF STMT = FUNCTION STORED-CHAR-LENGTH (ARR OF STMT).
EXEC SQL ALLOCATE DESCRIPTOR indesc END-EXEC.
EXEC SQL ALLOCATE DESCRIPTOR outdesc END-EXEC.
EXEC SQL PREPARE foo FROM :STMT END-EXEC.

EXEC SQL EXECUTE foo USING SQL DESCRIPTOR indesc INTO SQL DESCRIPTOR outdesc END-EXEC.
```

Compatibility

PREPARE is specified in the SQL standard.

See Also

EXECUTE

Refer to "SQL Commands" in "Reference" in the PostgreSQL Documentation for information on the EXECUTE command.

D.11.11 SET AUTOCOMMIT

Name

SET AUTOCOMMIT -- set the autocommit behavior of the current session

Synopsis

```
SET AUTOCOMMIT { = | TO } { ON | OFF }
```

Description

SET AUTOCOMMIT sets the autocommit behavior of the current database session. By default, embedded SQL programs are not in autocommit mode, so COMMIT needs to be issued explicitly when desired. This command can change the session to autocommit mode, where each individual statement is committed implicitly.

Compatibility

SET AUTOCOMMIT is an extension of PostgreSQL ECOBPG.

D.11.12 SET CONNECTION

Name

SET CONNECTION -- select a database connection

Synopsis

```
SET CONNECTION [ TO | = ] connection_name
```

Description

SET CONNECTION sets the "current" database connection, which is the one that all commands use unless overridden.

Parameters

connection_name

A database connection name established by the CONNECT command.

DEFAULT

Set the connection to the default connection.

Examples

```
EXEC SQL SET CONNECTION TO con2 END-EXEC.
EXEC SQL SET CONNECTION = con1 END-EXEC.
```

Compatibility

SET CONNECTION is specified in the SQL standard.

See Also

CONNECT, DISCONNECT

D.11.13 SET DESCRIPTOR

Name

SET DESCRIPTOR -- set information in an SQL descriptor area

Synopsis

```
SET DESCRIPTOR descriptor_name descriptor_header_item = value [, ... ]

SET DESCRIPTOR descriptor_name VALUE number descriptor_item = value [, ...]
```

Description

SET DESCRIPTOR populates an SQL descriptor area with values. The descriptor area is then typically used to bind parameters in a prepared query execution.

This command has two forms: The first form applies to the descriptor "header", which is independent of a particular datum. The second form assigns values to particular datums, identified by number.

Parameters

descriptor_name

A descriptor name.

descriptor_header_item

A token identifying which header information item to set. Only COUNT, to set the number of descriptor items, is currently supported.

number

The number of the descriptor item to set. The count starts at 1.

descriptor_item

A token identifying which item of information to set in the descriptor. See Section 33.7.1 for a list of supported items.

value

A value to store into the descriptor item. This can be an SQL constant or a host variable.

Examples

```
EXEC SQL SET DESCRIPTOR indesc COUNT = 1 END-EXEC.
EXEC SQL SET DESCRIPTOR indesc VALUE 1 DATA = 2 END-EXEC.
EXEC SQL SET DESCRIPTOR indesc VALUE 1 DATA = :val1 END-EXEC.
EXEC SQL SET DESCRIPTOR indesc VALUE 2 DATA = 'some string', INDICATOR = :val1 END-EXEC.
EXEC SQL SET DESCRIPTOR indesc VALUE 2 INDICATOR = :val2null, DATA = :val2 END-EXEC.
```

Compatibility

SET DESCRIPTOR is specified in the SQL standard.

See Also

ALLOCATE DESCRIPTOR, GET DESCRIPTOR

D.11.14 TYPE

Name

TYPE -- define a new data type

Synopsis

`TYPE` *`type_name`* `IS` *`ctype`*

Description

The TYPE command defines a new COBOL type. It is equivalent to putting a typedef into a declare section.

This command is only recognized when ecobpgpg is run with the -c option.

A level number of 01 is automatically added to type_name item. Thus, the level number must not to be specified externally. To define a group item, a level number needs to be specified to the each subordinate items.

For reasons of internal implementation, "TYPE" must be placed just after "EXEC SQL", without containing newline. For other place, you can use newline.

Parameters

type_name

The name for the new type. It must be a valid COBOL type name.

ctype

A COBOL type specification (including expression format specification).

Examples

```
EXEC SQL TYPE CUSTOMER IS
      02  NAME PIC X(50) VARYING.
      02 PHONE PIC S9(9) COMP. END-EXEC.

EXEC SQL TYPE CUST-IND IS
      02  NAME_IND PIC S9(4) COMP.
      02 PHONE_IND PIC S9(4) COMP. END-EXEC.

EXEC SQL TYPE INTARRAY IS
      02 INT PIC S9(9) OCCURS 20. END-EXEC.
EXEC SQL TYPE STR IS PIC X(50) VARYING. END-EXEC.
EXEC SQL TYPE STRING IS PIC X(10). END-EXEC.
```

Here is an example program that uses EXEC SQL TYPE:

```
EXEC SQL TYPE TT IS
     02 V PIC X(256) VARYING.
     02 I PIC S9(9) COMP. END-EXEC.


EXEC SQL TYPE TT-IND IS
     02 V-IND PIC S9(4) COMP.
     02 I-IND PIC S9(4) COMP. END-EXEC.

EXEC SQL BEGIN DECLARE SECTION END-EXEC.
    01 T TYPE TT.
    01 T-IND TYPE TT-IND.
EXEC SQL END DECLARE SECTION END-EXEC.

    EXEC SQL CONNECT TO testdb AS con1 END-EXEC.

    EXEC SQL SELECT current_database(), 256 INTO :T :T-IND LIMIT 1 END-EXEC.

    DISPLAY "t.v = " ARR OF V OF T.
    DISPLAY "t.i = " I OF T.

    DISPLAY "t_ind.v_ind = " V-IND OF T-IND.
    DISPLAY "t_ind.i_ind = " I-IND OF T-IND.

    EXEC SQL DISCONNECT con1 END-EXEC.
```

Compatibility

The TYPE command is a PostgreSQL extension.

D.11.15 VAR

Name

VAR－ define a variable

Synopsis

```
VAR varname IS ctype
```

Description

The VAR command defines a host variable. It is equivalent to an ordinary COBOL variable definition inside a declare section.

When translating, a level number 01 is added. Thus, the level number must not to be specified externally.

To define a group item, a level number needs to be specified to the each subordinate items.

For reasons of internal implementation, "VAR" must be placed just after "EXEC SQL", without containing newline. For other place, you can use newline.

Parameters

varname

A COBOL variable name.

ctype

A COBOL type specification.

Examples

```
EXEC SQL VAR VC IS PIC X(10) VARYING. END-EXEC.
EXEC SQL VAR BOOL-VAR IS BOOL. END-EXEC.
```

Compatibility

The VAR command is a PostgreSQL extension.

D.11.16 WHENEVER

Name

WHENEVER -- specify the action to be taken when an SQL statement causes a specific class condition to be raised

Synopsis

```
WHENEVER { NOT FOUND | SQLERROR | SQLWARNING } action
```

Description

Define a behavior which is called on the special cases (Rows not found, SQL warnings or errors) in the result of SQL execution.

Parameters

See Section "D.7.1 Setting Callbacks" or a description of the parameters.

Examples

```
EXEC SQL WHENEVER NOT FOUND CONTINUE END-EXEC.
EXEC SQL WHENEVER SQLWARNING SQLPRINT END-EXEC.
EXEC SQL WHENEVER SQLWARNING DO "warn" END-EXEC.
EXEC SQL WHENEVER SQLERROR sqlprint END-EXEC.
EXEC SQL WHENEVER SQLERROR CALL "print2" END-EXEC.
EXEC SQL WHENEVER SQLERROR DO handle_error USING "select" END-EXEC.
EXEC SQL WHENEVER SQLERROR DO sqlnotice USING 0 1 END-EXEC.
EXEC SQL WHENEVER SQLERROR DO "sqlprint" END-EXEC.
EXEC SQL WHENEVER SQLERROR GOTO error_label END-EXEC.
EXEC SQL WHENEVER SQLERROR STOP END-EXEC.
```

A typical application is the use of WHENEVER NOT FOUND GOTO to handle looping through result sets:

```
    EXEC SQL CONNECT TO testdb AS con1 END-EXEC.
    EXEC SQL ALLOCATE DESCRIPTOR d END-EXEC.
    EXEC SQL DECLARE cur CURSOR FOR SELECT current_database(), 'hoge', 256 END-EXEC.
    EXEC SQL OPEN cur END-EXEC.

*   when end of result set reached, break out of while loop
    EXEC SQL WHENEVER NOT FOUND GOTO NOTFOUND END-EXEC.

    PERFORM NO LIMIT
        EXEC SQL FETCH NEXT FROM cur INTO SQL DESCRIPTOR d END-EXEC
        ...
    END-PERFORM.

    NOTFOUND.
    EXEC SQL CLOSE cur END-EXEC.
    EXEC SQL COMMIT END-EXEC.

    EXEC SQL DEALLOCATE DESCRIPTOR d END-EXEC.
    EXEC SQL DISCONNECT ALL END-EXEC.
```

Compatibility

WHENEVER is specified in the SQL standard, but most of the actions are PostgreSQL extensions.

D.12 PostgreSQL Client Applications

This part contains reference information for PostgreSQL client applications and utilities. Not all of these commands are of general utility; some might require special privileges. The common feature of these applications is that they can be run on any host, independent of where the database server resides.

When specified on the command line, user and database names have their case preserved—the presence of spaces or special characters might require quoting. Table names and other identifiers do not have their case preserved, except where documented, and might require quoting.

D.12.1 ecobpg

Name

ecobpg -- embedded SQL COBOL preprocessor

Synopsis

ecobpg [*option*...] *file*...

Description

ecobpg is the embedded SQL preprocessor for COBOL programs. It converts COBOL programs with embedded SQL statements to normal COBOL code by replacing the SQL invocations with special function calls. The output files can then be processed with any COBOL compiler tool chain.

ecobpg will convert each input file given on the command line to the corresponding COBOL output file. Input files preferably have the extension .pco, in which case the extension will be replaced by .cob to determine the output file name. If the extension of the input file is not .pco, then the output file name is computed by appending .cob to the full file name. The output file name can also be overridden using the -o option.

Options

ecobpg accepts the following command-line arguments:

`-c`

Automatically generate certain COBOL code from SQL code. Currently, this works for EXEC SQL TYPE.

-I directory

Specify an additional include path, used to find files included via EXEC SQL INCLUDE. Defaults are: (current directory), /usr/local/include, the PostgreSQL include directory which is defined at compile time (default: /usr/local/pgsql/include), and /usr/include, in that order.

-o filename

Specifies that ecobpg should write all its output to the given filename.

-f format

Specifies the COBOL code notation. For "format", specify either of the following. If omitted, "fixed" is used.

fixed

Specifies fixed format notation. Up to 72 columns can be specified for area B. Characters in column 73 and beyond are deleted in the precompiled source.

variable

Specifies variable format notation. Up to 251 columns can be specified for area B. Characters in column 252 and beyond are deleted in the precompiled source.

-r option

Selects run-time behavior. Option can be one of the following:

prepare

Prepare all statements before using them. Libecpg will keep a cache of prepared statements and reuse a statement if it gets executed again. If the cache runs full, libecpg will free the least used statement.

questionmarks

Allow question mark as placeholder for compatibility reasons. This used to be the default long ago.

-t

Turn on autocommit of transactions. In this mode, each SQL command is automatically committed unless it is inside an explicit transaction block. In the default mode, commands are committed only when EXEC SQL COMMIT is issued.

--varchar-with-named-member

When converting VARCHAR host variable, adding name of the variable to members as prefix. Instead of LEN and ARR, (varname)-ARR and (varname)-LEN will be used.

--bytea-with-named-member

When converting bytea host variable, adding name of the variable to members as prefix. Instead of LEN and ARR, (varname)-ARR and (varname)-LEN will be used.

-E encode

Specify the COBOL source encoding: "UTF8", "SJIS", or "EUC_JP".

If this option is omitted, the encoding is processed based on the locale.

-v

Print additional information including the version and the "include" path.

--version

Print the ecobpg version and exit.

-?
--help

Show help about ecobpg command line arguments, and exit.

Notes

When compiling the preprocessed COBOL code files, the compiler needs to be able to find the library files in the PostgreSQL include directory.

Programs using COBOL code with embedded SQL have to be linked against the libecpg library, for example using the linker options.

The value of either of these directories that is appropriate for the installation can be found out using pg_config.

See

Refer to "pg_config" in "Reference" in the PostgreSQL Documentation.

Examples

If you have an embedded SQL COBOL source file named prog1.pco, you can create an executable program using the following command:

```
ecobpg prog1.pco
```

Appendix E Quantitative Limits

This appendix lists the quantitative limits of FUJITSU Enterprise Postgres.

Table E.1 Length of identifier

Item	Limit
Database name	Up to 63 bytes (*1) (*2)
Schema name	Up to 63 bytes (*1) (*2)
Table name	Up to 63 bytes (*1) (*2)
View name	Up to 63 bytes (*1) (*2)
Index name	Up to 63 bytes (*1) (*2)
Table space name	Up to 63 bytes (*1) (*2)
Cursor name	Up to 63 bytes (*1) (*2)
Function name	Up to 63 bytes (*1) (*2)
Aggregate function name	Up to 63 bytes (*1) (*2)
Trigger name	Up to 63 bytes (*1) (*2)
Constraint name	Up to 63 bytes (*1) (*2)
Conversion name	Up to 63 bytes (*1) (*2)
Role name	Up to 63 bytes (*1) (*2)
Cast name	Up to 63 bytes (*1) (*2)
Collation sequence name	Up to 63 bytes (*1) (*2)
Encoding method conversion name	Up to 63 bytes (*1) (*2)
Domain name	Up to 63 bytes (*1) (*2)
Extension name	Up to 63 bytes (*1) (*2)
Operator name	Up to 63 bytes (*1) (*2)
Operator class name	Up to 63 bytes (*1) (*2)
Operator family name	Up to 63 bytes (*1) (*2)
Rewrite rule name	Up to 63 bytes (*1) (*2)
Sequence name	Up to 63 bytes (*1) (*2)
Text search settings name	Up to 63 bytes (*1) (*2)
Text search dictionary name	Up to 63 bytes (*1) (*2)
Text search parser name	Up to 63 bytes (*1) (*2)
Text search template name	Up to 63 bytes (*1) (*2)
Data type name	Up to 63 bytes (*1) (*2)
Enumerator type label	Up to 63 bytes (*1) (*2)

*1: This is the character string byte length when converted by the server character set character code.

*2: If an identifier that exceeds 63 bytes in length is specified, the excess characters are truncated and it is processed.

Table E.2 Database object

Item	Limit
Number of databases	Less than 4,294,967,296 (*1)

Item	Limit
Number of schemas	Less than 4,294,967,296 (*1)
Number of tables	Less than 4,294,967,296 (*1)
Number of views	Less than 4,294,967,296 (*1)
Number of indexes	Less than 4,294,967,296 (*1)
Number of table spaces	Less than 4,294,967,296 (*1)
Number of functions	Less than 4,294,967,296 (*1)
Number of aggregate functions	Less than 4,294,967,296 (*1)
Number of triggers	Less than 4,294,967,296 (*1)
Number of constraints	Less than 4,294,967,296 (*1)
Number of conversion	Less than 4,294,967,296 (*1)
Number of roles	Less than 4,294,967,296 (*1)
Number of casts	Less than 4,294,967,296 (*1)
Number of collation sequences	Less than 4,294,967,296 (*1)
Number of encoding method conversions	Less than 4,294,967,296 (*1)
Number of domains	Less than 4,294,967,296 (*1)
Number of extensions	Less than 4,294,967,296 (*1)
Number of operators	Less than 4,294,967,296 (*1)
Number of operator classes	Less than 4,294,967,296 (*1)
Number of operator families	Less than 4,294,967,296 (*1)
Number of rewrite rules	Less than 4,294,967,296 (*1)
Number of sequences	Less than 4,294,967,296 (*1)
Number of text search settings	Less than 4,294,967,296 (*1)
Number of text search dictionaries	Less than 4,294,967,296 (*1)
Number of text search parsers	Less than 4,294,967,296 (*1)
Number of text search templates	Less than 4,294,967,296 (*1)
Number of data types	Less than 4,294,967,296 (*1)
Number of enumerator type labels	Less than 4,294,967,296 (*1)
Number of default access privileges defined in the ALTER DEFAULT PRIVILEGES statement	Less than 4,294,967,296 (*1)
Number of large objects	Less than 4,294,967,296 (*1)
Number of index access methods	Less than 4,294,967,296 (*1)

*1: The total number of all database objects must be less than 4,294,967,296.

Table E.3 Schema element

Item	Limit
Number of columns that can be defined in one table	From 250 to 1600 (according to the data type)
Table row length	Up to 400 gigabytes
Number of columns comprising a unique constraint	Up to 32 columns
Data length comprising a unique constraint	Less than 2,000 bytes (*1) (*2)

Item	Limit
Table size	Up to one terabyte
Search condition character string length in a trigger definition statement	Up to 800 megabytes (*1) (*2)
Item size	Up to 1 gigabyte

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: This is the character string byte length when converted by the server character set character code.

Table E.4 Index

Item	Limit
Number of columns comprising a key (including VCI)	Up to 32 columns
Key length (other than VCI)	Less than 2,000 bytes (*1)

*1: This is the character string byte length when converted by the server character set character code.

Table E.5 Data types and attributes that can be handled

Item			Limit
Character	Data length		Data types and attributes that can be handled (*1)
	Specification length (*n*)		Up to 10,485,760 characters (*1)
Numeric	External decimal expression		Up to 131,072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Internal binary expression	2 bytes	From -32,768 to 32,767
		4 bytes	From -2,147,483,648 to 2,147,483,647
		8 bytes	From -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
	Internal decimal expression		Up to 13,1072 digits before the decimal point, and up to 16,383 digits after the decimal point
	Floating point expression	4 bytes	From -3.4E+38 to -7.1E-46, 0, or from 7.1E-46 to 3.4E+38
		8 bytes	From -1.7E+308 to -2.5E-324, 0, or from 2.5E-324 to 1.7E+308
bytea			Up to one gigabyte minus 53 bytes
Large object			Up to two gigabytes

*1: This is the character string byte length when converted by the server character set character code.

Table E.6 Function definition

Item	Limit
Number of arguments that can be specified	Up to 100
Number of variable names that can be specified in the declarations section	No limit

Item	Limit
Number of SQL statements or control statements that can be specified in a function processing implementation	No limit

Table E.7 Data operation statement

Item	Limit
Maximum number of connections for one process in an application (remote access)	4,000 connections
Number of expressions that can be specified in a selection list	Up to 1,664
Number of tables that can be specified in a FROM clause	No limit
Number of unique expressions that can be specified in a selection list/DISTINCT clause/ORDER BY clause/GROUP BY clause within one SELECT statement	Up to 1,664
Number of expressions that can be specified in a GROUP BY clause	No limit
Number of expressions that can be specified in an ORDER BY clause	No limit
Number of SELECT statements that can be specified in a UNION clause/INTERSECT clause/EXCEPT clause	Up to 4,000 (*1)
Number of nestings in joined tables that can be specified in one view	Up to 4,000 (*1)
Number of functions or operator expressions that can be specified in one expression	Up to 4,000 (*1)
Number of expressions that can be specified in one row constructor	Up to 1,664
Number of expressions that can be specified in an UPDATE statement SET clause	Up to 1,664
Number of expressions that can be specified in one row of a VALUES list	Up to 1,664
Number of expressions that can be specified in a RETURNING clause	Up to 1,664
Total expression length that can be specified in the argument list of one function specification	Up to 800 megabytes (*2)
Number of cursors that can be processed simultaneously by one session	No limit
Character string length of one SQL statement	Up to 800 megabytes (*1) (*3)
Number of input parameter specifications that can be specified in one dynamic SQL statement	No limit
Number of tokens that can be specified in one SQL statement	Up to 10,000
Number of values that can be specified as a list in a WHERE clause IN syntax	No limit
Number of expressions that can be specified in a USING clause	No limit
Number of JOINs that can be specified in a joined table	Up to 4,000 (*1)
Number of expressions that can be specified in COALESCE	No limit
Number of WHEN clauses that can be specified for CASE in a simple format or a searched format	No limit

Item	Limit
Data size per record that can be updated or inserted by one SQL statement	Up to one gigabyte minus 53 bytes
Number of objects that can share a lock simultaneously	Up to 256,000 (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

*2: The total number of all database objects must be less than 4,294,967,296.

*3: This is the character string byte length when converted by the server character set character code.

Table E.8 Data sizes

Item	Limit
Data size per record for input data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)
Data size per record for output data files (COPY statement, psql command \copy meta command)	Up to 800 megabytes (*1)

*1: Operation might proceed correctly even if operations are performed with a quantity outside the limits.

Appendix F Reference

F.1 JDBC Driver

See

Refer to the Java API Reference for information on PostgreSQL JDBC driver.

F.2 ODBC Driver

F.2.1 List of Supported APIs

The following table shows the support status of APIs:

Function name	Support status
SQLAllocConnect	Y
SQLAllocEnv	Y
SQLAllocHandle	Y
SQLAllocStmt	Y
SQLBindCol	Y
SQLBindParameter	Y
SQLBindParam	Y
SQLBrowseConnect	Y
SQLBulkOperations	Y
SQLCancel	Y
SQLCancelHandle	N
SQLCloseCursor	Y
SQLColAttribute	Y
SQLColAttributeW	Y
SQLColAttributes	Y
SQLColAttributesW	Y
SQLColumnPrivileges	Y
SQLColumnPrivilegesW	Y
SQLColumns	Y
SQLColumnsW	Y
SQLCompleteAsync	N
SQLConnect	Y
SQLConnectW	Y
SQLCopyDesc	Y
SQLDataSources	Y
SQLDataSourcesW	Y
SQLDescribeCol	Y

Function name	Support status
SQLDescribeColW	Y
SQLDescribeParam	Y
SQLDisconnect	Y
SQLDriverConnect	Y
SQLDriverConnectW	Y
SQLDrivers	Y
SQLEndTran	Y
SQLError	Y
SQLErrorW	Y
SQLExecDirect	Y
SQLExecDirectW	Y
SQLExecute	Y
SQLExtendedFetch	Y
SQLFetch	Y
SQLFetchScroll	Y
SQLForeignKeys	Y
SQLForeignKeysW	Y
SQLFreeConnect	Y
SQLFreeEnv	Y
SQLFreeHandle	Y
SQLFreeStmt	Y
SQLGetConnectAttr	Y
SQLGetConnectAttrW	Y
SQLGetConnectOption	Y
SQLGetConnectOptionW	Y
SQLGetCursorName	Y
SQLGetCursorNameW	Y
SQLGetData	Y
SQLGetDescField	Y
SQLGetDescFieldW	Y
SQLGetDescRec	Y
SQLGetDescRecW	Y
SQLGetDiagField	Y
SQLGetDiagFieldW	Y
SQLGetDiagRec	Y
SQLGetDiagRecW	Y
SQLGetEnvAttr	Y
SQLGetFunctions	Y
SQLGetInfo	Y

Function name	Support status
SQLGetInfoW	Y
SQLGetStmtAttr	Y
SQLGetStmtAttrW	Y
SQLGetStmtOption	Y
SQLGetTypeInfo	Y
SQLGetTypeInfoW	Y
SQLMoreResults	Y
SQLNativeSql	Y
SQLNativeSqlW	Y
SQLNumParams	Y
SQLNumResultCols	Y
SQLParamData	Y
SQLParamOptions	Y
SQLPrepare	Y
SQLPrepareW	Y
SQLPrimaryKeys	Y
SQLPrimaryKeysW	Y
SQLProcedureColumns	Y
SQLProcedureColumnsW	Y
SQLProcedures	Y
SQLProceduresW	Y
SQLPutData	Y
SQLRowCount	Y
SQLSetConnectAttr	Y
SQLSetConnectAttrW	Y
SQLSetConnectOption	Y
SQLSetConnectOptionW	Y
SQLSetCursorName	Y
SQLSetCursorNameW	Y
SQLSetDescField	Y
SQLSetDescRec	Y
SQLSetEnvAttr	Y
SQLSetParam	Y
SQLSetPos	Y
SQLSetScrollOptions	N
SQLSetStmtAttr	Y
SQLSetStmtAttrW	Y
SQLSetStmtOption	Y
SQLSpecialColumns	Y

Function name	Support status
SQLSpecialColumnsW	Y
SQLStatistics	Y
SQLStatisticsW	Y
SQLTablePrivileges	Y
SQLTablePrivilegesW	Y
SQLTables	Y
SQLTablesW	Y
SQLTransact	Y

Y: Supported
N: Not supported

F.3 .NET Data Provider

There are the following ways to develop applications using Fujitsu Npgsql .NET Data Provider:

- Use the Fujitsu Npgsql.NET Data Provider API (classes and methods) directly.

  Fujitsu Npgsql .NET Data Provider is created based on the open source software Npgsql. Refer to the "Npgsql - .Net Data Provider for Postgresql" for information on the APIs:

  See

  Refer to the Installation and Setup Guide for Client for the version of Npgsql that Fujitsu Npgsql .NET Data Provider is based on.

- Use the API of the .NET System.Data.Common namespace

  It is possible to create applications that do not rely on a provider when you use the System.Data.Common namespace. Refer to the "Writing Provider-Independent Code in ADO.NET" in MSDN Library for information.

See

Refer to the Npgsql API Reference for information on Npgsql API classes and methods.

F.4 C Library (libpq)

See

Refer to "libpq - C Library" in "Client Interfaces" in the PostgreSQL Documentation.

F.5 Embedded SQL in C

See

Refer to "ECPG - Embedded SQL in C" in "Client Interfaces" in the PostgreSQL Documentation.

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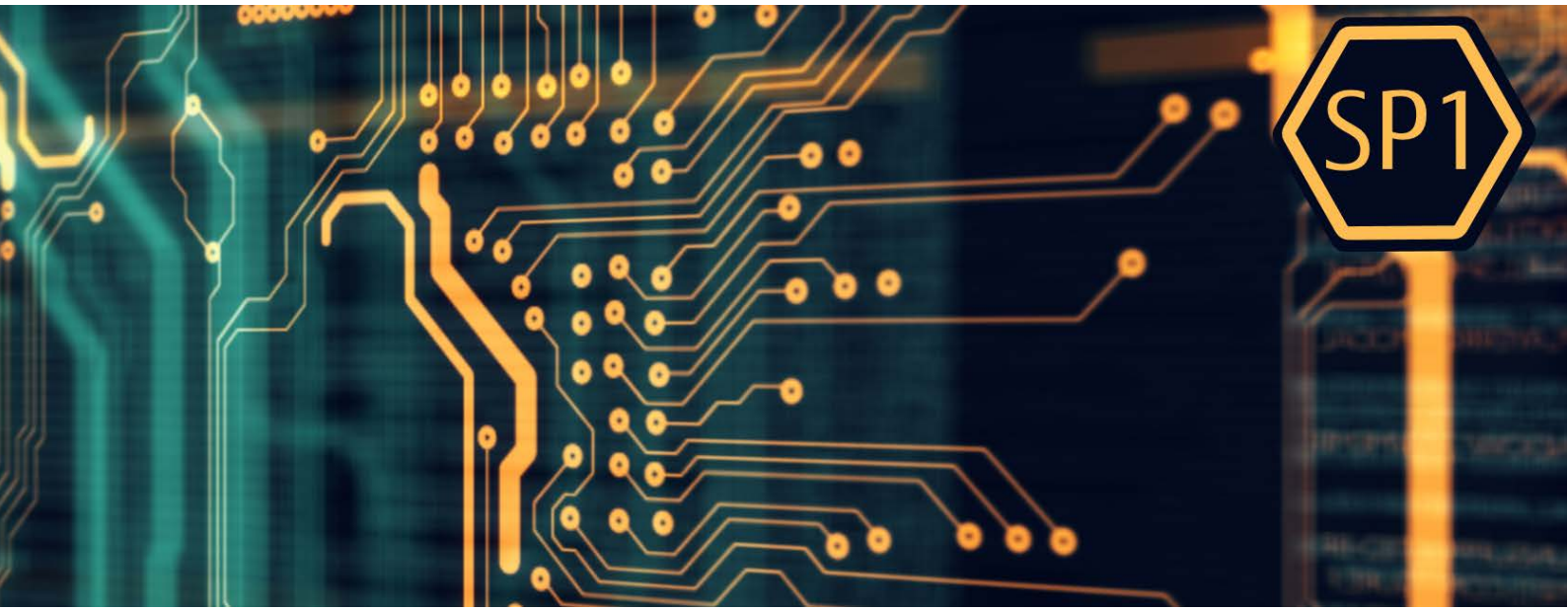

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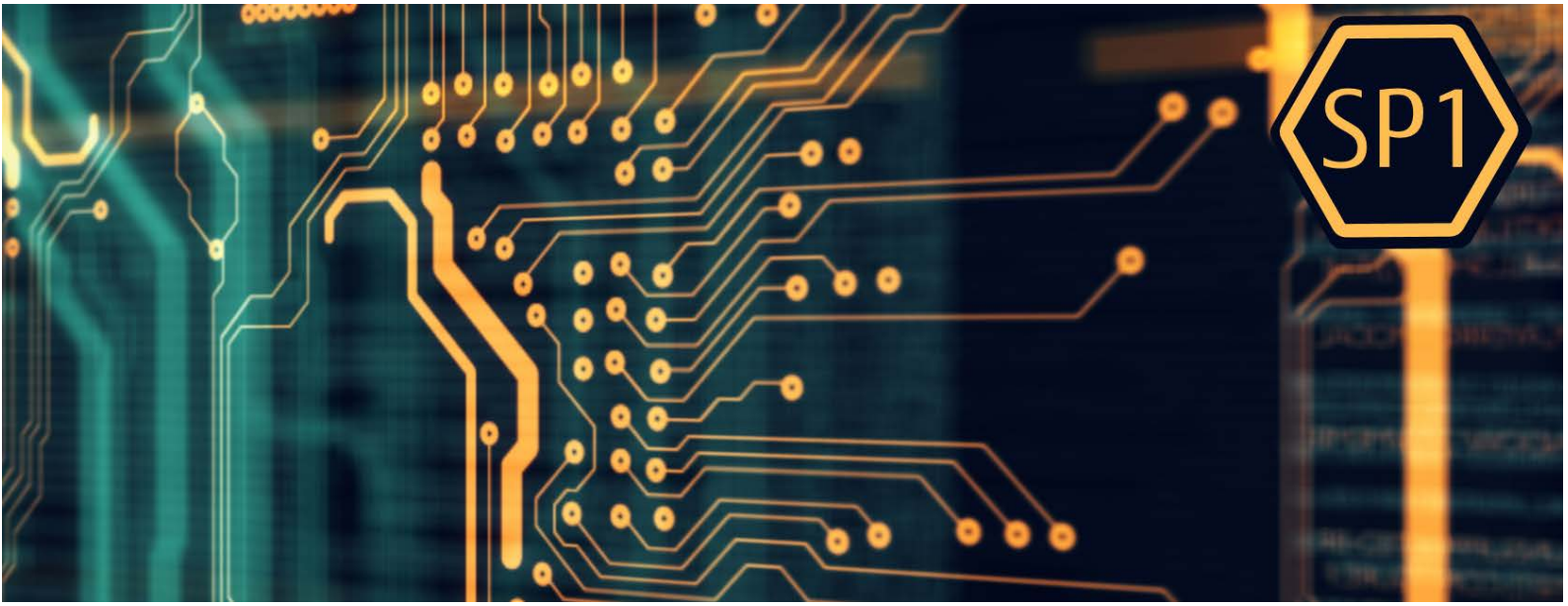

Operation Guide

(Linux)

Linux

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Preface

Purpose of this document

The FUJITSU Enterprise Postgres database system extends the PostgreSQL features and runs on the Linux platform.

This document is the FUJITSU Enterprise Postgres Operation Guide.

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

- PostgreSQL
- SQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Operating FUJITSU Enterprise Postgres

Describes how to operate FUJITSU Enterprise Postgres.

Chapter 2 Starting an Instance and Creating a Database

Describes how to start a FUJITSU Enterprise Postgres instance, and how to create a database.

Chapter 3 Backing Up the Database

Describes how to back up the database.

Chapter 4 Configuring Secure Communication Using Secure Sockets Layer

Describes communication data encryption between the client and the server.

Chapter 5 Protecting Storage Data Using Transparent Data Encryption

Describes how to encrypt the data to be stored in the database.

Chapter 6 Data Masking

Describes the data masking feature.

Chapter 7 Periodic Operations

Describes the periodic database operations that must be performed on FUJITSU Enterprise Postgres.

Chapter 8 Streaming Replication Using WebAdmin

Describes how to create a streaming replication cluster using WebAdmin.

Chapter 9 Installing and Operating the In-memory Feature

Describes how to install and operate the in-memory feature.

Chapter 10 Parallel Query

Describes the factors taken into consideration by FUJITSU Enterprise Postgres when performing parallel queries.

Chapter 11 High-Speed Data Load

Describes how to install and operate high-speed data load.

Chapter 12 Global Meta Cache

Describes how to use Grobal Meta Cache feature.

Chapter 13 Local Meta Cache Limit

Describes how to use Local Meta Cache Limit feature.

Chapter 14 Backup/Recovery Using the Copy Command

Describes backup and recovery using the copy command created by the user.

Chapter 15 Actions when an Error Occurs

Describes how to perform recovery when disk failure or data corruption occurs.

Appendix A Parameters

Describes the FUJITSU Enterprise Postgres parameters.

Appendix B System Administration Functions

Describes the system administration functions of FUJITSU Enterprise Postgres.

Appendix C System Views

Describes how to use the system view in FUJITSU Enterprise Postgres.

Appendix D Tables Used by Data Masking

Describes the tables used by the data masking feature.

Appendix E Tables Used by High-Speed Data Load

Describes the tables used by high-speed data load.

Appendix F Starting and Stopping the Web Server Feature of WebAdmin

Describes how to start and stop WebAdmin (Web server feature).

Appendix G WebAdmin Wallet

Describes how to use the Wallet feature of WebAdmin.

Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters

Describes characters not allowed in WebAdmin.

Appendix I Copy Command Samples that Use the Advanced Copy Feature of the ETERNUS Disk Array

Describes copy command samples that use the advanced copy feature of the ETERNUS disk array.

Appendix J Collecting Failure Investigation Data

Describes how to collect information for initial investigation.

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Chapter 1 Operating FUJITSU Enterprise Postgres

This chapter describes how to operate FUJITSU Enterprise Postgres.

1.1 Operating Methods

There are two methods of managing FUJITSU Enterprise Postgres operations:

- Operation management using GUI tools
- Operation management using commands

See

Before performing database multiplexing using database multiplexing, refer to "Database Multiplexing Mode" in the Cluster Operation Guide (Database Multiplexing).

Operation management using GUI tools

This involves managing operations using the WebAdmin and pgAdmin GUI tools.

- Management using WebAdmin

  This removes the requirement for complex environment settings and operational design for backup and recovery that is usually required for running a database. It enables you to easily and reliably monitor the state of the database, create a streaming replication cluster, back up the database, and restore it even if you do not have expert knowledge of databases.

- Management using pgAdmin

  When developing applications and maintaining the database, you can use pgAdmin to perform simple operations on database objects, such as:

  - Rebuild indexes and update statistics
  - Create, delete, and update database objects

  In addition, from pgAdmin of FUJITSU Enterprise Postgres, you can use the expanded features provided by FUJITSU Enterprise Postgres on the PostgreSQL SQL commands.

  See

  Refer to pgAdmin Help for information on the expanded features of pgAdmin provided by FUJITSU Enterprise Postgres.

Operation management using commands

You can use commands for configuring and operating the database and managing operations.

Note

- You cannot combine WebAdmin and server commands to perform the following operations:
  - Use commands to operate an instance created using WebAdmin.
  - Use WebAdmin to recover a database backed up using commands.

  For instances created with WebAdmin, however, backup can be obtained with the pgx_dmpall command. Also, WebAdmin can perform recovery by using the backup obtained with the pgx_dmpall command.

- To operate an instance created using the initdb command in WebAdmin, the instance needs to be imported using WebAdmin.

- You can perform backup and restoration in pgAdmin, but the backup data obtained with WebAdmin and pgx_dmpall is not compatible with the backup data obtained with pgAdmin.
- Refer to pgAdmin Help for other notes on pgAdmin.

Features used in each phase

The following table lists the features used in each phase for GUI-based operations and command-based operations.

Operation		Operation with the GUI	Operation with commands
Setup	Creating an instance	WebAdmin is used. The server machine capacity, and the optimum parameter for operations using WebAdmin, are set automatically.	The configuration file is edited directly using the initdb command.
	Creating a standby instance	WebAdmin is used. WebAdmin performs a base backup of the source instance and creates a standby instance.	A standby instance is created using the pg_basebackup command.
	Changing the configuration files	WebAdmin is used.	The configuration file is edited directly.
Starting and stopping an instance		WebAdmin is used.	The pg_ctl command is used.
Creating a database		This is defined using pgAdmin of the GUI tool, or using the psql command or the application after specifying the DDL statement.	
Backing up the database		WebAdmin, or the pgx_dmpall command, is used.	It is recommended that the pgx_dmpall command be used. Recovery to the latest database can be performed.
Database recovery		WebAdmin is used.	To use the backup that was performed using the pgx_dmpall command, the pgx_rcvall command is used.
Monitoring	Database errors	The status in the WebAdmin window can be checked. (*1)	The messages that are output to the database server log are monitored (*1)
	Disk space	The status in the WebAdmin window can be checked. A warning will be displayed if the free space falls below 20%. (*1)	This is monitored using the df command of the operating system, for example. (*1)
	Connection status	This can be checked using pgAdmin of the GUI tool, or referencing pg_stat_activity of the standard statistics view from psql or the application.	

*1: This can be used together with system log monitoring using operations management middleware (Systemwalker Centric Manager, for example).

1.2 Starting WebAdmin

This section describes how to start and log in to WebAdmin.

1.2.1 Logging in to WebAdmin

This section describes how to log in to WebAdmin.

User environment

It is recommended to use the following browsers with WebAdmin:

- Internet Explorer 11
- Microsoft Edge (Build41 or later)

WebAdmin will work with other browsers, such as Firefox and Chrome, however, the look and feel may be slightly different.

Startup URL for WebAdmin

In the browser address bar, type the startup URL of the WebAdmin window in the following format:

```
http://hostNameOrIpAddress:portNumber/
```

- *hostNameOrIpAddress*: The host name or IP address of the server where WebAdmin is installed.
- *portNumber*: The port number of WebAdmin. The default port number is 27515.

Example

For a server with IP address "192.0.2.0" and port number "27515"

```
http://192.0.2.0:27515/
```

The startup URL window shown below is displayed. From this window you can log in to WebAdmin or access the product documentation.

Note

- You must start the Web server feature of WebAdmin before using WebAdmin.
- Refer to "Appendix F Starting and Stopping the Web Server Feature of WebAdmin" for information on how to start the Web server feature of WebAdmin.

Log in to WebAdmin

Click [Launch WebAdmin] in the startup URL window to start WebAdmin and display the login window.

To log in, specify the following values:

- [User name]: User name (OS user account) of the instance administrator
- [Password]: Password corresponding to the user name

Point

Use the OS user account as the user name of the instance administrator. Refer to "Creating an Instance Administrator" in the Installation and Setup Guide for Server for details.

1.3 Starting pgAdmin

This section describes how to start pgAdmin, how to add an instance required for managing a database, and how to connect to and disconnect from the instance.

You can use pgAdmin on the Windows client.

1.3.1 Starting pgAdmin

This section explains how to start pgAdmin if you are using it from the product "FUJITSU Enterprise Postgres Client (*AA*bit) *x* SP*z*" (where *AA* is "32" or "64", "*x*" is the product version, and "*z*" is the product level (*x* SPz)).

Windows(R) 8.1

From the [Apps] view, start [pgAdmin 4 (*AA*bit) (*x* SP*z*)].

Windows(R) 10, Windows Server(R) 2016, or Windows Server(R) 2019

Click [Start] >> [All apps] >> [FUJITSU Enterprise Postgres Client(*AA*bit) *x* SP*z*] and start [pgAdmin 4 (*AA*bit) (*x* SP*z*)].

Note

- You must start the instance to be connected to before using pgAdmin.
- Refer to "2.1 Starting and Stopping an Instance" for information on how to start an instance.
- When using pgAdmin4 with Microsoft Edge, enable network access by loopback in Microsoft Edge. Also, add Microsoft Edge to the loopback exclusion list.

1.3.2 Adding an Instance

This section describes how to add an instance to be connected to.

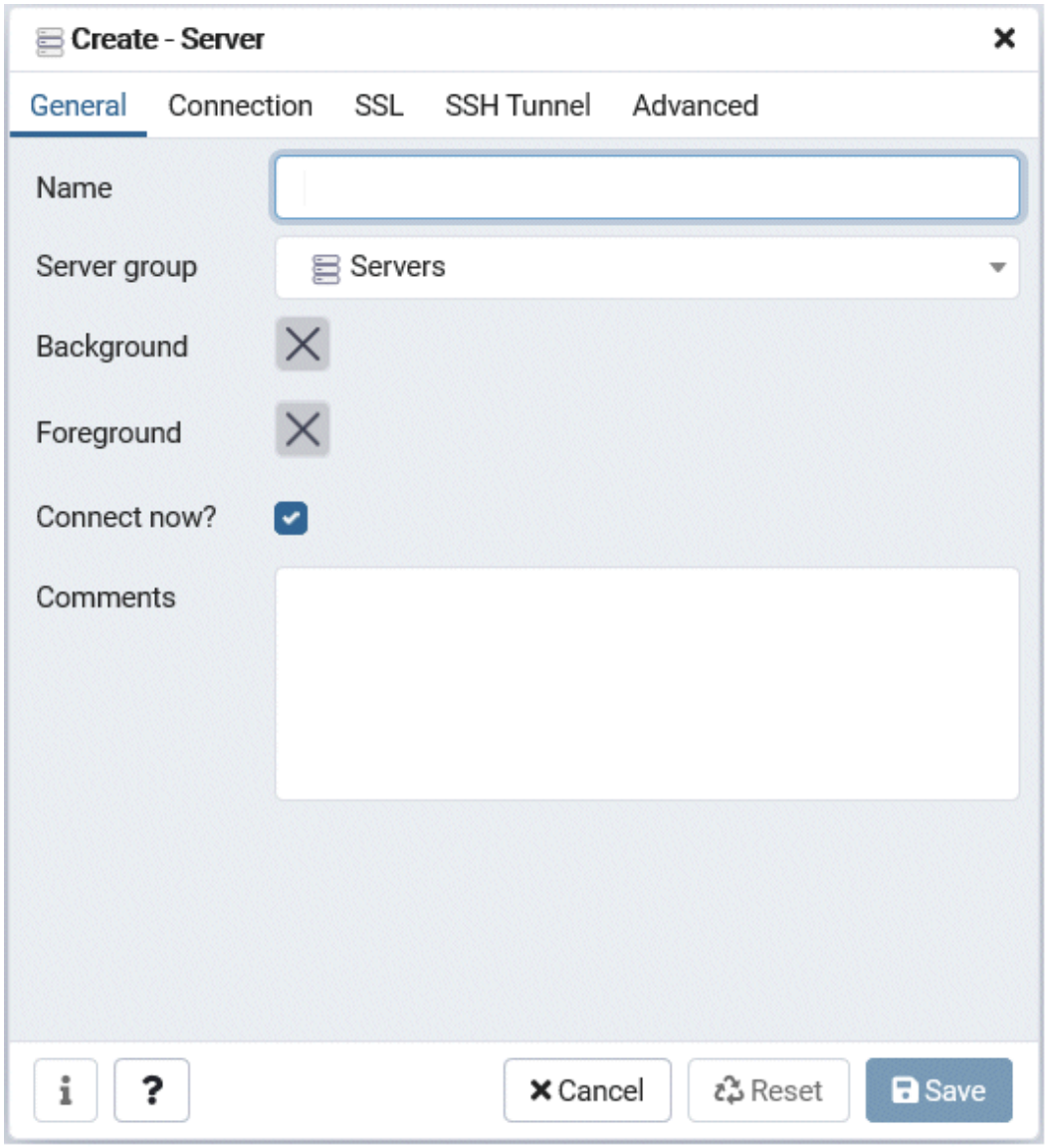
Note

If you use a link-local address with version 6 of the TCP/IP protocol, you may encounter the following error when registering the server with pgAdmin. Therefore, do not use link-local addresses.

```
unsupported format character '"' (0x22) at index 96
```

1. In the [Browser] pane, right-click [Servers], and then click [Create] >> [Server].

2. In the [Create - Server] window, specify a value for each item.



[General] tab

- [Name]: Name of the instance to be managed

[Connection] tab

- [Host name/address]: Host name or IP address of the server where FUJITSU Enterprise Postgres is installed
- [Port]: Port number of the instance
- [Username]: User name of the instance administrator
- [Password]: Password for the user name specified in [Username]

When you add an instance using pgAdmin, the instance is automatically connected to immediately after the addition is completed.

Note

If you select [Save password], the FUJITSU Enterprise Postgres connection password is stored in the following location. Set the appropriate access permissions for the password file to protect it from unauthorized access.

- %APPDATA%\Roaming\pgAdmin\pgadmin4.db

1.3.3 Connecting/Disconnecting an Instance

This section describes how to connect pgAdmin to an instance, and how to disconnect it.

Note

To connect to an instance created using WebAdmin, you must first configure the settings in the [Client authentication] window of WebAdmin to permit connection from pgAdmin.

See

Refer to "Changing the settings" in the Installation and Setup Guide for Server for information on the [Client authentication] window of WebAdmin.

Connecting to an instance

Starting pgAdmin does not connect it to any instance.

To connect to an instance, in the [Browser] pane, right-click the instance, and then click [Connect Server].

If a password was not saved when the instance was added, enter a password in the password entry window that is displayed.

Disconnecting from an instance

To disconnect from an instance, in the [Browser] pane, right-click the server, and then click [Disconnect Server].

1.4 Operations Using Commands

You can operate and manage the database using the following commands:

- Server commands

  This group of commands includes commands for creating a database cluster and controlling the database. You can run these commands on the server where the database is operating.

  To use these commands, you must configure the environment variables.

  See

  - Refer to "PostgreSQL Server Applications" under "Reference" in the PostgreSQL Documentation, or "Reference" for information on server commands.
  - Refer to "Configure the environment variables" in the procedure to create instances in "Using the initdb Command" in the Installation and Setup Guide for Server for information on configuring the environment variables.

- Client commands

  This group of commands includes the psql command and commands for extracting the database cluster to a script file. These commands can be executed on the client that can connect to the database, or on the server on which the database is running.

  To use these commands, you must configure the environment variables.

  See

  - Refer to "PostgreSQL Client Applications" under "Reference" in the PostgreSQL Documentation, or "Reference" for information on client commands.

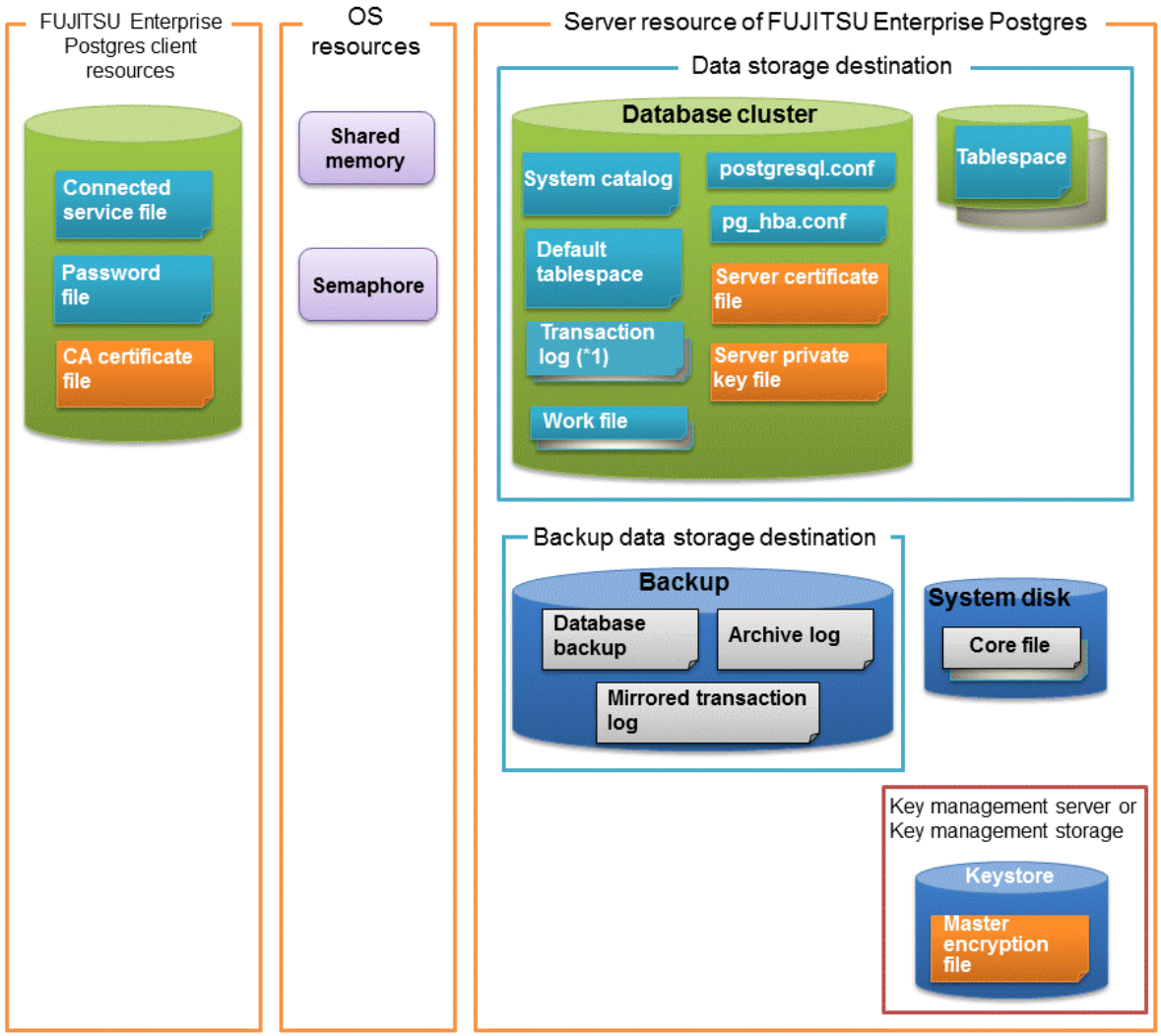
- Refer to "Configuring Environment Variables" in the Installation and Setup Guide for Client for information on the values to be set in the environment variables.

1.5 Operating Environment of FUJITSU Enterprise Postgres

This section describes the operating environment and the file composition of FUJITSU Enterprise Postgres.

1.5.1 Operating Environment

The following figure shows the configuration of the FUJITSU Enterprise Postgres operating environment. The tables given below list the roles of the OS resources and FUJITSU Enterprise Postgres resources.



*1: To distribute the I/O load, place the transaction log on a different disk from the data storage destination.

Table 1.1 OS resources

Type	Role
Shared memory	Used when a database process exchanges information with an external process.
Semaphore	

Table 1.2 FUJITSU Enterprise Postgres client resources

Type	Role
Connection service file	Specifies information, such as the host name, user name, and password, for connecting to FUJITSU Enterprise Postgres.
Password file	Securely manages the password for connecting to FUJITSU Enterprise Postgres.
CA certificate file	CA (certificate authority) certificate used for server authentication when encrypting communication data.

Table 1.3 Server resources of FUJITSU Enterprise Postgres

Type	Role
Database cluster	Database storage area on the database storage disk. It is a collection of databases managed by an instance.
System catalog	Contains information required for the system to run, including the database definition information and the operation information created by the user.
Default tablespace	Contains table files and index files stored by default.
Transaction log	Contains log information in case of a crash recovery or rollback. This is the same as the WAL (Write Ahead Log).
Work file	Work file used when executing applications or commands.
postgresql.conf	Contains information that defines the operating environment of FUJITSU Enterprise Postgres.
pg_hba.conf	FUJITSU Enterprise Postgres uses this file to authenticate individual client hosts.
Server certificate file	Contains information about the server certificate to be used when encrypting communication data and authenticating a server.
Server private key file	Contains information about the server private key to be used when encrypting communication data and authenticating a server
Tablespace	Stores table files and index files in a separate area from the database cluster. Specify a space other than that under the database cluster.
Backup	Stores the data required for recovering the database when an error, such as disk failure, occurs.
Database backup	Contains the backup data for the database.
Archive log	Contains the log information for recovery.
Mirrored transaction log (mirrored WAL)	Enables a database cluster to be restored to the state immediately before an error even if both the database cluster and transaction log fail when performing backup/recovery operations using the pgx_dmpall command or WebAdmin.
Core file	FUJITSU Enterprise Postgres process core file that is output when an error occurs during a FUJITSU Enterprise Postgres process.
Key management server or key management storage	Server or storage where the master encryption key file is located.
Master encryption key file	Contains the master encryption key to be used when encrypting storage data. The master encryption key file is managed on the key management server or key management storage.

1.5.2 File Composition

FUJITSU Enterprise Postgres consists of the following files for controlling and storing the database. The table below shows the relationship between the number of such files and their location within a single instance.

Table 1.4 Number of files within a single instance and how to specify their location

File type	Required	Quantity	How to specify the location
Program files	Y	Multiple	Note that "<*x*>" indicates the product version. /opt/fsepv<*x*>server64
Database cluster	Y	1	Specify using WebAdmin or server commands.
Tablespace	Y	Multiple	Specify a space other than that under the database cluster, using pgAdmin or the DDL statement.
Backup	Y	Multiple	Specify using WebAdmin or server commands.
Core file	Y	Multiple	Specify using WebAdmin, server commands, or postgresql.conf.
Server certificate file (*1)	N	1	Specify using postgresql.conf.
Server private key file (*1)	N	1	Specify using postgresql.conf.
Master encryption key file (*1)	N	1	Specify the directory created as the key store using postgresql.conf.
Connection service file (*1)	N	1	Specify using environment variables.
Password file (*1)	N	1	Specify using environment variables.
CA certificate file (*1)	N	1	Specify using environment variables.

Y: Mandatory
N: Optional

*1: Set manually when using the applicable feature.

Note

- Do not use an NFS for files used in FUJITSU Enterprise Postgres except when creating a database space in a storage device on a network.
- If anti-virus software is used, set scan exception settings for directories so that none of the files that comprise FUJITSU Enterprise Postgres are scanned for viruses. Alternatively, if the files that comprise FUJITSU Enterprise Postgres are to be scanned for viruses, stop FUJITSU Enterprise Postgres and perform the scan when tasks that use FUJITSU Enterprise Postgres are not operating.

1.6 Notes on Compatibility of Applications Used for Operations

When you upgrade FUJITSU Enterprise Postgres to a newer version, there may be some effect on applications due to improvements or enhancements in functionality.

Take this into account when creating applications so that you can maintain compatibility after upgrading to a newer version of FUJITSU Enterprise Postgres.

See

Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

1.7 Notes on Upgrading Database Instances

When upgrading FUJITSU Enterprise Postgres 9.4 or newer database instances to FUJITSU Enterprise Postgres 10 or later using pg_upgrade, there are certain steps you need to follow.

Before using pg_upgrade, remove the following extensions from all databases in the instance, except "template0":

- pg_stat_statements
- pgx_io
- pgx_paging
- pgx_network
- pgx_network_err
- pgx_cpu
- pgx_memory
- pgx_swap
- pgx_disk
- pgx_process
- pgx_log
- oracle_compatible
- pg_dbms_stats
- pg_hint_plan

For all databases except "template0", execute the following command to remove these extensions:

```
DROP EXTENSION extensionName;
```

Once the pg_upgrade operation is complete, for all databases except "template0", execute the following command to re-create these extensions as required:

```
CREATE EXTENSION extensionName;
```

Note

- It is strongly recommended to back up the database using pg_dump before performing pg_upgrade or using DROP EXTENSION.
- If there are any columns created in the user tables using a data type from these extensions, then DROP EXTENSION will also drop these columns. Therefore, it is essential that alternate upgrade mechanisms are considered instead of pg_upgrade, in such scenarios. These may include pg_dump/pg_restore.

1.7.1 Additional Steps for upgrading to FUJITSU Enterprise Postgres with Vertical Clustered Index (VCI) Enabled

When upgrading FUJITSU Enterprise Postgres 11.0 or earlier instances that are using the VCI extension to FUJITSU Enterprise Postgres 12 or later using pg_upgrade, additional steps must be performed because of the incompatibility of the VCI extension between FUJITSU Enterprise Postgres 12 or later and FUJITSU Enterprise Postgres 11 or earlier.

Follow the procedure below in all databases in the FUJITSU Enterprise Postgres 11 or earlier instance, except "template0".

Before upgrading

1. Obtain the CREATE INDEX Definitions

   Run the query below to list all the VCI indexes created in the database. Ensure that these indexes are re-created in the FUJITSU Enterprise Postgres 12 or later instance after pg_upgrade has finished.

```
SELECT nspname || '.' || relname AS index_relname,* FROM pg_class, pg_namespace
  WHERE relnamespace = pg_namespace.oid AND relam IN (SELECT oid FROM pg_am WHERE amname='vci');
```

   For each index_relname listed above, execute the commands below to obtain the CREATE INDEX definition (to use the same SQL syntax while re-creating the indexes on the FUJITSU Enterprise Postgres 12 or later instance).

```
SELECT pg_get_indexdef('indexName'::regclass);
```

2. Drop the VCI indexes and VCI extension along with all its dependencies.

   To remove all the VCI indexes and VCI internal objects that are created in FUJITSU Enterprise Postgres, execute the commands below. VCI internal objects will be created in FUJITSU Enterprise Postgres 12 or later automatically when CREATE EXTENSION for VCI is executed.

```
DROP EXTENSION VCI CASCADE;
```

   Note

   To restore the VCI extension in the FUJITSU Enterprise Postgres 11 or earlier instance, execute CREATE EXTENSION.

After upgrading

Once the pg_upgrade operation is complete, for all databases except "template0", execute CREATE EXTENSION to create the VCI extension, and then execute CREATE INDEX for all the VCI indexes as required.

Chapter 2 Starting an Instance and Creating a Database

This chapter describes basic operations, from starting an instance to creating a database.

2.1 Starting and Stopping an Instance

This section describes how to start and stop an instance.

- 2.1.1 Using WebAdmin
- 2.1.2 Using Server Commands

Point

To automatically start or stop an instance when the operating system on the database server is started or stopped, refer to "Configuring Automatic Start and Stop of an Instance" in the Installation and Setup Guide for Server and configure the settings.

Note

The collected statistics are initialized if an instance is stopped in the "Immediate" mode or if it is abnormally terminated. To prepare for such initialization of statistics, consider regular collection of the statistics by using the SELECT statement. Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for information on the statistics.

2.1.1 Using WebAdmin

WebAdmin enables you to start or stop an instance and check its operating status.

Starting an instance

Start an instance by using the [Instances] tab in WebAdmin.

is displayed when an instance is stopped.

To start a stopped instance, click .

Stopping an instance

Stop an instance by using the [Instances] tab in WebAdmin.

 is displayed when an instance is active.

To stop an active instance, click .

Stop mode

Select the mode in which to stop the instance. The following describes the operations of the modes:

Stop mode	Connected clients	Backup being executed using the command
Smart mode (*1)	Waits for all connected clients to be disconnected.	Waits for backups being executed using the command to finish.
Fast mode	Rolls back all transactions being executed and forcibly disconnects clients.	Terminates backups being executed using the command.
Immediate mode	All server processes are terminated immediately. Crash recovery is executed the next time the instance is started.	

Stop mode	Connected clients	Backup being executed using the command
Kill process mode	Send SIGKILL to the process and abort all active transactions. This will lead to a crash-recovery run at the next restart.	

*1: When the processing to stop the instance in the Smart mode has started and you want to stop immediately, use the following procedure:

1. Restart the Web server feature of WebAdmin.
2. In the [Instances] tab, click .
3. In the [Instances] tab, click , and select the Immediate mode to stop the instance.

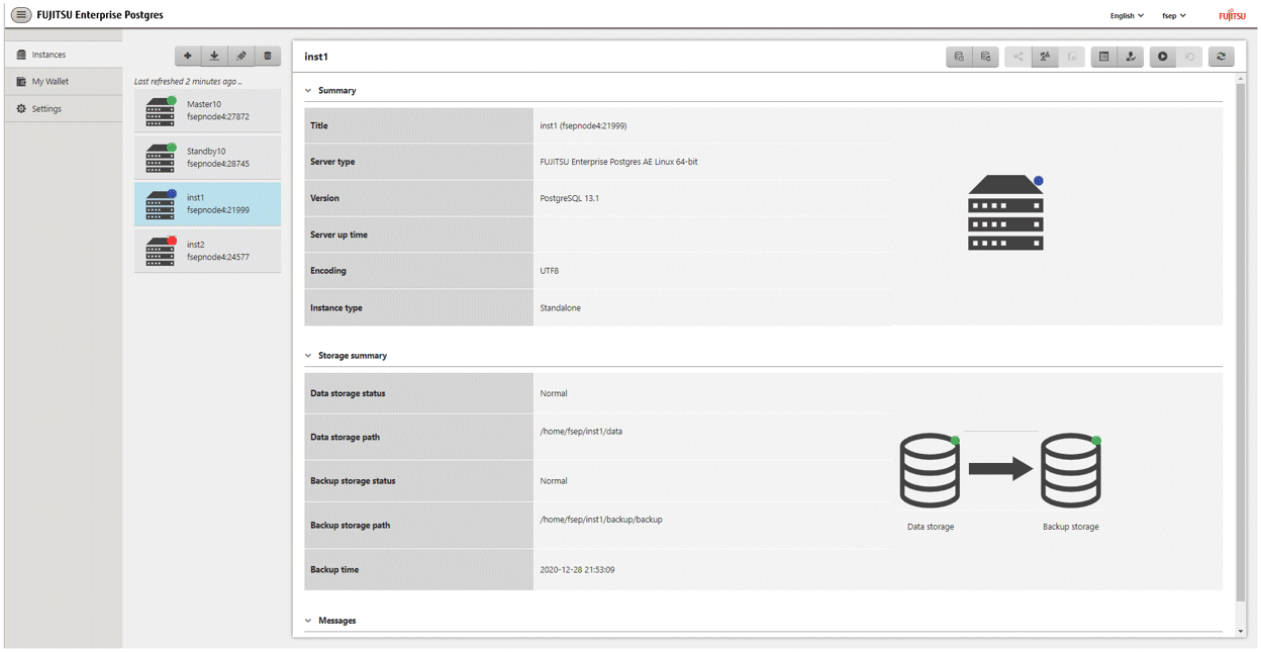
Checking the operating status of an instance

You can check the operating status of an instance by using the [Instances] tab. The following indicators are used to show the status of a resource.

Status indicator	Explanation
	The resource is operating normally.
	The resource is stopped.
	There is an error in the resource.
	An operation is in progress on this resource or the status is being checked.
	The resource is not operating optimally and needs intervention.

If an instance stops abnormally, remove the cause of the stoppage and start the instance by using WebAdmin.

Figure 2.1 Example of operating status indicators



Note

- When operating WebAdmin, click to update the status. WebAdmin will reflect the latest status of the operation or the instance resources from the server.
- If an error occurs while communicating with the server, there may be no response from WebAdmin. When this happens, close the browser and then log in again. If this does not resolve the issue, check the system log of the server and confirm whether a communication error has occurred.
- The following message is output during startup of an instance when the startup process is operating normally, therefore, the user does not need to be aware of this message:

```
FATAL:  the database system is starting up
```

2.1.2 Using Server Commands

Server commands enable you to start or stop an instance and check its operating status.

To use sever commands, configure the environment variables.

See

Refer to " Configure the environment variables" in the procedure to create instances in " Using the initdb Command" in the Installation and Setup Guide for Server for information on configuring the environment variables.

Starting an instance

Use the pg_ctl command to start an instance.

Specify the following values in the pg_ctl command:

- Specify "start" as the mode.
- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

If an application, command, or process tries to connect to the database while the instance is starting up, the message "FATAL:the database system is starting up(11189)" is output. However, this message may also be output if the instance is started without the -W option specified. This message is output by the pg_ctl command to check if the instance has started successfully. Therefore, ignore this message if there are no other applications, commands, or processes that connect to the database.

Example

```
> pg_ctl start -D /database/inst1
```

Note

If the -W option is specified, the command will return without waiting for the instance to start. Therefore, it may be unclear as to whether the instance startup was successful or failed.

Stopping an instance

Use the pg_ctl command to stop an instance.

Specify the following values in the pg_ctl command:

- Specify "stop" as the mode.

- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

Example

```
> pg_ctl stop -D /database/inst1
```

Checking the operating status of an instance

Use the pg_ctl command to check the operating status of an instance.

Specify the following values in the pg_ctl command:

- Specify "status" as the mode.
- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

Example

When the instance is active:

```
> pg_ctl status -D /database/inst1
pg_ctl: server is running (PID: 1234)
```

When the instance is inactive:

```
> pg_ctl status -D /database/inst1
pg_ctl: no server running.
```

See

Refer to "pg_ctl" under "Reference" in the PostgreSQL Documentation for information on pg_ctl command.

2.2 Creating a Database

This section explains how to create a database.

- 2.2.1 Using pgAdmin
- 2.2.2 Using Client Commands

2.2.1 Using pgAdmin

Follow the procedure below to define a database using pgAdmin.

1. In the pgAdmin window, right-click [Databases] in the [Browser] pane, and then click [Create] >> [Database] to display a [Create - Database] window.
2. Specify appropriate values for the following items in the [Create - Database] window.
   - [General] tab
     - [Database]: Name of the database to be managed
3. Click [Save] to create the database.

2.2.2 Using Client Commands

Follow the procedure below to define a database using client commands.

An example of operations on the server is shown below.

1. Use psql command to connect to the postgres database.
   Execute psql postgres.

```
> psql postgres
psql (13.3)
Type "help" for help.
```

2. Create the database.
   To create the database, execute the CREATE DATABASE databaseName; statement.

```
postgres=# CREATE DATABASE db01;
CREATE DATABASE
```

3. Confirm that the database is created.
   Execute \l+, and confirm that the name of the database created in step 2 is displayed.

```
postgres=# \l+
```

4. Disconnect from the postgres database.
   Execute \q to terminate the psql command.

```
postgres=# \q
```

You can create a database using the createdb command.

See

Refer to "Creating a Database" in "Tutorial" in the PostgreSQL Documentation for information on creating a database using the createdb command.

Chapter 3 Backing Up the Database

This chapter describes how to back up the database.

Backup methods

The following backup methods enable you to recover data to a backup point or to the state immediately preceding disk physical breakdown or data logical failure.

- Backup using WebAdmin

  This method enables you to back up data through intuitive window operations using the GUI.

  WebAdmin is used for recovery.

- Backup using the pgx_dmpall command

  Execute the pgx_dmpall command with a script to perform automatic backup.

  To back up data automatically, you must register the process in the automation software of the operating system. Follow the procedure given in the documentation for your operating system.

  The pgx_rcvall command is used for recovery.

Information

By using a copy command created by the user, the pgx_dmpall command and the pgx_rcvall command can back up database clusters and tablespaces to any destination and recover them from any destination using any copy method. Refer to "Chapter 14 Backup/Recovery Using the Copy Command" for details.

Approximate backup time

The formula for deriving the approximate backup time when you use WebAdmin or the pgx_dmpall command is as follows:

```
backupTime = dataStorageDestinationUsage / diskWritePerformance x 1.5
```

- *dataStorageDestinationUsage*: Disk usage at the data storage destination
- *diskWritePerformance*: Maximum data volume (bytes/second) that can be written per second in the system environment where operation is performed
- 1.5: Coefficient to factor in tasks other than disk write (which is the most time-consuming step)

If using the copy command with the pgx_dmpall command, the backup time will depend on the implementation of the copy command.

Note

- Backup operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.
- Use the selected backup method continuously.

  There are several differences, such as the data format, across the backup methods. For this reason, the following restrictions apply:

  - It is not possible to use one method for backup and another for recovery.
  - It is not possible to convert one type of backup data to a different type of backup data.
- Mirrored WALs can be used only for backup/recovery using the pgx_dmpall command or WebAdmin.
- There are several considerations for the backup of the keystore and backup of the database in case the data stored in the database is encrypted. Refer to the following for details:

  - 5.6.4 Backing Up and Recovering the Keystore
  - 5.7 Backing Up and Restoring/Recovering the Database

- If you have defined a tablespace, back it up. If you do not back it up, directories for the tablespace are not created during recovery, which may cause the recovery to fail. If the recovery fails, refer to the system log, create the tablespace, and then perform the recovery process again.

Information

The following methods can also be used to perform backup. Performing a backup using these methods allows you to restore to the point when the backup was performed.

- Backup using an SQL-based dump

  Dump the data by using SQL. This backup method also enables data migration.

- File system level backup

  This backup method requires you to stop the instance and use OS commands to backup database resources as files.

- Backup by continuous archiving

  This is the standard backup method for PostgreSQL.

Refer to "Backup and Restore" in "Server Administration" in the PostgreSQL Documentation for information on these backup methods.

3.1 Periodic Backup

It is recommended that you perform backup periodically.

Backing up data periodically using WebAdmin or the pgx_dmpall command has the following advantages:

- This method reduces disk usage, because obsolete archive logs (transaction logs copied to the backup data storage destination) are deleted. It also minimizes the recovery time when an error occurs.

Backup cycle

The time interval when backup is performed periodically is called the backup cycle. For example, if backup is performed every morning, the backup cycle is 1 day.
The backup cycle depends on the jobs being run, but on FUJITSU Enterprise Postgres it is recommended that operations are run with a backup cycle of at least once per day.

3.2 Backup Methods

This section describes the methods for backing up the database.

- 3.2.1 Using WebAdmin
- 3.2.2 Using Server Commands

3.2.1 Using WebAdmin

You can use WebAdmin to perform backup and check the backup status.

Note

- If backup is disabled for an instance, you will not be able to back up or restore the instance. Refer to "[Backup]" in "Creating an Instance" in the Installation and Setup Guide for Server for details.
- If the data to be stored in the database is to be encrypted, it is necessary to enable the automatic opening of the keystore before doing so. Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for details.

- WebAdmin uses the labels "Data storage path", "Backup storage path" and "Transaction log path" to indicate "data storage destination", "backup data storage destination" and "transaction log storage destination" respectively. In this manual these terms are used interchangeably.

Backup operation

Follow the procedure below to back up the database.

1. Select the database to back up

   In the [Instances] tab, select the instance to be backed up and click .

2. Back up the database

   The [Backup] dialog box is displayed. To perform backup, click [Yes].
   An instance is automatically started when backup is performed.

Backup status

If an error occurs and backup fails, [Error] is displayed adjacent to [Data storage status] or [Backup storage status] in the [Instances] tab. An error message is also displayed in the message list.

In this case, the backup data is not optimized. Ensure that you check the backup result whenever you perform backup. If backup fails, [Solution] appears to the right of the error message. Clicking this button displays information explaining how to resolve the cause of the error. Remove the cause of failure, and perform backup again.

3.2.2 Using Server Commands

Use the pgx_dmpall command and pgx_rcvall command to perform backup and check the backup result.

Preparing for backup

You must prepare for backup before actually starting the backup process.

Follow the procedure below.

See

Refer to "Preparing Directories to Deploy Resources" in the Installation and Setup Guide for Server for information on the location of directories required for backup and for points to take into account.

1. Prepare the backup data storage disk

   For backup, prepare a separate disk unit from the database storage disk and mount it using the operating system commands.

2. Create a directory where the backup data will be stored

   Create an empty directory.

   Set appropriate permissions so that only the instance administrator can access the directory.

   Example

   ```
   # mkdir /backup/inst1
   # chown fsepuser:fsepuser /backup/inst1
   # chmod 700 /backup/inst1
   ```

3. Specify the settings required for backup

   Stop the instance, and set the following parameters in the postgresql.conf file.

   Start the instance after editing the postgresql.conf file.

Parameter name	Setting	Description
backup_destination	Name of the directory where the backup data will be stored	Specify the name of the directory where the backup data will be stored. Appropriate privileges that allow only the instance administrator to access the directory must already be set. Place the backup data storage destination directory outside the data storage destination directory, the tablespace directory, and the transaction log storage destination directory.
archive_mode	on	Specify the archive log mode. Specify [on] (execute).
archive_command	'*installationDirectory*/bin/pgx_walcopy.cmd "%p" "*backupDataStorageDestinationDirectory*/archived_wal/%f"'	Specify the path name of the command that will save the transaction log and the storage destination.

Refer to "Appendix A Parameters" and "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on the parameters.

Backup operation (file backup)

Use the pgx_dmpall command to perform file backup. You can even embed the pgx_dmpall command in OS automation software to perform backup.

The backup data is stored in the directory specified in the backup_destination parameter of postgresql.conf.

Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

Example

```
> pgx_dmpall -D /database/inst1
```

Note

Backup stores the data obtained during the backup and the backup data of the data obtained during previous backup.

If the data to be stored in the database is encrypted, refer to the following and back up the keystore:

- 5.6.4 Backing Up and Recovering the Keystore

Backup status

Use the pgx_rcvall command to check the backup status.

Specify the following values in the pgx_rcvall command:

- The -l option indicates backup data information.
- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

```
> pgx_rcvall -l -D /database/inst1
Date                    Status          Dir
2020-05-01 13:30:40     COMPLETE        /backup/inst1/2020-05-01_13-30-40
```

If an error occurs and backup fails, a message is output to the system log.

In this case, the backup data is not optimized. Ensure that you check the backup result whenever you perform backup. If backup fails, remove the cause of failure and perform backup again.

See

Refer to "pgx_dmpall" and "pgx_rcvall" in the Reference for information on the pgx_dmpall command and pgx_rcvall command.

Setting a restore point

In case you want to recover your database to a certain point in time, you can name this particular point in time, which is referred to as the restore point, by using the psql command.

By setting a restore point before executing an application, it becomes easy to identify up to which point in time the data will be reverted.

A restore point can be set to any point in time after a backup is executed. However, if a restore point is set before a backup is executed, the database cannot be recovered to that point in time. This is because restore points are recorded in the archive logs, and the archive logs are discarded when backups are executed.

Example

The following example uses the psql command to connect to the database and execute the SQL statement to set a restore point.

However, when considering continued compatibility of applications, do not use functions directly in SQL statements. Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

```
postgres=# SELECT pg_create_restore_point('batch_20200503_1');
LOG:  restore point "batch_20200503_1" created at 0/20000E8
STATEMENT:  select pg_create_restore_point('batch_20200503_1');
 pg_create_restore_point
-------------------------
 0/20000E8
(1 row)
```

Refer to "15.3.2 Using the pgx_rcvall Command" for information on using a restore point to recover the database.

Note

- Name restore points so that they are unique within the database. Add the date and time of setting a restore point to distinguish it from other restore points, as shown below:
  - YYMMDD_HHMMSS
    - YYMMDD: Indicates the date
    - HHMMSS: Indicates the time
- There is no way to check restore points you have set. Keep a record in, for example, a file.

See

Refer to "System Administration Functions" under "Functions and Operators" in the PostgreSQL Documentation for information on pg_create_restore_point.

Chapter 4 Configuring Secure Communication Using Secure Sockets Layer

If communication data transferred between a client and a server contains confidential information, encrypting the communication data can protect it against threats, such as eavesdropping on the network.

4.1 Configuring Communication Data Encryption

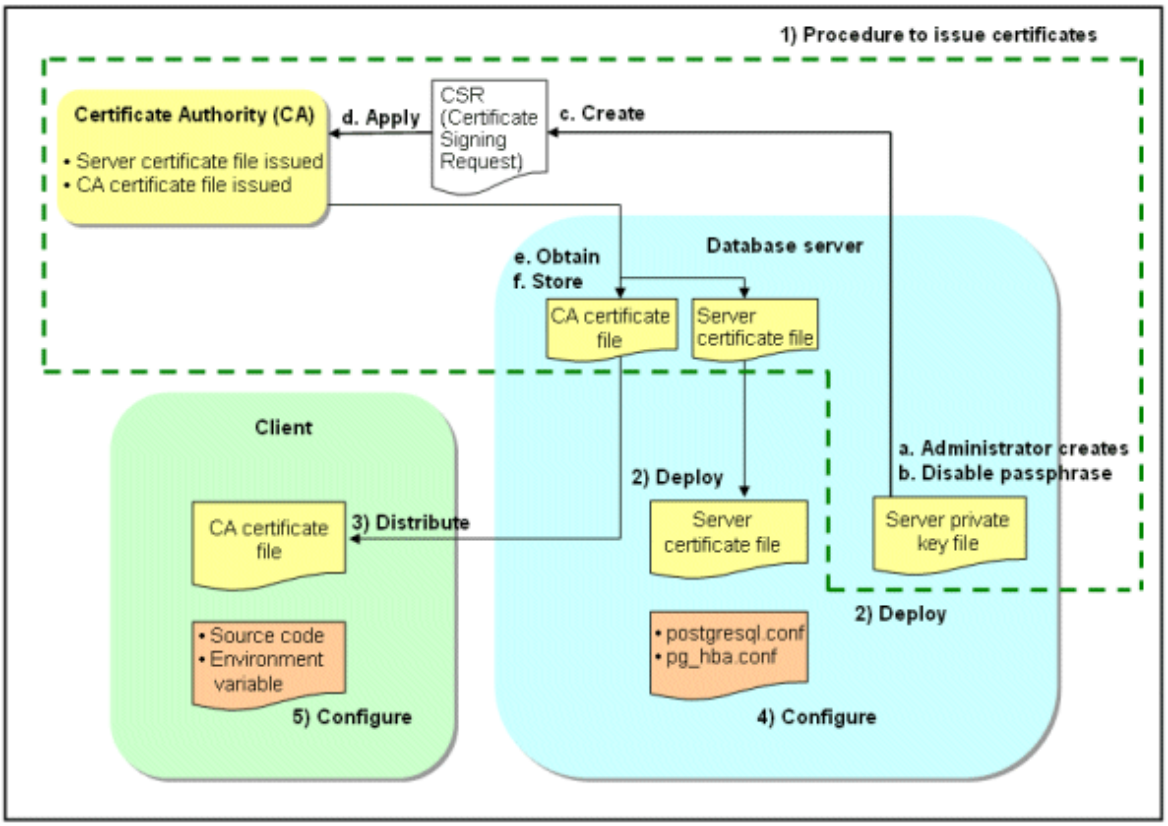
To encrypt communication data transferred between a client and a server, configure communication data encryption as described below. Communication data encryption not only protects the communication content, but it also guards against man-in-the-middle (MITM) attacks (for example, data and password theft through server impersonation).

Table 4.1 Configuration procedure

Configuration procedure
1) Issue a certificate
2) Deploy a server certificate file and a server private key file
3) Distribute a CA certificate file to the client
4) Configure the operating environment for the database server
5) Configure the operating environment for the client

The following figure illustrates the environment for communication data encryption.

Figure 4.1 Environment for communication data encryption



4.1.1 Issuing a Certificate

For authenticating servers, you must acquire a certificate issued by the certificate authority (CA).
FUJITSU Enterprise Postgres supports X.509 standard PEM format files. If the certificate authority issues a file in DER format, use a tool such as the openssl command to convert the DER format file to PEM format.

The following provides an overview of the procedure. Refer to the procedure published by the public or independent certificate authority (CA) that provides the certificate file for details.

a. Create a server private key file

b. Disable the passphrase for the server private key file

c. Create a CSR (signing request for obtaining a server certificate) from the server private key file

d. Apply to the certificate authority (CA) for a server certificate

e. Obtain a server certificate file and a CA certificate file from the certificate authority (CA)

f. Store the server certificate file and the CA certificate file
   Note: If you lose or destroy the certificates, you will need to have them re-issued.

The above procedure enables you to prepare the following files:

- Server private key file
- Server certificate file
- CA certificate file

4.1.2 Deploying a Server Certificate File and a Server Private Key File

Create a directory on the local disk of the database server and store the server certificate file and the server private key file in it.
Use the operating system features to set access privileges for the server certificate file and the server private key file so that only the database administrator has load privileges.
Back up the server certificate file and the server private key file in the event that data corruption occurs and store them securely.

4.1.3 Distributing a CA Certificate File to the Client

Create a directory on the local disk of the client and place the distributed CA certificate file there. Use the operating system features to set load privileges to protect the CA certificate file against accidental deletion.

4.1.4 Configuring the Operating Environment for the Database Server

See

Refer to "Secure TCP/IP Connections with SSL" under "Server Administration" in the PostgreSQL Documentation for details.

4.1.5 Configuring the Operating Environment for the Client

See

Refer to the following sections in the Application Development Guide for details, depending on your application development environment:

- "Settings for Encrypting Communication Data" under "Setup" in "JDBC Driver"
- "Settings for Encrypting Communication Data" under "Setup" in "C Library (libpq)"
- "Settings for Encrypting Communication Data" under "Setup" in "Embedded SQL in C"

4.1.6 Performing Database Multiplexing

When you perform communication that uses database multiplexing and a Secure Socket Layer server certificate, certificates with the same "Common Name" must be used. To ensure this, take one of the following actions:

- Create one server certificate, replicate it, and place a copy on each server used for database multiplexing.
- Create a server certificate with the same "Common Name" for each server used for database multiplexing.

See

Refer to "Using the Application Connection Switch Feature" in the Application Development Guide for information on how to specify applications on the client.

Chapter 5 Protecting Storage Data Using Transparent Data Encryption

This chapter describes how to encrypt data to be stored in the database.

5.1 Protecting Data Using Encryption

With PostgreSQL, data in a database is protected from access by unauthorized database users through the use of authentication and access controls. However, the OS file is not protected from attackers who bypass the database server's authentication and access controls.

With FUJITSU Enterprise Postgres, data inside the OS file is encrypted, so valuable information is protected even if the file or disk is stolen.

Data to be stored in a database is encrypted when it is written to the data file, and decrypted when it is read.

This is performed automatically by the instance, so the user and the application need not be aware of key management and encryption or decryption. This process is called TDE (Transparent Data Encryption).

The characteristics of TDE are described below.

Encryption mechanisms

Two-layer encryption key and the keystore

In each tablespace, there is a tablespace encryption key that encrypts and decrypts all the data within. The tablespace encryption key is encrypted by the master encryption key and saved.
Only one master encryption key exists in a database cluster. It is encrypted based on a passphrase specified by the user and stored in a keystore. FUJITSU Enterprise Postgres provides a file-based keystore. Attackers who do not know the passphrase cannot read the master encryption key from the keystore.

Strong encryption algorithms

TDE uses the Advanced Encryption Standard (AES) as its encryption algorithm. AES was adopted as a standard in 2002 by the United States Federal Government, and is used throughout the world.

Faster encryption and decryption based on hardware

TDE minimizes the overhead of encryption and decryption by using the AES-NI (Advanced Encryption Standard New Instructions) built into Intel(R) Xeon(R) processors since the 5600 series. This means that even in situations where previously the minimum encryption target was selected as a tradeoff between performance and security, it is now possible to encrypt all the data of an application.

Refer to the Intel Corporation's website for information on the list of processors equipped with AES-NI.

Zero overhead storage areas

Encryption does not change the size of data stored in tables, indexes, or WAL. There is, therefore, no need for additional estimates or disks.

Scope of encryption

All user data within the specified tablespace

The tablespace is the unit for specifying encryption. All tables, indexes, temporary tables, and temporary indexes created in the encrypted tablespace are encrypted. There is no need for the user to consider which tables and strings to encrypt.

Refer to "5.4 Encrypting a Tablespace" for details.

Backup data

The pgx_dmpall command and pg_basebackup command create backup data by copying the OS file. Backups of the encrypted data are, therefore, also encrypted. Information is protected from leakage even if the backup medium is stolen.

WAL and temporary files

WAL, which is created by updating encrypted tables and indexes, is encrypted with the same security strength as the update target. When large merges and sorts are performed, the encrypted data is written to a temporary file in encrypted format.

Streaming replication support

You can combine streaming replication and transparent data encryption. The data and WAL encrypted on the primary server is transferred to the standby server in its encrypted format and stored.

Note

The following are not encrypted:

- pg_dump and pg_dumpall output files
- Files output by the COPY command
- Notification event payloads that communicate using the LISTEN or NOTIFY command
- Checksum validation is not performed on encrypted tablespaces during backup and when using the pg_checksum utility.

5.2 Setting the Master Encryption Key

To use transparent data encryption, you must create a keystore and set the master encryption key.

1. In the keystore_location parameter of postgresql.conf, specify the directory to store the keystore.

   Specify a different location for each database cluster.

   ```
   keystore_location = '/key/store/location'
   ```

   Refer to "Appendix A Parameters" for information on postgresql.conf.

   After editing the postgresql.conf file, either start or restart the instance.

   - Using WebAdmin

     Refer to "2.1.1 Using WebAdmin", and restart the instance.

   - Using the pg_ctl command

     Specify the following in the pg_ctl command:

     - Specify "restart" as the mode.
     - Specify the data storage destination directory in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
     - Specify the -w option. This means that the command returns after waiting for the instance to start. If the -w option is not specified, it may not be possible to determine if the starting of the instance completed successfully or if it failed.

     Example

     ```
     > pg_ctl restart -w -D /database/inst1
     ```

2. Execute an SQL function, such as the one below, to set the master encryption key. This must be performed by the superuser. Execute it as the database superuser.

   ```
   SELECT pgx_set_master_key('passphrase');
   ```

   The value "passphrase" is the passphrase that will be used to open the keystore. The master encryption key is protected by this passphrase, so avoid specifying a short simple string that is easy to guess.

   Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_master_key function.

Note

Note that if you forget the passphrase, you will not be able to access the encrypted data. There is no method to retrieve a forgotten passphrase and decrypt data. Do not, under any circumstances, forget the passphrase.

The pgx_set_master_key function creates a file with the name keystore.ks in the keystore storage destination. It also creates a master encryption key from random bit strings, encrypts it with the specified passphrase, and stores it in keystore.ks. At this point, the keystore is open.

5.3 Opening the Keystore

To create encrypted tablespaces and access the encrypted data, you must first open the keystore. When you open the keystore, the master encryption key is loaded into the database server memory and becomes usable for encryption and decryption.

You need to open the keystore each time you start the instance. To open the keystore, the database superuser must execute the following SQL function.

```
SELECT pgx_open_keystore('passphrase');
```

The value "passphrase" is the passphrase specified during creation of the keystore.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_open_keystore function.

Note that, in the following cases, the passphrase must be entered when starting the instance, because the encrypted WAL must be decrypted for recovery. In this case, the above-mentioned pgx_open_keystore function cannot be executed.

- If performing crash recovery at the time of starting the instance
- If performing recovery using continuous archiving

For the above cases, specify the --keystore-passphrase option in the pg_ctl command, and then start the instance. This will display the prompt for the passphrase to be entered, as shown below.

```
> pg_ctl --keystore-passphrase start
Enter the passphrase:
The server is starting
>
```

Point

When using an automatically opening keystore, you do not need to enter the passphrase and you can automatically open the keystore when the database server starts. Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for details.

5.4 Encrypting a Tablespace

The keystore must be open before you can create an encrypted tablespace.

When creating a tablespace that will be encrypted, configure the encryption algorithm in the runtime parameters. For example, to create a tablespace with the name secure_tablespace using AES with a key length of 256 bits as the encryption algorithm, configure as shown below.

```
-- Specify the encryption algorithm for the tablespace to be created below
SET tablespace_encryption_algorithm = 'AES256';
CREATE TABLESPACE secure_tablespace LOCATION '/My/Data/Dir';
-- Specify that the tablespace to be created below is not to be encrypted
SET tablespace_encryption_algorithm = 'none';
```

Or

```
CREATE TABLESPACE secure_tablespace LOCATION '/My/Data/Dir' WITH (tablespace_encryption_algorithm =
'AES256' );
```

When the tablespace is empty, the encryption algorithm can be modified with the command below.

```
ALTER TABLESPACE secure_tablespace SET (tablespace_encryption_algorithm=AES256);
```

Trying to set the encryption algorithm for a non-empty tablespace causes an error.

You can use AES with a key length of 128 bits or 256 bits as the encryption algorithm. It is recommended that you use 256-bit AES. Refer to "Appendix A Parameters" for information on how to specify the runtime parameters.

If user provides both GUC and command line options while creating the tablespace, the preference is given to the command line option.

The pg_default and pg_global tablespaces cannot be encrypted.

Create tables and indexes in the encrypted tablespace that you created. Relations created in the encrypted tablespace are automatically encrypted.

Example

Example 1: Specifying an encrypted tablespace when creating it

```
CREATE TABLE my_table (...)
    TABLESPACE secure_tablespace;
```

Example 2: Not explicitly specifying a tablespace when creating it and instead using the default tablespace

```
SET default_tablespace = 'secure_tablespace';
CREATE TABLE my_table (...);
```

The process is the same for encrypting temporary tables and temporary indexes. In other words, either explicitly specify the TABLESPACE clause or list encrypted tablespaces in the temp_tablespaces parameter, and then execute CREATE TEMPORARY TABLE or CREATE INDEX.

Point

If an encrypted tablespace is specified in the TABLESPACE clause of the CREATE DATABASE statement, relations created in the database without explicitly specifying a tablespace will be encrypted. Furthermore, the system catalog will also be encrypted, so the source code of user-defined functions is also protected.

Example: Specifying a tablespace in a database definition statement

```
CREATE DATABASE DB01 TABLESPACE=SP01 ... ;
```

Part of the data is also stored in the system catalog - to encrypt this data as well, specify an encrypted tablespace as above and create a database.

Note

An encrypted tablespace cannot be created from the window used for creating the pgAdmin tablespace, or from the query tool. To create an encrypted tablespace, click [PSQL Console] from the [Plugins] menu and create an encrypted tablespace in the psql console window.

5.5 Checking an Encrypted Tablespace

The pgx_tablespaces system view displays information about whether each tablespace has been encrypted, and about the encryption algorithm. Refer to "C.1 pgx_tablespaces" for information on strings.

You can discover which tablespaces have been encrypted by executing the following SQL statements.

However, when considering continued compatibility of applications, do not reference system catalogs (pg_tablespace) directly in SQL statements.

```
SELECT spcname, spcencalgo
FROM pg_tablespace ts, pgx_tablespaces tsx
WHERE ts.oid = tsx.spctablespace;
```

Example

```
postgres=# SELECT spcname, spcencalgo FROM pg_tablespace ts, pgx_tablespaces tsx WHERE ts.oid =
tsx.spctablespace;
      spcname      | spcencalgo
-------------------+------------
 pg_default        | none
 pg_global         | none
 secure_tablespace | AES256
(3 rows)
```

See

Refer to "Notes on Application Compatibility" in the Application Development Guide for information on how to maintain application compatibility.

5.6 Managing the Keystore

This section describes how to manage the keystore and the master encryption key to guard against the threat of theft.

5.6.1 Changing the Master Encryption Key

Using the same encryption key for an extended period gives attackers an opportunity to decipher the encrypted data. It is recommended that you change the key at regular intervals, or whenever the key is exposed to risk.

Adhere to the industry's best practices for encryption algorithms and key management when considering how often the key should be changed. For example, the NIST in the United States has published "NIST Special Publication 800-57". The PCI DSS also refers to this publication. This publication recommends changing the master encryption key once a year.

To change the master encryption key, execute the pgx_set_master_key function, which is the same function used for configuring the key. Refer to "5.2 Setting the Master Encryption Key" for details.

After changing the master encryption key, you must immediately back up the keystore.

5.6.2 Changing the Keystore Passphrase

In security policies for organizations, it is usually a requirement that the passphrase be changed whenever a security administrator who knows the passphrase is removed from duties due to transfer or retirement. It is also recommended that the passphrase be changed if it is ever exposed to risks due to deception such as social engineering.

To change the keystore passphrase, execute the following SQL function as a superuser.

```
SELECT pgx_set_keystore_passphrase('oldPassphrase', 'newPassphrase');
```

After changing the passphrase, you must immediately back up the keystore.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_keystore_passphrase function.

5.6.3 Enabling Automatic Opening of the Keystore

When using an automatically opening keystore, you do not need to enter the passphrase and you can automatically open the keystore when the instance starts. Execute the pgx_keystore command to enable automatic opening of the keystore.

```
> pgx_keystore --enable-auto-open /key/store/location/keystore.ks
Enter the passphrase:
Automatic opening of the keystore is now enabled
>
```

See

Refer to "pgx_keystore" in the Reference for information on pgx_keystore command.

When automatic opening is enabled, an automatically opening keystore is created in the same directory as the original keystore. The file name of the automatically opening keystore is keystore.aks. The file keystore.aks is an obfuscated copy of the decrypted content of the keystore.ks file. As long as this file exists, there is no need to enter the passphrase to open the keystore when starting the instance.

Do not delete the original keystore file, keystore.ks. It is required for changing the master encryption key and the passphrase. When you change the master encryption key and the passphrase, keystore.aks is recreated from the original keystore file, keystore.ks.

Protect keystore.ks, keystore.aks, and the directory that stores the keystore so that only the user who starts the instance can access them.

Configure the permission of the files so that only the user who starts the instance can access the SQL functions and commands that create these files. Accordingly, manually configure the same permission mode if the files are restored.

Example

```
# chown -R fsepuser:fsepuser /key/store/location
# chmod 700 /key/store/location
# chmod 600 /key/store/location/keystore.ks
# chmod 600 /key/store/location/keystore.aks
```

An automatically opening keystore will only open on the computer where it was created.

To disable automatic opening of the keystore, delete keystore.aks.

Note

- To use WebAdmin for recovery, you must enable automatic opening of the keystore.
- Refer to "5.7 Backing Up and Restoring/Recovering the Database" after enabling or reconfiguring encryption to back up the database.
- Specify a different directory from those below as the keystore storage destination:
  - Data storage destination
  - Tablespace storage destination
  - Transaction log storage destination
  - Backup data storage destination

5.6.4 Backing Up and Recovering the Keystore

Back up the keystore at the following times in case it is corrupted or lost. Note that you must store the database and the keystore on separate data storage media. Storing both on the same data storage medium risks the danger of the encrypted data being deciphered if the medium is stolen. A passphrase is not required to open an automatically opening keystore, so store this type of keystore in a safe location.

- When the master encryption key is first configured
- When the master encryption key is changed
- When the database is backed up
- When the keystore passphrase is changed

Point

Do not overwrite an old keystore when backing up a keystore. This is because during database recovery, you must restore the keystore to its state at the time of database backup. When the backup data of the database is no longer required, delete the corresponding keystore.

Example

- Back up the database and the keystore on May 1, 2020.

```
> pgx_dmpall -D /database/inst1
> cp -p /key/store/location/keystore.ks /keybackup/keystore_20200501.ks
```

  Specify the following in the pgx_dmpall command:

  - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

- Change the master encryption key, and back up the keystore on May 5, 2020.

```
> psql -c "SELECT pgx_set_master_key('passphrase')" postgres
> cp -p /key/store/location/keystore.ks /keybackup/keystore_20200505.ks
```

  Specify the following in the psql command:

  - Specify the SQL function that sets the master encryption key in the -c option.
  - Specify the name of the database to be connected to as the argument.

If the keystore is corrupted or lost, restore the keystore containing the latest master encryption key. If there is no keystore containing the latest master encryption key, restore the keystore to its state at the time of database backup, and recover the database from the database backup. This action recovers the keystore to its latest state.

Example

- Restore the keystore containing the latest master encryption key as of May 5, 2020.

```
> cp -p /keybackup/keystore_20200505.ks /key/store/location/keystore.ks
```

- If there is no backup of the keystore containing the latest master encryption key, recover the keystore by restoring the keystore that was backed up along with the database on 1 May 2020.

```
> cp -p /keybackup/keystore_20200501.ks /key/store/location/keystore.ks
> pgx_rcvall -B /backup/inst1 -D /database/inst1 --keystore-passphrase
```

  Specify the following in the pgx_rcvall command:

  - Specify the data storage directory in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
  - Specify the backup data storage directory in the -B option.
  - The --keystore-passphrase option prompts you to enter the passphrase to open the keystore.

If you have restored the keystore, repeat the process of enabling automatic opening of the keystore. This ensures that the contents of the automatically opening keystore (keystore.aks) are identical to the contents of the restored keystore.

It is recommended that you do not back up the automatically opening keystore file, keystore.aks. If the database backup medium and the backup medium storing the automatically opening keystore are both stolen, the attacker will be able to read the data even without knowing the passphrase.

If the automatically opening keystore is corrupted or lost, you must again enable automatic opening. The keystore.aks file will be recreated from keystore.ks at this time.

See

Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall and pgx_dmpall commands.

Refer to "psql" under "Reference" in the PostgreSQL Documentation for information on the psql command.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_master_key function.

Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for information on how to enable automatic opening of the keystore.

5.7 Backing Up and Restoring/Recovering the Database

FUJITSU Enterprise Postgres enables you to use the five backup and recovery methods described below. Regardless of the method you use, you must back up the keystore at the same time.

Note that you must store the database and the keystore on separate data storage media. Storing both on the same data storage medium risks the danger of the encrypted data being deciphered if the medium is stolen.

Backup and recovery using WebAdmin

- Backup

  WebAdmin backs up encrypted data.

  Back up the key store after backing up the database.

- Recovery

  Restore the keystore to its state at the time of database backup. Refer to "5.6.4 Backing Up and Recovering the Keystore" for details.

  Enable automatic opening of the keystore in accordance with the procedure described in "5.6.3 Enabling Automatic Opening of the Keystore". Then, use WebAdmin to recover the database.

Backup and recovery using the pgx_dmpall and pgx_rcvall commands

- Backup

  The pgx_dmpall command backs up the encrypted data.

  Back up the key store after backing up the database.

- Recovery

  Restore the keystore to its state at the time of the database backup.

  Configure automatic opening of the key store as necessary.

  If automatic opening of the keystore is not enabled, execute the pgx_rcvall command with the --keystore-passphrase option specified. This will display the prompt for the passphrase to be entered.

Example

- Back up the database and the keystore on May 1, 2020.

```
> pgx_dmpall -D /database/inst1
> cp -p /key/store/location/keystore.ks /keybackup/keystore_20200501.ks
```

  Specify the following in the pgx_dmpall command:

  - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

- Recover the database and the keystore from the backup taken on May 1, 2020.

```
> cp -p /keybackup/keystore_20200501.ks /key/store/location/keystore.ks
> pgx_keystore --enable-auto-open /key/store/location/keystore.ks  (Execute only when enabling
automatic opening)
> pgx_rcvall -B /backup/inst1 -D /database/inst1 --keystore-passphrase
```

  Specify the following in the pgx_rcvall command:

- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
- Specify the backup data storage directory in the -B option.
- The --keystore-passphrase option prompts you to enter the passphrase to open the keystore.

Dump and restore using SQL

- Backup

  The files output by the pg_dump and pg_dumpall commands are not encrypted. You should, therefore, encrypt the files using OpenSSL commands or other means before saving them, as described in "5.8 Importing and Exporting the Database" below.

  Back up the key store after backing up the database.

- Restore

  If the backup data has been encrypted using, for example Open SSL commands, decrypt that data.

  The data generated by the pg_dumpall command includes a specification to encrypt tablespaces by default. For this reason, the psql command encrypts tablespaces during restoration.

File system level backup and restore

- Backup

  Stop the instance and backup the data directory and the tablespace directory using the file copy command of the operating system. The files of encrypted tablespaces are backed up in the encrypted state.

  Back up the key store after performing the backup.

- Restore

  Restore the keystore to its state at the time of the database backup.

  Stop the instance and restore the data directory and the tablespace directory using the file copy command of the operating system.

Continuous archiving and point-in-time recovery

- Backup

  The pg_basebackup command backs up the encrypted data as is.

  Back up the key store after performing the backup.

- Recovery

  Restore the keystore to its state at the time of the database backup.

  Configure automatic opening of the key store as necessary.

  If automatic opening of the keystore is not enabled, execute the pg_ctl command to start the instance with the --keystore-passphrase option specified. This will display the prompt for the passphrase to be entered.

See

- Refer to "pg_ctl" under "Reference" in the PostgreSQL Documentation for information on the pg_ctl command.
- Refer to "Reference" in the PostgreSQL Documentation for information on the following commands:
  - psql
  - pg_dump
  - pg_basebackup
- Refer to the Reference for information on the following commands:
  - pgx_rcvall

- pgx_dmpall
- pg_dumpall

If you have restored the keystore, repeat the process of enabling automatic opening of the keystore This ensures that the contents of the automatically opening keystore (keystore.aks) are identical to the contents of the restored keystore.

Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for information on how to enable automatic opening of the keystore.

5.8 Importing and Exporting the Database

The files output by the COPY TO command are not encrypted. Therefore, when transferring files to other systems, you should encrypt files using OpenSSL commands or other means and use scp or sftp to encrypt the data being transferred.

Use a safe method to delete obsolete plain text files.

You can use the following methods to safely delete files:

- shred command

Example

```
# Export the contents of the table my_table to a CSV file.
> psql -c "COPY my_table TO '/tmp/my_table.csv' (FORMAT CSV)" postgres

# Encrypt the exported file.
> openssl enc -e -aes256 -in my_table.csv -out my_table.csv.enc
(The user is prompted to enter the passphrase to be used for encryption)

# Safely delete plain text files.
> shred -u -x my_table.csv
 (Transfer encrypted files to other systems)

# Decrypt the encrypted files on other systems.
> openssl enc -d -aes256 -in my_table.csv.enc -out my_table.csv
(The user is prompted to enter the passphrase to be used for decryption)
```

If you use COPY FROM to import data to tables and indexes in an encrypted tablespace, the imported data is automatically encrypted before being stored.

5.9 Encrypting Existing Data

You cannot encrypt existing unencrypted tablespaces. In addition, you cannot change encrypted tablespaces so that they do not encrypt.

As an alternative, transfer the tables and indexes to other tablespaces. You can use the following SQL commands for this.

```
ALTER TABLE table_name SET TABLESPACE new_tablespace;
ALTER INDEX index_name SET TABLESPACE new_tablespace;
ALTER DATABASE database_name SET TABLESPACE new_tablespace;
```

See

Refer to "SQL Commands" under "Reference" in the PostgreSQL Documentation for information on SQL commands.

5.10 Operations in Cluster Systems

This section describes how to use transparent data encryption on cluster systems such as high-availability systems, streaming replication, and database multiplexing.

5.10.1 HA Clusters that do not Use Database Multiplexing

Take the following points into account when using transparent data encryption in an HA cluster environment that does not use database multiplexing.

Placement and automatic opening of the keystore file

There are two alternatives for placing the keystore file:

- Sharing the keystore file
- Placing a copy of the keystore file

Sharing the keystore file

This involves using the same keystore file on the primary server and the standby server.

As the standby server is not active while the primary server is running, this file would not be accessed simultaneously, and therefore, it can be shared.

To manage the keystore file in a more secure manner, place it on the key management server or the key management storage isolated in a secure location.

Enable the automatic opening of the keystore on both the primary and standby servers.

Placing a copy of the keystore file

This involves placing a copy of the primary server keystore file on the standby server.

You can do this if you cannot prepare a shared server or disk device that can be accessed from both the primary and standby servers.

However, if you change the master encryption key and the passphrase on the primary server, you must copy the keystore file to the standby server again.

To manage the keystore file in a more secure manner, prepare the key management server or the key management storage isolated in a secure location for both the primary and standby servers, and place the keystore files there.

Enable the automatic opening of the keystore on both the primary and standby servers. Note that copying the automatically opening keystore file (keystore.aks) to the standby server does not enable the automatic opening of the keystore.

See

Refer to the Cluster Operation Guide (PRIMECLUSTER) for information on building a cluster system environment for performing failover using the failover feature integrated with the cluster software.

5.10.2 Database Multiplexing Mode

Note the following when using transparent data encryption in environments that use streaming replication, or database multiplexing with streaming replication.

Placing the keystore file

Place a copy of the primary server keystore file on the standby server.

This is required as the keystore file cannot be shared, and both servers may need to access it simultaneously.

Point

To manage the keystore file in a more secure manner, place it on the key management server or the key management storage isolated in a secure location. A keystore used by both the primary and standby servers can be managed on the same key management server or key management storage.

However, create different directories for the keystores to be used by the primary server and the standby server. Then copy the keystore for the primary server to the directory used on the standby server.

Automatically opening the keystore

You must enable automatic opening of the keystore.

To do this, enable automatic opening of the keystore in all servers that make up database multiplexing. The settings for automatic opening of the keystore include information unique to each server, so simply copying the file does not enable it.

Changing the passphrase

Changes to the passphrase are reflected in all servers that make up database multiplexing, so no special operation is required.

Building and starting a standby server

Before using the pg_basebackup command or pgx_rcvall command to build a standby server, copy the keystore file from the primary server to the standby server. When using an automatically opening keystore, use the copied keystore file to enable automatic opening on the standby server.

Open the keystore each time you start the standby server. This step is necessary for decrypting and restoring encrypted WAL received from the primary server. To open the keystore, specify the --keystore-passphrase option in the pg_ctl command or pgx_rcvall command and enter the passphrase, or use an automatically opening keystore.

Changing the master encryption key and the passphrase

Change the master encryption key and the passphrase on the primary server. You need not copy the keystore from the primary server to the standby server. You need not even restart the standby server or reopen the keystore. Changes to the master encryption key and the passphrase are reflected in the keystore on the standby server.

See

Refer to "pgx_rcvall " in the Reference for information on pgx_rcvall command.

Refer to "pg_ctl" under "Reference" in the PostgreSQL Documentation for information on pg_ctl command.

Refer to "pg_basebackup" under "Reference" in the PostgreSQL Documentation for information on pg_basebackup command.

Refer to "High Availability, Load Balancing, and Replication" under "Server Administration" in the PostgreSQL Documentation for information on how to set up streaming replication.

5.11 Security-Related Notes

- Decrypted data is cached in the database server memory (shared buffer). As a result, unencrypted data is stored in a core file, which is a process memory dump. You should, therefore, safely delete the memory dump.
  You can safely delete files by using the following command:
  - shred command
- Unencrypted data may be written from the database server memory to the operating system's swap area. To prevent leakage of information from the swap area, consider either disabling the use of swap area or encrypting the swap area using a full-disk encryption product.
- The content of the server log file is not encrypted. Therefore, in some cases the value of a constant specified in a SQL statement is output to the server log file. To prevent this, consider setting a parameter such as log_min_error_statement.
- When executing an SQL function that opens the keystore and modifies the master encryption key, ensure that the SQL statement containing the passphrase is not output to the server log file. To prevent this, consider setting a parameter such as log_min_error_statement. If you are executing this type of SQL function on a different computer from the database server, encrypt the communication between the client and the database server with SSL.
- Starting with FEP 10, logical replication is available, which allows non-backed up clusters to subscribe to databases where transparent data encryption is enabled. Logical replication does not need to have the same encryption strategy between publisher and subscriber.

  In this scenario, if the user wants to encrypt the subscribed copy of data as well, then it is the user's responsibility to create encryption policies to the subscribed databases. By default, published encrypted tablespace data will not be encrypted in the subscriber side.

5.12 Tips for Installing Built Applications

With transparent data encryption, you can easily encrypt all the data in an application without modifying the application. Database administrators install built applications in the following manner. However, this procedure stores data to the default tablespace, so take necessary action if processing differs from the original design.

1. (Normal procedure) Create an owner and a database for the built application.

```
CREATE USER crm_admin ...;
CREATE DATABASE crm_db ...;
```

2. (Procedure for encryption) Create an encrypted tablespace to store the data for the built application.

```
SET tablespace_encryption_algorithm = 'AES256';
CREATE TABLESPACE crm_tablespace LOCATION '/crm/data';
```

3. (Procedure for encryption) Configure an encrypted tablespace as the default tablespace for the owner of the built application.

```
ALTER USER crm_admin SET default_tablespace = 'crm_tablespace';
ALTER USER crm_admin SET temp_tablespaces = 'crm_tablespace';
```

4. (Normal procedure) Install the built application. The application installer prompts you to enter the host name and the port number of the database server, the user name, and the database name. The installer uses the entered information to connect to the database server and execute the SQL script. For applications that do not have an installer, the database administrator must manually execute the SQL script.

Normally, the application's SQL script includes logic definition SQL statements, such as CREATE TABLE, CREATE INDEX, and GRANT or REVOKE, converted from the entity-relationship diagram. It does not include SQL statements that create databases, users, and tablespaces. Configuring the default tablespace of the users who will execute the SQL script deploys the objects generated by the SQL script to the tablespace.

Chapter 6 Data Masking

Data masking is a feature that can change the returned data for queries generated by applications, so that it can be referenced by users. For example, for a query of employee data, digits except the last four digits of an eight-digit employee number can be changed to "*" so that it can be used for reference.

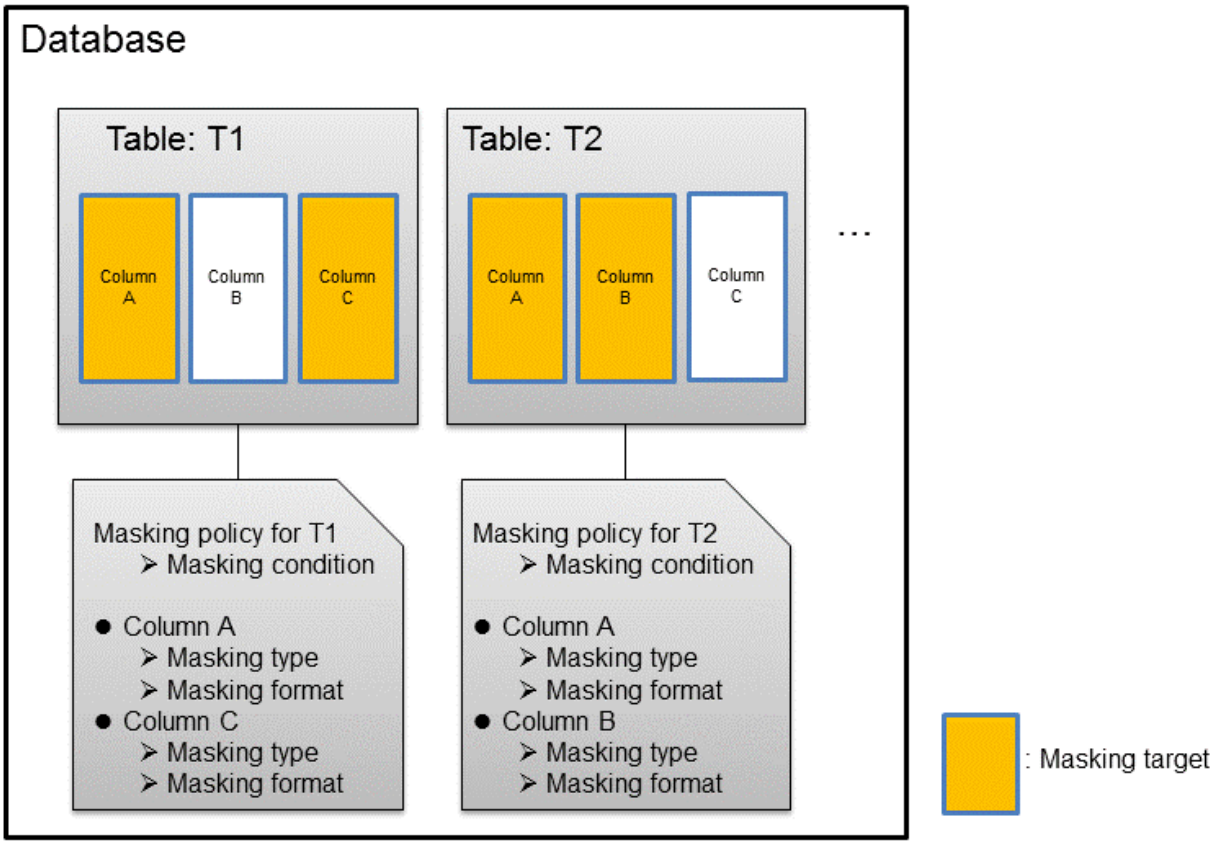
Note

When using this feature, it is recommended that the changed data be transferred to another medium for users to reference. This is because, if users directly access the database to extract the masked data, there is a possibility that they can deduce the original data by analyzing the masking policy or query result to the masking target column.

6.1 Masking Policy

Masking policy is a method of changing data under specific conditions when it is returned for a query from an application. One masking policy can be created per table. You can configure masking target, masking type, masking condition and masking format in a masking policy.

Figure 6.1 Masking policy



Note

When a masking policy is defined, the search performance for the corresponding table may deteriorate.

6.1.1 Masking Target

Masking target refers to a column to which a masking policy will be applied. When referring to a masking target or a function that includes a masking target, the execution result will be changed and obtained.

The following commands can change the execution result:

- SELECT
- COPY
- pg_dump
- pg_dumpall

- If a masking target is specified to INSERT...SELECT target columns, processing will be performed using data before change.
- If a masking target other than SELECT target columns is specified, processing will be performed using data before change.
- If a masking target is specified in a function where the data type will be converted, an error will occur.

6.1.2 Masking Type

Masking type is a method to change column data that is returned from queries. Specify the masking type in the function_type parameter. The following masking types can be specified and selected depending on the masking target data type.

Full masking

All the data in the specified column is changed. The changed value returned to the application that made the query varies depending on the column data type.
For example, 0 is used for a numeric type column and a space is used for a character type column.

Partial masking

The data in the specified column is partially changed.
For example, digits except the last four digits of an employee number can be changed to "*".

Regular expression masking

The data in the specified column is changed via a search that uses a regular expression.
For example, for strings such as email address that can have variable length, "*" can be used to change characters preceding "@" by using a regular expression. Regular expression masking can only be used for character type data.

- If multiple valid masking targets are specified for a function, the masking type for the left-most masking target will be applied.
  For example, if "SELECT GREATEST(c1, c2) FROM t1" is executed for numeric type masking target c1 and c2, the masking type for c1 will be applied.
- When masking the data that includes multibyte characters, do not specify partial masking for masking type. The result may not be as expected.

6.1.3 Masking Condition

Masking condition refers to the conditions configured to perform masking. Specify the masking condition in the expression parameter. Changed or actual data can be displayed for different users by defining masking condition. An expression that returns a boolean type result needs to be specified in masking condition and masking is performed only when TRUE is returned. Refer to "Value Expressions" in the PostgreSQL Documentation for information on the expressions that can be specified. Note that expressions that include a column cannot

be specified.
For example, when masking data only for "postgres" users, specify 'current_user = "postgres"' in the masking condition.

Information

Specify '1=1' so the masking condition is always evaluated to be TRUE and masking is performed all the time.

6.1.4 Masking Format

Masking format is a combination of change method and displayed characters when the masking condition is met. Masking format varies depending on the masking type. The following describes the masking format.

Full masking

With full masking, all characters are changed to values as determined by the database. Changed characters can be referenced in the pgx_confidential_values table. Also, replacement characters can be changed using the pgx_update_confidential_values system management function.

See

Refer to "6.3 Data Types for Masking" for information on the data types for which data masking can be performed.

Partial masking

With partial masking, data is changed according to the content in the function_parameters parameter. The method of specifying function_parameters varies depending on the data type.

Category	Method of specifying function_parameters
Numeric type	'*replacementCharacter*, *startPosition*, *endPosition*' - *replacementCharacter*: Specify the number to display. Specify a value from 0 to 9. - *startPosition*: Specify the start position of masking. Specify a positive integer. - *endPosition*: Specify the end position of masking. Specify a positive integer that is greater than *startPosition*. **Example** Specify as below to change the values from the 1st to 5th digits to 9. function_parameters := '9, 1, 5' In this example, if the original data is "123456789", it will be changed to "999996789".
Character type	*'inputFormat*, *outputFormat*, *replacementCharacter*, *startPosition*, *endPosition'* - *inputFormat*: Specify the current format of the data. Specify "V" for characters that will potentially be masked, and specify "F" for values such as spaces or hyphens that will not be masked. - *outputFormat*: Define the method to format the displayed data. Specify "V" for characters that will potentially be masked. Any character to be output can be specified for each character "F" in *inputFormat*. If you want to output a single quotation mark, specify two of them consecutively. - *replacementCharacter*: Specify any single character. If you want to output a single quotation mark, specify two of them consecutively. - *startPosition*: Specify the position of "V" as the start position of masking. For example, to specify the position of the 4th "V" from the left, specify 4. Specify a positive integer.

Category	Method of specifying function_parameters
	- *endPosition*: Specify the position of "V" as an end position of masking. When working out the end position, do not include positions of "F". For example, to specify the position of the 11th "V" from the left, specify 11. Specify a positive integer that is greater than *startPosition*. **Example** Specify as below to mask a telephone number other than the first three digits using *. function_parameters := 'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11' In this example, if the original data is "012-3156-7890", it will be changed to "012-****-****".
Date/timestamp type	'MDYHMS' - M: Masks month. To mask month, enter the month from 1 to 12 after a lowercase letter m. Specify an uppercase letter M to not mask month. - D: Masks date. To mask date, enter the date from 1 to 31 after a lowercase letter d. If a value bigger than the last day of the month is entered, the last day of the month will be displayed. Specify an uppercase letter D to not mask date. - Y: Masks year. To mask year, enter the year from 1 to 9999 after a lowercase letter y. Specify an uppercase letter Y to not mask year. - H: Masks hour. To mask hour, enter the hour from 0 to 23 after a lowercase letter h. Specify an uppercase letter H to not mask hour. - M: Masks minute. To mask minute, enter the minute from 0 to 59 after a lowercase letter m. Specify an uppercase letter M to not mask minute. - S: Masks second. To mask second, enter the second from 0 to 59 after a lowercase letter s. Specify an uppercase letter S to not mask second. **Example** Specify as below to mask hour, minute, and second and display 00:00:00. function_parameters := 'MDYh0m0s0' In this example, if the original data is "2010-10-10 10:10:10", it will be changed to "2010-10-10 00:00:00".

See

- Refer to "B.3.2 pgx_create_confidential_policy" for information on function_parameters.
- Refer to "6.3 Data Types for Masking" for information on the data types for which masking can be performed.

Regular expression masking

With regular expression masking, data is changed according to the content of the regexp_pattern, regexp_replacement and regexp_flags parameters. For regexp_pattern, specify the search pattern using a regular expression. For regexp_replacement, specify the replacement character to use when data matches the search pattern. For regexp_flags, specify the regular expression flags.

Example

Specify as below to change all three characters starting from b to X.

regexp_pattern := 'b..'

regexp_replacement:= 'X'

regexp_flags := 'g'

In this example, if the original data is "foobarbaz", it will be changed to "fooXX".

See

- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.
- Refer to "6.3 Data Types for Masking" for information on the data types for which masking can be performed.

Note

- When column data type is character(*n*) or char(*n*) and if the string length after change exceeds n, the extra characters will be truncated and only characters up to the nth character will be displayed.
- When column data type is character varying(*n*) or varchar(*n*) and if the string length after change exceeds the length before the change, the extra characters will be truncated and only characters up to the length before change will be displayed.

6.2 Usage Method

Preparation

The following preparation is required to use this feature.

1. Set the postgresql.conf file parameters.

   Prepend "pgx_datamasking" to the shared_preload_libraries parameter.

2. Restart the instance.

3. Execute CREATE EXTENSION for the database that will use this feature.

   The target database is described as "postgres" here.

   Use the psql command to connect to the "postgres" database.

   #### Example

   ```
   postgres=# CREATE EXTENSION pgx_datamasking;
   CREATE EXTENSION
   ```

   #### Note

   You must always prepend "pgx_datamasking" to the "shared_preload_libraries" parameter.

   #### Information

   - Specify "false" for pgx_datamasking.enable to not use this feature. Data will not be masked even if a masking policy is configured. This feature becomes available again once "true" is specified for pgx_datamasking.enable. This setting can be made

by specifying a SET statement or specifying a parameter in the postgresql.conf file.
Example

```
postgres=# SET pgx_datamasking.enable=false;
```

- Hereafter, also perform this preparatory task for the "template1" database, so that this feature can be used by default when creating a new database.

Usage

To perform masking, a masking policy needs to be configured. The masking policy can be created, changed, confirmed, enabled, disabled or deleted during operation.
The procedures to perform these tasks are explained below with examples.

1. Creating a masking policy
2. Changing a masking policy
3. Confirming a masking policy
4. Enabling and disabling a masking policy
5. Deleting a masking policy

Note

Only database superusers can configure masking policies.

6.2.1 Creating a Masking Policy

An example of the operation on the server is shown below.

1. Create a masking policy
   Execute the pgx_create_confidential_policy system management function to create a masking policy.
   The following values are configured in this example.
   - Masking target: Numeric type c1
   - Masking type: FULL
   - Masking condition: '1=1'

```
postgres=# select pgx_create_confidential_policy(table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c1', function_type := 'FULL');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the masking target data (column c1) has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  0 | 012-3456-7890
  0 | 012-3456-7891
  0 | 012-3456-7892
(3 row)
```

See

- Refer to "B.3.2 pgx_create_confidential_policy" for information on the pgx_create_confidential_policy system management function.

Note

- Only one masking policy can be created per table.
- All users can view the masking policy created, so do not grant the login privilege of the database where this feature is set to the users who refer to the changed data. Masking policies are defined in the "pgx_confidential_columns", "pgx_confidential_policies" and "pgx_confidential_values" tables.

6.2.2 Changing a Masking Policy

1. An example of the operation on the server is shown below.
2. Change a masking policy
   Execute the pgx_alter_confidential_policy system management function to change a masking policy.
   The following values are changed in this example.
   - Content of change: Add a masking target
   - Masking target: Character type c2
   - Masking type: PARTIAL
   - Masking condition: 'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11'

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1',
action := 'ADD_COLUMN', column_name := 'c2', function_type := 'PARTIAL', function_parameters :=
'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

3. Confirm the displayed data
   Confirm that the masking target data has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+--------------
  0 | 012-****-****
  0 | 012-****-****
  0 | 012-****-****
(3 row)
```

See

- Refer to "B.3.1 pgx_alter_confidential_policy" for information on the pgx_alter_confidential_policy system management function.

6.2.3 Confirming a Masking Policy

An example of the operation on the server is shown below.

1. Confirm information about a masking target where a masking policy is set
   Refer to the pgx_confidential_columns table to confirm the masking target where the masking policy is set.

```
postgres=# select * from pgx_confidential_columns;
 schema_name | table_name | policy_name | column_name | function_type |
function_parameters           | regexp_pattern | regexp_replacement | regexp_flags |
column_description
-------------+------------+-------------+-------------+---------------
+---------------------------------------+----------------+--------------------+-------------
+--------------------
 public      | t1         | p1          | c1          | FULL
|                                       |                |                    |             |
```

```
 public      | t1         | p1          | c2          | PARTIAL       | VVVFVVVVFVVVV, VVV-VVVV-
VVVV, *, 4, 11 |                |                    |             |
(2 row)
```

2. Confirm information about the masking policy content
   Refer to pgx_confidential_policies to confirm the masking policy content.

```
postgres=# select * from pgx_confidential_policies;
 schema_name | table_name | policy_name | expression | enable | policy_description
-------------+------------+-------------+------------+--------+--------------------
 public      | t1         | p1          | 1=1        | t      |
(1 row)
```

See

- Refer to "D.1 pgx_confidential_columns" for information on the pgx_confidential_columns table.
- Refer to "D.2 pgx_confidential_policies" for information on the pgx_confidential_policies table.

6.2.4 Enabling and Disabling a Masking Policy

An example of the operation on the server is shown below.

1. Disable a masking policy
   Execute the pgx_enable_confidential_policy system management function to disable a masking policy.

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1',
enable := 'f');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the original data is displayed by disabling the masking policy.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  1 | 012-3456-7890
  2 | 012-3456-7891
  3 | 012-3456-7892
(3 row)
```

3. Enable a masking policy
   Execute the pgx_enable_confidential_policy system management function to enable a masking policy.

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1',
enable := 't');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

4. Confirm the displayed data
   Confirm that the masking target data has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  0 | 012-****-****
  0 | 012-****-****
```

```
  0 | 012-****-****
(3 row)
```

See

- Refer to "B.3.4 pgx_enable_confidential_policy" for information on the pgx_enable_confidential_policy system management function.

6.2.5 Deleting a Masking Policy

An example of the operation on the server is shown below.

1. Delete a masking policy
   Execute the pgx_drop_confidential_policy system management function to delete a masking policy.

```
postgres=# select pgx_drop_confidential_policy(table_name := 't1', policy_name := 'p1');
 pgx_drop_confidential_policy
------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the original data is displayed by deleting the masking policy.

```
postgres=# select * from t1;
 c1 |      c2
----+--------------
  1 | 012-3456-7890
  2 | 012-3456-7891
  3 | 012-3456-7892
(3 row)
```

See

- Refer to "B.3.3 pgx_drop_confidential_policy" for information on the gx_drop_confidential_policy function.

6.3 Data Types for Masking

The data types for which data masking can be performed are shown below.

Category	Data type	Masking type		
		Full masking	Partial masking	Regular expression masking
Numeric type	smallint	Y	Y	N
	integer	Y	Y	N
	bigint	Y	Y	N
	decimal	Y	Y	N
	numeric	Y	Y	N
	float	Y	Y	N
	real	Y	Y	N
	double precision	Y	Y	N

Category	Data type	Masking type		
		Full masking	Partial masking	Regular expression masking
Character type	character varying(*n*)	Y	Y	Y
	varchar(*n*)	Y	Y	Y
	character(*n*)	Y	Y	Y
	char(*n*)	Y	Y	Y
Date/timestamp type	date	Y	Y	N
	timestamp	Y	Y	N

6.4 Security Notes

- Starting with FEP 10, logical replication is available, which allows non-backed up clusters to subscribe to databases where data masking policies are enabled. Logical replication allows publisher and subscriber databases to have their own or the same data masking policies.

  In this scenario, the user must disable data masking on the publisher database whenever a subscription is created. This ensures that subscribers are able to obtain the original data (initial copy) instead of the masked version. Then, it is the user's responsibility to set masking policies to each subscribed database.

- Take strong caution in publishing data masking's confidential tables (pgx_confidential_policies, pgx_confidential_columns, etc.) unless the user is publishing all tables of the database and wants to apply the same data masking's policies on the subscribed database for all of them.

  Otherwise, as these confidential tables contain the masking policies for all tables of the database, confidential policies of unpublished tables may be unintentionally published. Additionally, it is not possible to apply different data masking policies on the subscriber database.

Chapter 7 Periodic Operations

This chapter describes the operations that must be performed periodically when running daily database jobs.

7.1 Configuring and Monitoring the Log

FUJITSU Enterprise Postgres enables you to output database errors and warnings to a log file.

This information is useful for identifying if errors have occurred and the causes of those errors.

By default, this information is output to the system log. It is recommended that you configure FUJITSU Enterprise Postgres to collect logs from its log files (for example, log_destination) before operating FUJITSU Enterprise Postgres.

Periodically monitor the log files to check if any errors have occurred.

See

- Refer to "Error Reporting and Logging" under "Server Administration" in the PostgreSQL Documentation for information on logs.
- Refer to "Configuring Parameters" in the Installation and Setup Guide for Server for information on log settings when operating with WebAdmin.

7.2 Monitoring Disk Usage and Securing Free Space

When a database is used for an extended period, free space on the disk is continuously consumed and in some cases the disk space runs out. When this happens, database jobs may stop and no longer run.

You should, therefore, periodically monitor the usage of disk space, and delete obsolete files located in the disk.

Monitor the disk usage of the disk where the following directories are located:

- Data storage destination directory
- Transaction log storage destination (if the transaction log is stored in a different directory from the data storage destination directory)
- Backup data storage destination directory
- Tablespace storage destination directory

7.2.1 Monitoring Disk Usage

To check the disk usage, use the following operating system commands:

- df command

You can even use SQL statements to check tables and indexes individually.

Refer to "Determining Disk Usage" under "Server Administration" in the PostgreSQL Documentation for information on this method.

Information

If you are using WebAdmin for operations, a warning is displayed when disk usage reaches 80%

7.2.2 Securing Free Disk Space

Secure free disk space by using the following operating system commands to delete unnecessary files, other than the database, from the same disk unit.

- rm command

You can also secure disk space by performing the following tasks periodically:

- To secure space on the data storage destination disk:

  Execute the REINDEX statement. Refer to "7.5 Reorganizing Indexes" for details.

- To secure space on the backup data storage destination disk:

  Execute backup using WebAdmin or the pgx_dmpall command.

7.3 Automatically Closing Connections

If an application stops responding and abnormally terminates for any reason, the connection from the application may remain active on the database server. If this situation continues for an extended period, other applications attempting to connect to the database server may encounter an error, or an error indicating that the tables are unavailable may occur.

It is, therefore, recommended that idle connections be closed automatically at regular intervals.

Set the following parameters in the postgresql.conf file to indicate the time permitted to elapse before a connection is closed.

Parameter name	Setting	Description
tcp_keepalives_idle	Time until keepalive is sent (seconds) If 0, the default value of the system is used.	Sends keepalive to an idle connection at the specified interval in seconds It is recommended to specify 30 seconds.
tcp_keepalives_interval	keepalive send interval (seconds) If 0, the default value of the system is used.	Sends keepalive at the specified interval It is recommended to specify 10 seconds.
tcp_user_timeout	Time to wait for a response from the server (milliseconds) If 0, the default value of the system is used. If not set, the behavior is the same as if 0 were specified.	After establishing the connection, when sending from the client to the server, if the TCP resend process operates, specify the time until it is considered to be disconnected. If a value other than 0 is specified in this parameter, the time until automatic disconnection is determined by the waiting time specified in this parameter. The actual wait time is until the timing of the first keepalive retransmission after the time specified by this parameter has elapsed.

Note

If a value other than 0 is specified for the tcp_user_timeout parameter, the waiting time set by the tcp_keepalives_idle parameter and tcp_keepalives_interval parameter will be invalid and the waiting time specified by the tcp_user_timeout parameter will be used.

See

Refer to "Connection Settings" under "Server Administration" in the PostgreSQL Documentation for information on the parameters.

7.4 Monitoring the Connection State of an Application

FUJITSU Enterprise Postgres does not immediately delete the updated or deleted data. If the VACUUM determines there are no transactions that reference the database, FUJITSU Enterprise Postgres collects obsolete data.

However, obsolete data is not collected if there are connections that have remained active for an extended period or connections occupying resources. In this case the database may expand, causing performance degradation.

See

Refer to "Routine Vacuuming" under "Server Administration" in the PostgreSQL Documentation for information on the VACUUM command.

In such cases, you can minimize performance degradation of the database by monitoring problematic connections.

The following methods are supported for monitoring connections that have been in the waiting status for an extended period:

- 7.4.1 Using the View (pg_stat_activity)
- 7.4.2 Using pgAdmin

7.4.1 Using the View (pg_stat_activity)

Use the view (pg_stat_activity) to identify and monitor connections where the client has been in the waiting status for an extended period.

Example

The example below shows connections where the client has been in the waiting status for at least 60 minutes.

However, when considering continued compatibility of applications, do not reference system catalogs directly in the following SQL statements.

```
postgres=# select * from pg_stat_activity where state='idle in transaction' and current_timestamp >
cast(query_start + interval '60 minutes' as timestamp);
-[ RECORD 1 ]----+------------------------------
datid            | 13003
datname          | db01
pid              | 4638
leader_pid       |
usesysid         | 10
usename          | fsep
application_name | apl01
client_addr      | 192.33.44.15
client_hostname  |
client_port      | 27500
backend_start    | 2020-02-24 09:09:21.730641+09
xact_start       | 2020-02-24 09:09:23.858727+09
query_start      | 2020-02-24 09:09:23.858727+09
state_change     | 2020-02-24 09:09:23.858834+09
wait_event_type  | Client
wait_event       | ClientRead
state            | idle in transaction
backend_xid      |
backend_xmin     |
query            | begin;
backend_type     | client backend
```

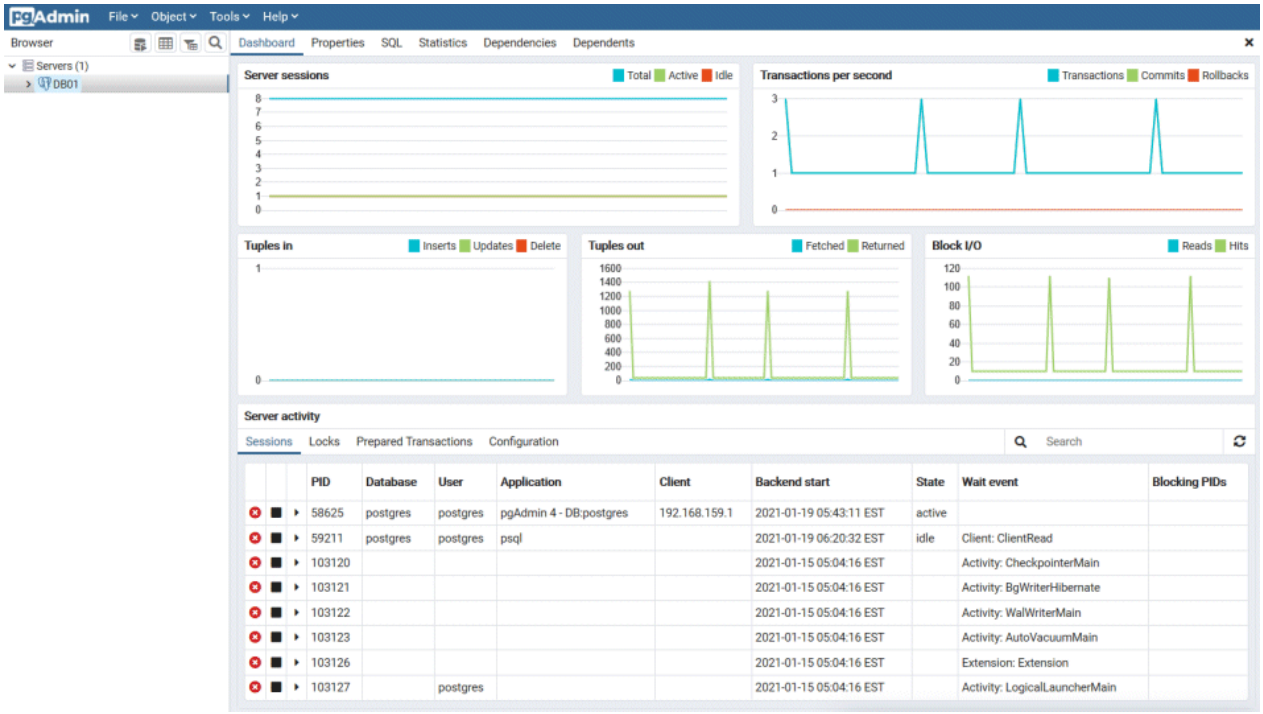
See

- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on maintaining application compatibility.
- Refer to "The Statistics Collector" under "Server Administration" in the PostgreSQL Documentation for information on pg_stat_activity.

7.4.2 Using pgAdmin

This section describes the procedure for monitoring connections using [Server Status] in pgAdmin.

1. In the [Browser] pane, click the database server for monitoring.
2. In the [Dashboard] tab, identify client connections that have been in the waiting state for an extended period.



7.5 Reorganizing Indexes

Normally, a database defines indexes in tables, but if data is frequently updated, indexes can no longer use free space in the disk efficiently. This situation can also cause a gradual decline in database access performance.

To rearrange used space on the disk and prevent the database access performance from declining, it is recommended that you periodically execute the REINDEX command to reorganize indexes.

Check the disk usage of the data storage destination using the method described in "7.2 Monitoring Disk Usage and Securing Free Space".

Note

Because the REINDEX command retrieves the exclusive lock for an index being processed and locks writing of tables that are the source of the index, other processes that access these may stop while waiting to be locked.

Therefore, it is necessary to consider measures such as executing the command after the task is completed.

See

Refer to "Routine Reindexing" under "Server Administration" in the PostgreSQL Documentation for information on reorganizing indexes by periodically executing the REINDEX command.

Point

Typically, reorganize indexes once a month at a suitable time such as when conducting database maintenance. Use SQL statements to check index usage. If this usage is increasing on a daily basis, adjust the frequency of recreating the index as compared to the free disk space.

The following example shows the SQL statements and the output.

However, when considering continued compatibility of applications, do not reference system catalogs and functions directly in the following SQL statements. Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

[SQL statements]

```
SELECT
  nspname AS schema_name,
  relname AS index_name,
  round(100 * pg_relation_size(indexrelid) / pg_relation_size(indrelid)) / 100 AS index_ratio,
  pg_size_pretty(pg_relation_size(indexrelid)) AS index_size,
  pg_size_pretty(pg_relation_size(indrelid)) AS table_size
FROM pg_index I
  LEFT JOIN pg_class C ON (C.oid = I.indexrelid)
  LEFT JOIN pg_namespace N ON (N.oid = C.relnamespace)
WHERE
  C.relkind = 'i' AND
  pg_relation_size(indrelid) > 0
ORDER BY pg_relation_size(indexrelid) DESC, index_ratio DESC;
```

[Output]

```
 schema_name |            index_name            | index_ratio | index_size | table_size
-------------+----------------------------------+-------------+------------+------------
 public      | pgbench_accounts_pkey            |        0.16 | 2208 KB    | 13 MB
 pg_catalog  | pg_depend_depender_index         |         0.6 | 224 KB     | 368 KB
 pg_catalog  | pg_depend_reference_index        |        0.58 | 216 KB     | 368 KB
...
```

See

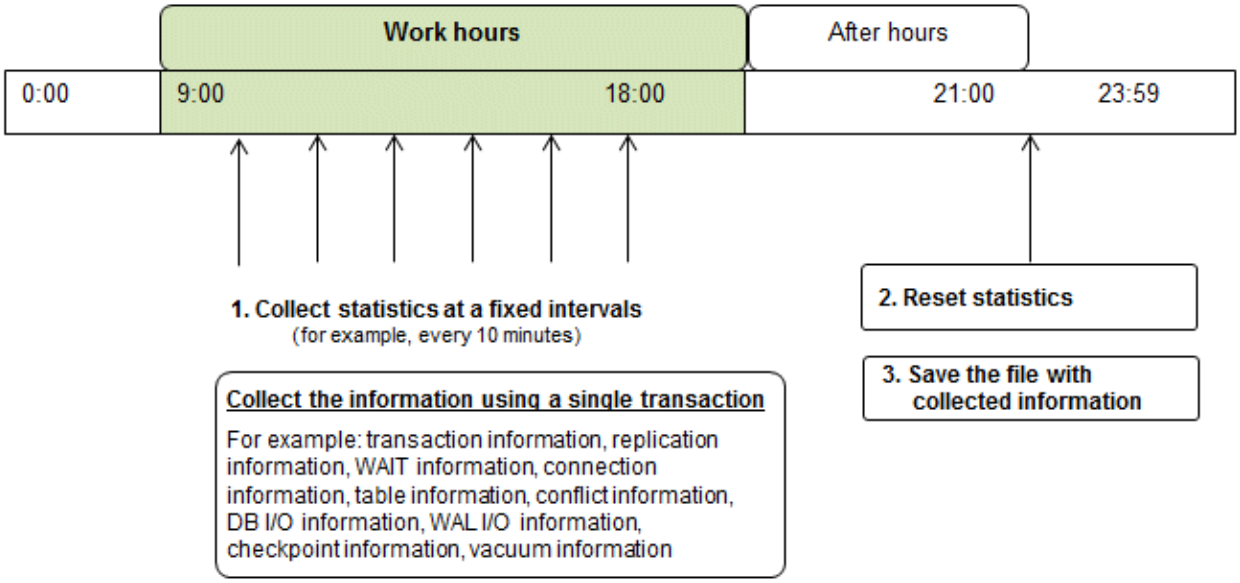
Refer to "Notes on Application Compatibility" in the Application Development Guide for information on maintaining application compatibility.

7.6 Monitoring Database Activity

FUJITSU Enterprise Postgres enables you to collect information related to database activity. By monitoring this information, you can check changes in the database status.

This information includes wait information for resources such as internal locks, and is useful for detecting performance bottlenecks. Furthermore, you should collect this information in case you need to request Fujitsu technical support for an investigation.

Figure 7.1 Overview of information collection



1. Collect statistics at fixed intervals during work hours.

   Accumulate the collected information into a file.

   Wherever possible, collect data from the various statistics views using a single transaction, because it enables you to take a snapshot of system performance at a given moment.

   Refer to "7.6.1 Information that can be Collected" for information on the system views that can be collected.

2. Reset statistics after work hours, that is, after jobs have finished.

   Refer to "7.6.3 Information Reset" for information on how to reset statistics.

3. Save the file with collected information.

   Keep the file with collected information for at least two days, in order to check daily changes in performance and to ensure that the information is not deleted until you have sent a query to Fujitsu technical support.

Where jobs run 24 hours a day, reset statistics and save the file with collected information when the workload is low, for example, at night.

Note

Statistics cumulatively add the daily database value, so if you do not reset them, the values will exceed the upper limit, and therefore will not provide accurate information.

The subsections below explain the following:

- Information that can be collected
- Collection configuration
- Information reset

7.6.1 Information that can be Collected

Information that can be collected is categorized into the following types:

- Information common to PostgreSQL
- Information added by FUJITSU Enterprise Postgres

Information common to PostgreSQL

See

Refer to "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on information common to PostgreSQL.

Information added by FUJITSU Enterprise Postgres

You can collect the following information added by FUJITSU Enterprise Postgres.

Table 7.1 Information added by FUJITSU Enterprise Postgres

View name	Description
pgx_stat_lwlock	Displays statistic related to lightweight lock, with each type of content displayed on a separate line. This information helps to detect bottlenecks. Refer to "C.2 pgx_stat_lwlock" for details.
pgx_stat_latch	Displays statistics related latches, with each type of wait information within FUJITSU Enterprise Postgres displayed on a separate line. This information helps to detect bottlenecks. Refer to "C.3 pgx_stat_latch" for details.
pgx_stat_walwriter	Displays statistics related to WAL writing, in a single line. Refer to "C.4 pgx_stat_walwriter" for details.
pgx_stat_sql	Displays statistics related to SQL statement executions, with each type of SQL statement displayed on a separate line. Refer to "C.5 pgx_stat_sql" for details.
pgx_stat_gmc	Displays statistics related to Global Meta Cache hit ration and used memory size. Refer to "C.6 pgx_stat_gmc" for detail. Also refer to Chapter 12 Global Meta Cache" for information on the Global Meta Cache.

7.6.2 Collection Configuration

The procedure for configuring collection depends on the information content.

- Information common to PostgreSQL
- Information added by FUJITSU Enterprise Postgres

Information common to PostgreSQL

See

Refer to "The Statistics Collector" in "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on information common to PostgreSQL.

Information added by FUJITSU Enterprise Postgres

Information added by FUJITSU Enterprise Postgres is collected by default.

To enable or disable information collection, change the configuration parameters in postgresql.conf. The following table lists the views for which you can enable or disable information collection, and the configuration parameters.

View name	Parameter
pgx_stat_lwlock pgx_stat_latch	track_waits (*1)

View name	Parameter
pgx_stat_sql	track_sql
pgx_stat_gmc	track_gmc

Remarks: You cannot change the collection status for pgx_stat_walwriter.

*1: When executing the SQL statement with EXPLAIN ANALYZE, processing time may increase because of this information collection. It is recommended to set this parameter to "off" when executing EXPLAIN ANALYZE to check the processing time.

Refer to "Appendix A Parameters" for information on the parameters.

7.6.3 Information Reset

This section describes how to reset information.

Information added by FUJITSU Enterprise Postgres

You can reset information added by FUJITSU Enterprise Postgres by using the pg_stat_reset_shared function in the same way as for information common to PostgreSQL.

Configure the following parameters in the pg_stat_reset_shared function:

Function	Type of return value	Description
pg_stat_reset_shared(text)	void	Reset some cluster-wide statistics counters to zero, depending on the argument (requires superuser privileges). Calling pg_stat_reset_shared('lwlock') will zero all counters shown in pgx_stat_lwlock. Similarly, in the following cases, all values of the pertinent statistics counter are reset: - If pg_stat_reset_shared('latch') is called: All values displayed in pgx_stat_latch - If pg_stat_reset_shared('walwriter') is called: All values displayed in pgx_stat_walwriter - If pg_stat_reset_shared('sql') is called: All values displayed in pgx_stat_sql - If pg_stat_reset_shared('gmc') is called: All values except size column in pgx_stat_gmc

See

Refer to "Statistics Functions" in "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on other parameters of the pg_stat_reset_shared function.

Chapter 8 Streaming Replication Using WebAdmin

This chapter describes how to create a streaming replication cluster using WebAdmin.

Streaming replication allows the creation of one or more standby instances, which connect to the master instances and replicate the data using WAL records. The standby instance can be used for read-only operations.

WebAdmin can be used to create a streaming replication cluster. WebAdmin allows the creation of a cluster in the following configurations:

- Master-Standby Configuration: This configuration creates a master and standby instance together.
- Standby Only Configuration: This configuration creates a standby instance from an already existing instance.

Point

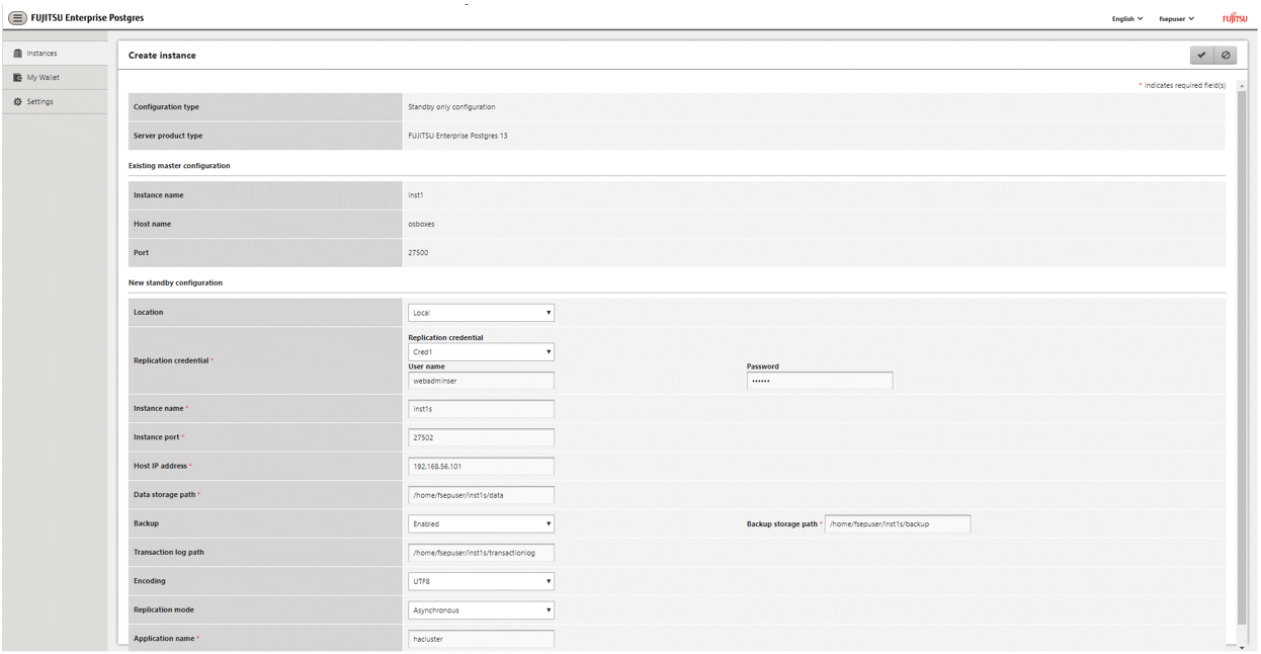
- A standby instance can be created from a standalone instance, a master instance, or even from another standby instance.
- If a streaming replication cluster is created using WebAdmin, the network with the host name (or IP address) specified in [Host name] will be used across sessions of WebAdmin, and also used as the log transfer network.
- To use a network other than the job network as the log transfer network, specify the host name other than the job network one in [Host name].

8.1 Creating a Standby Instance

Follow the procedure below to create a standby instance.

1. In the [Instances] tab, select the instance from which a standby instance is to be created.
2. Click .
3. Enter the information for the standby instance to be created. In the example below, a standby instance is created from instance "inst1".

   The instance name, host address and port of the selected instance are already displayed for easy reference.



   Enter the following items:

   - [Location]: Whether to create the instance in the server that the current user is logged in to, or in a remote server. The default is "Local", which will create the instance in the server machine where WebAdmin is currently running.

- [Replication credential]: The user name and password required for the standby instance to connect to the master instance. The user name and password can be entered or selected from the Wallet. Refer to "Appendix G WebAdmin Wallet" for information on creating wallet entries.
- [Instance name]: Name of the standby database instance to create.

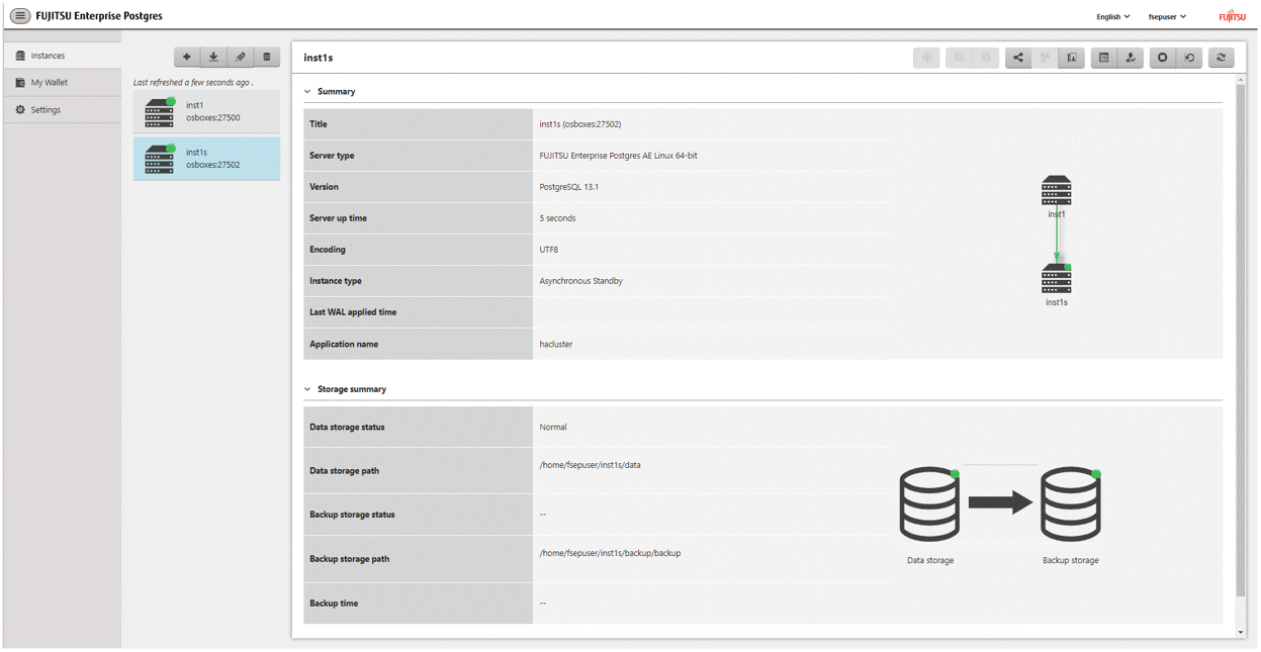
  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters
- [Instance port]: Port number of the standby database instance.
- [Host IP address]: The IP address of the server machine where the standby instance is to be created. This information is needed to configure the standby instance to be connected to the master.
- [Data storage path]: Directory where the database data will be stored
- [Backup storage path]: Directory where the database backup will be stored
- [Transaction log path]: Directory where the transaction log will be stored
- [Encoding]: Database encoding system
- [Replication mode]: Replication mode of the standby instance to be created ("Asynchronous" or "Synchronous")
- [Application name]: The reference name of the standby instance used to identify it to the master instance.

  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters

4. Click ✔ to create the standby instance.
5. Once the standby instance is created successfully, select standby instance in the [Instances] tab. The following page will be displayed:



Note

- Backups are not possible for standby instances in WebAdmin. As a result, and are disabled and no value is shown for [Backup storage status] and [Backup time].
- If using WebAdmin to manage Mirroring Controller, the message below may be output to the server log or system log in the standby instance. No action is required, as the instance is running normally.

```
ERROR:  pgx_rcvall failed (16491)
ERROR:  pgx_rcvall: backup of the database has not yet been performed, or an incorrect backup
storage directory was specified
```

- Replication credential (user name and password) should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".

8.2 Promoting a Standby Instance

Streaming replication between a master and standby instance can be discontinued using WebAdmin.

Follow the procedure below to promote a standby instance to a standalone instance, thereby discontinuing the streaming replication.

1. In the [Instances] tab, select the standby instance that needs to be promoted.
2. Click .
3. Click [Yes] from the confirmation dialog box.

The standby instance will be promoted and will become a standalone instance, which is not part of a streaming replication cluster.

Once the standby instance is promoted to become a standalone instance, the backup storage status will be "Error". This is because no backups are available when the instance is newly promoted to a standalone instance. The status will be reset if a new backup is performed by clicking [Solution] or .

8.3 Converting an Asynchronous Replication to Synchronous

Streaming replication between a master and standby instance can be configured to be in Asynchronous or Synchronous mode. This mode can be changed even after the standby instance was successfully created.

Follow the procedure below to convert an Asynchronous standby instance to Synchronous.

1. In the [Instances] tab, select the master instance of the relevant cluster.
2. Click .
3. In the [Streaming replication] section, edit the value for [Synchronous standby names].
   - Add the "Application name" of the standby instance you want to be in Synchronous mode.
4. Click .
5. Select the master instance and click .
6. Select the standby instance. [Instance type] will now show the updated status.

Note

- Converting an Asynchronous standby instance to Synchronous can cause the master instance to queue the incoming transactions until the standby instance is ready. For this reason, it is recommended that this operation be performed during a scheduled maintenance period.
- When adding a synchronous standby instance, FUJITSU Enterprise Postgres will only keep the first entry in [Synchronous standby names] in synchronous state.

- To learn more about the differences between synchronous and asynchronous standby modes and their behavior, refer to "Streaming Replication" in "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation.

8.4 Converting a Synchronous Replication to Asynchronous

Streaming replication between a master and standby instance can be configured to be in Asynchronous or Synchronous Mode. This mode can be changed even after the standby instance was successfully created.

Follow the procedure below to convert a Synchronous standby instance to Asynchronous.

1. In the [Instances] tab, select the master instance of the relevant cluster.
2. Click .
3. In the [Streaming replication] section, edit the value for [Synchronous standby names].
   - Remove the "Application name" of the standby instance you want to be in Asynchronous mode.
4. Click .
5. Select the master instance and click .
6. Select the standby instance. [Instance type] will now show the updated status.

Note

To learn more about the differences between synchronous and asynchronous standby modes and their behavior, refer to "Streaming Replication" in "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation.

8.5 Joining a Replication Cluster

WebAdmin facilitates the joining of an old master of the cluster as a standby node.

1. In the [Instances] tab, select the remote instance (from where the new cluster node will stream WAL entries), and then click .
2. Configure the node to accept streaming requests from the new node.
3. In the [Instances] tab, select the new standby instance (which needs to be connected to the cluster), and then click .
4. Set [Replication host name] to the remote instance.
5. Enter [Replication credential].

   Specify the user name and password required for the standby instance to connect to the remote instance. The user name and password can be entered or selected from the Wallet. Refer to "Appendix G WebAdmin Wallet" for information on creating wallet entries. Replication credential (user name and password) should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".
6. Enter [Host IP address].

   Specify the IP address of the node where the standby instance was created.
7. Click to open the [Join replication cluster] dialog box.
   For FUJITSU Enterprise Postgres 12 and earlier instances, select [Restart later] or [Restart now], and then click [Yes] to set up the standby instance.
   For FUJITSU Enterprise Postgres 13, click [Yes] or [Restart now], and then click [Yes] to set up the standby instance.
8. Upon successful completion, the confirmation dialog box will be displayed.
9. Click [Close] to return to the instance details window.

The instance will become a standby instance, and will be part of the streaming replication cluster. The replication diagram will display the relationship between the standby instance and the remote instance. The user can change the replication relationship of the remote instance from asynchronous to synchronous (and vice versa) using the [Configuration] window.

Chapter 9 Installing and Operating the In-memory Feature

The in-memory feature enables fast aggregation using Vertical Clustered Index (VCI) and memory-resident feature.

VCI has a data structure suitable for aggregation, and features parallel scan and disk compression, which enable faster aggregation through reduced disk I/O.

The memory-resident feature reduces disk I/O that occurs during aggregation. It consists of the preload feature that reads VCI data to memory in advance, and the stable buffer feature that suppresses VCI data eviction from memory. The stable buffer feature secures the proportion specified by parameter in the shared memory for VCI.

This chapter describes how to install and operate the in-memory feature.

Note

This feature can only be used in Advanced Edition.

9.1 Installing Vertical Clustered Index (VCI)

This section describes the installation of VCI.

1. Evaluating whether to Install VCI
2. Estimating Resources
3. Setting up

9.1.1 Evaluating whether to Install VCI

VCI uses available resources within the server to increase scan performance.

It speeds up processing in many situations, and can be more effective in the following situations:

- Single table processing
- Processing that handles many rows in the table
- Processing that handles some columns in the table
- Processing that performs very heavy aggregation such as simultaneous sum and average aggregation

VCI will not be used in the following cases, so it is necessary to determine its effectiveness in advance:

- The data type of the target table or column contains VCI restrictions.
- The SQL statement does not meet the VCI operating conditions
- VCI is determined to be slower based on cost estimation

Note

If performing operations that use VCI, the full_page_writes parameter setting in postgresql.conf must be enabled (on). For this reason, if this parameter is disabled (off), operations that use VCI return an error. In addition, to perform operations for tables that do not create a VCI when the full_page_writes parameter setting is temporarily disabled (off), do not create a VCI or perform operations to tables that created a VCI during that time.

See

- Refer to "9.1.4 Data that can Use VCI" for information on VCI restrictions.

- Refer to "Scan Using a Vertical Clustered Index (VCI)" - "Operating Conditions" in the Application Development Guide for information on VCI operating conditions.

9.1.2 Estimating Resources

Estimate resources before setting up VCI.

Select the aggregation that you want to speed up and identify the required column data. The additional resources below are required according to the number of columns.

- Memory

  Secure additional capacity required for the disk space for the column for which VCI is to be created.

- Disk

  Secure additional disks based on the disk space required for the column for which VCI is to be created, as VCI stores column data as well as existing table data on the disk. It is recommended to provide a separate disk in addition to the existing one, and specify it as the tablespace to avoid impact on any other jobs caused by I/O.

Information

The operations on VCI can continue even if the memory configured for VCI is insufficient by using VCI data on the disk.

See

Refer to "Estimating Memory Requirements" and "Estimating Database Disk Space Requirements" in the Installation and Setup Guide for Server for information on how to estimate required memory and disk space.

9.1.3 Setting up

This section describes how to set up VCI.

Setup flow

1. Setting Parameters
2. Installing the Extensions
3. Creating VCI
4. Confirming that VCI has been Created

9.1.3.1 Setting Parameters

Edit postgresql.conf to set the required parameters for VCI. After that, start or restart the instance.

The following table lists the parameters that need or are recommended to be configured in advance:

Parameter name	Setting value	Description	Required
shared_preload_libraries	Literal 'vci, pg_prewarm'	VCI and shared library to be preloaded at server start.	Y
session_preload_libraries	Literal 'vci, pg_prewarm'	VCI and shared library to be preloaded at connection start.	Y
reserve_buffer_ratio	Percentage of shared memory to be used for stable buffer table	Proportion of shared memory to be used for a stable buffer table.	N

Parameter name	Setting value	Description	Required
vci.control_max_workers	Number of background workers that manage VCI	Number of background workers that manage VCI. Add this value to max_worker_processes.	N
vci.max_parallel_degree	Maximum number of background workers used for parallel scan	Maximum number of background workers used for parallel scan. Add this value to max_worker_processes.	N

Example

```
shared_preload_libraries = 'vci, pg_prewarm'
session_preload_libraries = 'vci, pg_prewarm'
reserve_buffer_ratio = 20
vci.control_max_workers = 8
vci.max_parallel_degree = 4
max_worker_processes = 18 # Example: If the initial value was 6, 6 + 8 + 4 = 18
```

Note

An error occurs if you use VCI to start instances when procfs is not mounted. Ensure that procfs is mounted before starting instances.

See

- Refer to "Appendix A Parameters" for information on all parameters for VCI. Refer also to default value for each parameter and details such as specification range in the same chapter. Refer to "Server Configuration" under "Server Administration" in the PostgreSQL documentation for information on shared_preload_libraries, session_preload_libraries, and max_worker_processes.

9.1.3.2 Installing the Extensions

Execute CREATE EXTENSION to install the VCI and pg_prewarm extensions. Both extensions need to be installed for each database.

- Installing VCI

```
db01=# CREATE EXTENSION vci;
```

- Installing pg_prewarm

```
db01=# CREATE EXTENSION pg_prewarm;
```

Note

- Only superusers can install VCI extensions.
- VCI extensions can only be installed in public schema.
- Some operations cannot be performed for VCI extensions. Refer to "9.2.1 Commands that cannot be Used for VCI" for details.

9.1.3.3 Creating a VCI

Execute the CREATE INDEX statement with the "USING vci" clause to create a VCI for the desired columns and the "WITH (stable_buffer=true)" clause to enable the stable buffer feature.

To use a separate disk for the VCI, specify the TABLESPACE clause.

```
db01=# CREATE INDEX idx_vci ON table01 USING vci (col01, col02) WITH (stable_buffer=true);
```

Note

- Some table types cannot be specified on the ON clause of CREATE INDEX. Refer to "9.1.4.1 Relation Types" for details.
- Some data types cannot be specified on the column specification of CREATE INDEX. Refer to "9.1.4.2 Data Types" for details.
- Some operations cannot be performed for VCI. Refer to "9.2.1 Commands that cannot be Used for VCI" for details.
- The same column cannot be specified more than once on the column specification of CREATE INDEX.
- VCI cannot be created for table columns that belong to the template database.
- CREATE INDEX creates multiple views named vci_*10digitRelOid_5digitRelAttr_1charRelType* alongside VCI itself. These are called VCI internal relations. Do not update or delete them as they are used for VCI aggregation.
- All data for the specified column will be replaced in columnar format when VCI is created, so executing CREATE INDEX on an existing table with data inserted takes more time compared with a general index (B-tree). Jobs can continue while CREATE INDEX is running.
- When CREATE INDEX USING VCI is invoked on a partitioned table, the default behavior is to recurse to all partitions to ensure they all have matching indexes. Each partition is first checked to determine whether an equivalent index already exists, and if so, that index will become attached as a partition index to the index being created, which will become its parent index. If no matching index exists, a new index will be created and automatically attached; the name of the new index in each partition will be determined as if no index name had been specified in the command. If the ONLY option is specified, no recursion is done, and the index is marked invalid. (ALTER INDEX ... ATTACH PARTITION marks the index valid, once all partitions acquire matching indexes.) Note, however, that any partition that is created in the future using CREATE TABLE ... PARTITION OF will automatically have a matching index, regardless of whether ONLY is specified.
- Parallel index build is not supported on VCI indexes.

9.1.3.4 Confirming that the VCI has been Created

Execute the SELECT statement to reference the pg_indexes catalog, and confirm that the VCI was created for the target columns.

Example

```
db01=# SELECT indexdef FROM pg_indexes WHERE indexdef LIKE '%vci%';
                        indexdef
-----------------------------------------------------------
CREATE INDEX idx_vci ON table01 USING vci (col01, col02)
(1 row)
```

9.1.4 Data that can Use VCI

This section describes on which relation types and for which data types VCIs can be created.

9.1.4.1 Relation Types

VCIs cannot be created on some relation types.

The ON clause of CREATE INDEX described in "9.1.3.3 Creating a VCI" cannot specify relations on which VCIs cannot be created.

- Relations on which VCIs can be created
  - Normal tables
  - UNLOGGED TABLEs

- Relations on which VCIs cannot be created
  - Materialized views
  - Temporary tables
  - Views
  - Temporary views
  - Foreign tables

9.1.4.2 Data Types

VCIs cannot be created for some data types.

The column specification of CREATE INDEX described in "9.1.3.3 Creating a VCI" cannot specify a column with data type on which VCIs cannot be created.

Category	Data type	Supported by VCI?
Numeric	smallint	Y
	integer	Y
	bigint	Y
	decimal	Y
	numeric	Y
	real	Y
	double precision	Y
	serial	Y
	bigserial	Y
Monetary	money	Y
Character	varchar(*n*)	Y
	char(*n*)	Y
	nchar	Y
	nvarchar(*n*)	Y
	text	Y
Binary	bytea	Y
Date/time	timestamp	Y
	timestamp with time zone	Y
	date	Y
	time	Y
	time with time zone	Y
	interval	Y
Boolean	boolean	Y
Geometric	point	N
	line	N
	lseg	N
	box	N
	path	N

Category	Data type	Supported by VCI?
	polygon	N
	circle	N
Network address	cidr	N
	inet	N
	macaddr	N
	macaddr8	N
Bit string	bit(*n*)	Y
	bit varying(*n*)	Y
Text search	tsvector	N
	tsquery	N
UUID	uuid	Y
XML	xml	N
JSON	json	N
	jsonb	N
Range	int4range	N
	int8range	N
	numrange	N
	tsrange	N
	tstzrange	N
	daterange	N
Object identifier	oid	N
	regproc	N
	regprocedure	N
	regoper	N
	regoperator	N
	regclass	N
	regtype	N
	regconfig	N
	regdictionary	N
pg_lsn type	pg_lsn	N
Array type	-	N
User-defined type (Basic type, enumerated type, composite type, and range type)	-	N

9.2 Operating VCI

This section describes how to operate VCI.

9.2.1 Commands that cannot be Used for VCI

Some operations cannot be performed for VCI extensions and VCI itself.

This section describes SQL commands that cannot be executed for the VCI extensions and VCI itself, and client application commands.

SQL commands

- Operations that cannot be performed for the VCI extension

Command	Subcommand	Description
ALTER EXTENSION	UPDATE	The VCI extension cannot be specified. This operation is not required for VCI.
	SET SCHEMA	
	ADD	
	DROP	
CREATE EXTENSION	SCHEMA	The subcommands on the left cannot be performed if the VCI extension is specified. This operation is not required for VCI.

- Operations that cannot be performed on relations containing a VCI

Command	Subcommand	Description
ALTER INDEX	SET	The subcommands on the left cannot be performed if a VCI is specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	SET TABLESPACE	
	ALL IN TABLESPACE	
ALTER OPERATOR CLASS	RENAME TO	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
	OWNER TO	
	SET SCHEMA	
ALTER OPERATOR FAMILY	ADD	
	DROP	
	RENAME TO	
	OWNER TO	
	SET SCHEMA	
ALTER TABLE	ALL IN TABLESPACE *name* [OWNED BY *roleName*] SET TABLESPACE *newTablespace*	A tablespace that contains a VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	DROP [COLUMN] [IF EXISTS] *colName* [RESTRICT | CASCADE]	A column that contains a VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	ALTER [COLUMN] *colName* [SET DATA] TYPE *dataType* [COLLATE *collation*] [USING *expr*]	
	CLUSTER ON *indexName*	A VCI cannot be specified. This operation is not supported in VCI.
	REPLICA IDENTITY {DEFAULT | USING INDEX *indexName* | FULL | NOTHING}	

Command	Subcommand	Description
CLUSTER	-	A table that contains a VCI and VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
CREATE INDEX	UNIQUE	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
	CONCURRENTLY	
	[ASC | DESC]	
	[NULLS { FIRST | LAST }]	
	WITH	
	WHERE	
	INCLUDE	
CREATE OPERATOR CLASS	-	A VCI cannot be specified. This operation is not supported in VCI.
CREATE OPERATOR FAMILY	-	
CREATE TABLE	EXCLUDE	
DROP INDEX	CONCURRENTLY	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
REINDEX	-	A VCI cannot be specified. This command is not required as VCI uses daemon's automatic maintenance to prevent disk space from increasing.

Client application command

- Operations that cannot be performed on relations containing a VCI

Command	Description
clusterdb	Clustering cannot be performed for tables that contain a VCI.
reindexdb	VCIs cannot be specified on the --index option.

9.2.2 Data Preload Feature

The first aggregation using VCI immediately after an instance is started may take time, because the VCI data has not been loaded to buffer.

Therefore, use the preload feature to load the VCI data to buffer in advance when performing VCI aggregation after an instance is started.

When using the preload feature, execute the function pgx_prewarm_vci to each VCI created with CREATE INDEX.

```
db01=# SELECT pgx_prewarm_vci('idx_vci');
```

Refer to "B.4 VCI Data Load Control Function" for information on pgx_prewarm_vci.

Chapter 10 Parallel Query

FUJITSU Enterprise Postgres enhances parallel queries, by taking into consideration the aspects below:

- CPU load calculation
- Increase of workers during runtime

10.1 CPU Load Calculation

There may be a case when the user tries to execute a parallel query but there is not enough CPU available.

Adding dynamic workers at this stage will provide no benefits - instead, it may add overhead due to context switching.

FUJITSU Enterprise Postgres takes into consideration the current CPU load when deciding on the number of workers for parallel query.

10.2 Increase of Workers during Runtime

This FUJITSU Enterprise Postgres enhancement allows systems to allocate additional workers during query execution (if there are workers available at the time). This improves query performance, which could otherwise starve of CPU if there were fewer or no workers when the query started.

Note

The ability to increase workers during runtime is available only with parallel sequence scan.

Chapter 11 High-Speed Data Load

High-speed data load uses the pgx_loader command to load data from files at high speed into FUJITSU Enterprise Postgres.

Note

- This feature is available only in the Advanced Edition.
- This feature is not available in single-user mode. This is because in single-user mode instances run in a single process, and it cannot start parallel workers.

11.1 Installing High-Speed Data Load

This section describes how to install high-speed data load.

Installation flow

1. Deciding whether to Install
2. Estimating Resources
3. Setup

11.1.1 Deciding whether to Install

The feature achieves high speed data load by executing the COPY FROM command in parallel. If the database system is unable to use sufficient resources due to the feature using more resources than the COPY FROM command of PostgreSQL, load performance may be inferior to that of the COPY FROM command of PostgreSQL. Therefore, determine if the feature will be effective by considering the factors below before deciding to install.

Database server memory

If the value of shared_buffers in postgresql.conf is small, fewer data pages are cached to the shared memory of the database server. This will result in multiple parallel workers more often having to wait for write exclusive locks to the same data page. Moreover, the smaller the number of data pages, the more often the table expands. During table expansion, access to the table is exclusive (standby event name: extend), so write time increases. To cater for that, increase the value of shared_buffers.

See

The standby event name is stored in the wait_event column of the pg_stat_activity view. Refer to "wait_event Description" in "The Statistics Collector" in the PostgreSQL Documentation for details.

Frequency of checkpoints

If checkpoints are issued at short intervals, write performance is reduced. If the messages below are output to the server log during data writes, increase the values of max_wal_size and checkpoint_timeout in postgresql.conf to reduce the frequency of checkpoints.

Example

```
LOG:  checkpoints are occurring too frequently (19 seconds apart)
HINT:  Consider increasing the configuration parameter "max_wal_size".
```

11.1.2 Estimating Resources

Estimate the memory requirements for high-speed data load.

Up to 128 parallel workers to perform data load can be specified for this feature. The additional resources below are required depending on the number of parallel workers.

- Dynamic shared memory created during data load

  The feature creates shared memory and shared memory message queues during data load. These are used to send external data from the back end to the parallel workers, and for error notifications.

Note

If the value of shared_buffers in postgresql.conf is small, the system will often have to wait for write exclusive locks to the same data page (as described in "Database server memory" in "11.1.1 Deciding whether to Install"). Since input data cannot be loaded from the shared memory message queues during such waits, they will often be full. In these cases, it will not be possible to write to the shared memory message queues, resulting in degraded data load performance.

See

Refer to "High-Speed Data Load Memory Requirements" in the Installation and Setup Guide for Server for information on the formula for estimating memory requirements.

11.1.3 Setup

This section describes how to set up high-speed data load.

Setup flow

1. Setting Parameters
2. Installing the Extension

11.1.3.1 Setting Parameters

Set the parameters required for high-speed data load in postgresql.conf. After that, start or restart the instance.

The table below lists the postgresql.conf parameters that must be changed, and the values that must be added to their current values. After editing postgresql.conf, start or restart the instance.

Parameter	Setting	Required
max_prepared_transactions	Add the number of transactions that can be prepared by parallel workers during data load to the parameter's current value. The resulting value must be equal to or greater than the maximum number of parallel workers used with this feature.	Mandatory
max_worker_processes	Number of parallel workers to perform data load.	Mandatory
max_parallel_workers	Add the maximum number of parallel workers to be used in a parallel query by this feature to the parameter's current value. The resulting value must be equal to or greater than the number of parallel workers used with this feature.	Mandatory

Example

The example below shows how to configure 2 instances of high-speed data load being executed simultaneously using a degree of parallelism of 4.

```
max_prepared_transactions = 13  #Example if the initial value was 5: 5 + 2 x 4 = 13
max_worker_processes = 16        #Example if the initial value was 8: 8 + 2 x 4 = 16
max_parallel_workers = 12        #Example if the initial value was 4: 4 + 2 x 4 = 12
```

Note

As shown in the example above, set the value of max_prepared_transactions, max_worker_processes and max_parallel_workers multiplied by the number of instances of this feature executed simultaneously.

The table below lists the postgresql.conf parameters that must also be checked.

Parameter	Setting	Required
dynamic_shared_memory_type	Implementation of dynamic shared memory to be used by the instance. The default value is recommended.	Mandatory

See

Refer to "Resource Consumption" in the PostgreSQL Documentation for information on the parameters.

11.1.3.2 Installing the Extension

Execute CREATE EXTENSION to install the high-speed data load extension. The extension needs to be installed on each database.

Example

The example below installs the extension on the "postgres" database.

```
postgres=# CREATE EXTENSION pgx_loader;
CREATE EXTENSION
```

Note

- Only superusers can install the high-speed data load extension.
- The high-speed data load extension can only be installed on the public schema.

11.2 Using High-Speed Data Load

This section describes how to use high-speed data load.

11.2.1 Loading Data

To load data from a file into a FUJITSU Enterprise Postgres table, execute the pgx_loader command in load mode.

Example

The example below loads the file /path/to/data.csv (2000 records) into table tbl using a degree of parallelism of 3.

```
$ pgx_loader load -j 3 -c "COPY tbl FROM '/path/to/data.csv' WITH CSV"
LOAD 2000
```

Point

If an external file contains data that violates the format or constraints, the data load may fail partway through, resulting in delays for routine tasks such as nightly batch processing. Therefore, it is recommended to remove the invalid data before executing the data load.

Note

The data inserted using this feature is dumped as a COPY command by the pg_dump command and the pg_dumpall command.

See

- Refer to "pgx_loader" in the Reference for information on the command.
- Refer to "COPY" in the PostgreSQL Documentation for information on the deployment destination and access privileges for external files.

11.2.2 Recovering from a Data Load that Ended Abnormally

If a system interruption such as a server failure occurs while high-speed data load is being performed, transactions prepared using this feature may be changed to the in-doubt state. At that point, resources occupied by the transaction will be locked, and access to the relevant resources from other transactions will be blocked, rendering them unusable.

In such cases, check transactions that are in an in-doubt state, and resolve them.

Checking for in-doubt transactions

This section describes how to check for in-doubt transactions.

1. Refer to the pgx_loader_state table in the pgx_loader schema.

   Retrieve the global transaction identifier (gid column) of in-doubt transactions. In-doubt transactions will contain "rollback" in the column "state".

   #### Example

   The example below retrieves the global transaction identifier (gid) of in-doubt transactions performed by the database role myrole and that used table tbl. The retrieved global transaction identifiers pgx_loader:9589 and pgx_loader:9590 identify in-doubt transactions.

   ```
   postgres=# SELECT gid, state FROM pgx_loader.pgx_loader_state WHERE
   postgres-# role_oid IN (SELECT oid FROM pg_roles WHERE rolname = 'myrole') AND
   postgres-# relation_oid IN (SELECT relid FROM pg_stat_all_tables WHERE
   postgres-# relname = 'tbl');
          gid       | state
   -----------------+-------------
    pgx_loader:9590 | rollback
    pgx_loader:9591 | commit
    pgx_loader:9589 | rollback
   (3 rows)
   ```

2. Refer to the pg_prepared_xacts system view.

   Check if the in-doubt transactions retrieved above exist.

Example

The example below checks if in-doubt transactions with the global transaction identifiers pgx_loader:9589 and pgx_loader:9590 exist.

```
postgres=# SELECT gid FROM pg_prepared_xacts WHERE gid IN ('pgx_loader:9589','pgx_loader:9590');
       gid
------------------
 pgx_loader:9590
 pgx_loader:9589
(2 rows)
```

See

Refer to "E.1 pgx_loader_state" for information on the pgx_loader_state table.

Resolving in-doubt transactions

Execute the pgx_loader command in recovery mode to resolve in-doubt transactions.

After executing the pgx_loader command in recovery mode, perform the procedure described in "Checking for in-doubt transactions" to check if the in-doubt transactions have been resolved.

Example

The example below completes the in-doubt transactions prepared for table tbl.

```
$ pgx_loader recovery -t tbl
```

Point

The recovery mode of the pgx_loader command only resolves transactions prepared by high-speed data load. For transactions prepared by an application using distributed transactions other than this feature, follow the procedure described in "15.13 Actions in Response to Error in a Distributed Transaction".

11.3 Removing High-Speed Data Load

This section describes how to remove high-speed data load.

11.3.1 Removing the Extension

Execute DROP EXTENSION to remove the high-speed data load extension. The extension needs to be removed on each database.

Example

The example below removes the extension on the "postgres" database.

```
postgres=# DROP EXTENSION pgx_loader;
DROP EXTENSION
```

Note

- The information required for operation of high-speed data load is stored in the pgx_loader_state table of the pgx_loader schema. Do not remove the high-speed data load extension if the pgx_loader_state table is not empty.
- Only superusers can remove the high-speed data load extension.
- The high-speed data load extension can only be removed on the public schema.

Chapter 12 Global Meta Cache

The Global Meta Cache (GMC) feature loads a meta cache into shared memory using the pgx_global_metacache parameter. This reduces the amount of memory required throughout the system.

Note

This feature can only be used in Advanced Edition.

12.1 Usage

Describes how to use the Global Meta Cache feature.

12.1.1 Deciding Whether to Enable the Global Meta Cache Feature

Global Meta Cache is a mechanism for sharing meta caches between processes, so it works well on systems with a high number of resources accessed and SQL connections. The number of resources is primarily the number of tables accessed by a process, the number of indexes, or the total number of all columns in all tables accessed.

In particular, consider using Global Meta Cache if the total size of the meta cache for each process exceeds the amount of installed memory, or takes up a large portion of that memory, thereby squeezing memory allocations to the database cache or the Operating system file cache. Using Global Meta Cache may slightly increase the time it takes to execute a single SQL to reference a meta cache on shared memory (For example, it will not exceed 5% of the execution time in a situation where all the data is located in the database cache), but you can expect a greater benefit from being able to allocate more memory, such as for the database cache.

If performance degradation using Global Meta Cache is not acceptable, you may want to limit the number of tables accessed by a process.

12.1.2 Estimating Memory for Global Meta Cache

To enable the Global Meta Cache feature, the pgx_global_metacache parameter must specify an upper limit on the size of the shared memory (Hereinafter, the GMC area) dedicated to Global Meta Cahche. Ideally, this upper limit should be the size estimated in “Appendix A Parameters”. Values lower than this can still work, but refer to "12.1.3 How the GMC Memory Area Is Used" on using the GMC area to understand the disadvantages.

12.1.3 How the GMC Memory Area Is Used

At startup, the memory for the GMC area is not used much, but the GMC area grows as new meta caches are placed in the GMC area. If it does, it discards any meta caches that the system determines are not heavily used and places a new one in the GMC area.

Therefore, the GMC area will work even if it is smaller than the estimate, but the meta cache will be regenerated if the discarded meta cache needs to be reused. Note that if this happens frequently, it will degrade overall performance.

With this in mind, it may not be a problem if, for example, the tables to be accessed are different depending on the time zone, and the degradation of the time zone immediately after the change is acceptable.

In any case, be sure to test and tune the system thoroughly before running it.

12.1.4 Enabling the Global Meta Cache Feature

To Enable the Global Meta Cache feature edit the postgresql.conf file and set the pgx_global_metacahe parameter. Restarting the instance after editing the postgresql.conf file is required. Refer to "Appendix A Parameters" for information on the parameters.

Parameter Name	Description
pgx_global_metacache	Specify the maximum amount of memory for the GMC area on shared memory. When it’s set to 0 (default value), the Global Meta Cache feature is disabled. When enabled, the minimum value allowed is 10MB.

When the cache is created, if the total amount of meta caches on shared memory exceeds the value specified by pgx_global_metacache, the inactive, unreferenced meta caches are removed from the GMC area. Note that if all GMC are in use and the cache cannot be created in the GMC area, the cache is temporarily created in the local memory of the backend process.

Example

Here is an example postgresql.conf configuration:

```
pgx_global_metacache = 800 MB
```

Wait Events

The Global Meta Cache feature may cause wait events. Wait events are identified in the wait_event column of the pg_stat_activity view. GMC specific wait events are described below.

[GMC Feature Wait Events]

Wait Event Type	Wait Event Name	Description
LWLock	GlobalCatcache	Waiting to find, add, and remove meta caches in the GMC area.
IPC	GMCSweep	Waiting to select a meta cache that can be deleted when GMC space is low. If the GMC is fully referencing and there is no deletable meta cache, it is waiting for the reference to be removed and a deletable meta cache to be selected.

Note

If GMCSweep is happened frequently, increase the pgx_global_metacache setting.

See

Refer to "Viewing Statistics" in the PostgreSQL Documentation for information on the pg_stat_activity view.

12.1.5 Estimating Resources

Refer to "Global Meta Cache Memory Requirements" in the Installation and Setup Guide for Server for formulas to estimate the amount of memory used by the Global Meta Cache feature.

12.2 Statistics

Describes the statistics for the Global Meta Cache feature.

12.2.1 System View

You can check the cache hit ratio and size of the GMC area in the system view pgx_stat_gmc. Refer to "C.6 pgx_stat_gmc" for information on the columns.

If the cache hit ratio is low and the current memory usage is close to pgx_global_metacache, increase the pgx_global_metacache setting because performance may be degraded.

Refer to "7.6 Monitoring Database Activity" in the Operations Guide for information on the statistics.

Chapter 13 Local Meta Cache Limit

Local Meta Cache Limit feature limits the size of a Local Meta Cache by removing it if it has not been accessed for a long time.

Note

This feature is available only in the Advanced Edition.

13.1 Usage

Describes how to use the Local Meta Cache Limit feature.

13.1.1 Deciding Whether to Enable the Local Meta Cache Limit Feature

Refer to "Appendix A Parameters", after estimating the total amount of memory to be used as the catalog cache and relation cache, when the total amount of memory exceeds the amount of installed memory or occupies a large amount of installed memory, consider using this feature.

This feature adds the action of discarding the meta cache that has been held permanently. If you attempt to refer to a destroyed meta cache again, the meta cache is recreated, so using this feature will result in poor performance compared to not using it.

Therefore, read the following to understand how to discard a meta cache.

- 13.1.3 Cache Removal when Local Meta Cache Limit is Enabled
- 13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature
- Parameters for the Local Meta Cache Limit feature

How to set the upper limit with these considerations is described in detail in the estimation formula in "Appendix A Parameters".

13.1.2 How to Set Parameters for the Local Meta Cache Limit Feature

To enable the Local Meta Cache Limit feature, set the pgx_catalog_cache_max_size and pgx_relation_cache_max_size parameters.

Parameter Name	Description
pgx_catalog_cache_max_size	Specify the maximum amount of memory that the backend process should use as the catalog cache. You can enable catalog cache removal by setting it to 8 KB or more. When it is set to 0 (default value), the catalog cache removal is disabled.
pgx_relation_cache_max_size	Specify the maximum amount of memory that the backend process should use as the relation cache. You can enable relation cache removal by setting it to 8 KB or more. When it is set to 0 (default value), the relation cache removal is disabled.

Example

Here is an example postgresql.conf configuration:

```
pgx_catalog_cache_max_size = 1MB
pgx_relation_cache_max_size = 1MB
```

13.1.3 Cache Removal when Local Meta Cache Limit is Enabled

When this feature is enabled, the caching strategy is to keep the cache as long as possible within the specified upper limit. If holding a new cache exceeds the limit, consider locality of reference and remove the cache from the one with the longest unreferenced time.

However, because the cache used by active transactions cannot be removed, if a transaction uses a large number of caches, the cache may be held above the limit. In this case, remove the all caches at the end of the transaction. This is necessary to free up memory.

In PostgreSQL, in order to acquire memory at high speed, a memory block of a certain size is acquired from the OS, and a small memory is cut out from the block and used. The memory for the metacache is cut out in the same way. Therefore, it is possible to return the memory block to the OS by destroying all the meta caches scattered throughout the memory block. When this happens, the next SQL execution will be slowed down due to the re-creation of the meta cache. Therefore, upper limit of feature should be set to a value larger than the size of the meta cache used by at least one transaction.

When the size of the meta cache exceeds the upper limit, the following message is output:

```
WARNING: could not reduce Cat/RelCacheMemoryContext size to AA kilobytes, reduced to BB kilobytes
HINT: consider increasing the configuration parameter pgx_catalog/relation_cache_max_size
```

(***AA***: Upper limit, ***BB***: Amount of memory actually used)

CatCacheMemoryContext and RelCacheMemoryContext are memory areas for storing the catalog cache and relation cache, respectively. If this message is output, consider increasing the upper limit.

If the memory consumption by the backend process exceeds the allowable value by increasing the upper limit, reconsider the SQL to be executed, such as reducing the number of tables accessed in one transaction, or add memory adjust to the amount of memory used.

13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature

By observing how much meta cache regeneration is taking place, you can determine if the low upper limit is the cause of the failure to achieve the desired performance.

From the message below, calculate the cache hit ratio as follows:

```
Cache hit ratio = Number of cache hits ÷ Number of times the cache was searched
```

If the cache hit ratio is 80% or higher, this feature will not be the main factor that impedes performance. If not, raise the upper limit and see if performance can reach the goal. In doing so, first try to shift the focus of allocation to the relations cache. This is because when executing SQL, the relation cache generated based on the catalog cache is mainly referenced, so it is advantageous to leave a large amount of relation cache.

```
Catalog cache:catalog cache hit stats: search XX, hits YY
Relation cache:relation cache hit stats: search XX, hits YY
```

(***XX***: Number of times the cache was searched, ***YY***: Number of cache hits)

This message is printed when the transaction ends. However, if you output the message frequently, the performance will be degraded by itself, so you can adjust the output interval with the following parameters.

Parameter Name	Description
pgx_cache_hit_log_interval	When the transaction ends, if the time set in this parameter has elapsed since the previous message was output, the message is output. If set to 0, a message will be output each time the transaction ends. Setting -1 disables the output. The default value is 10min. Even if pgx_catalog_cache_max_size and pgx_relation_cache_max_size are disabled, the message output of the corresponding cache will be invalid. Immediately after connecting to the server, a small transaction occurs before the request from the user application, such as for user authentication. Since it is meaningless to know the hit ratio for these, a message is output at the end of the transaction that started after the time set in this parameter has elapsed after connecting to the server. For the same reason, setting a small value such as 0 may result in a message being printed at the end of such a small transaction. You can check which transaction the message corresponds to from the information output at the beginning. This information depends on the setting of the parameter log_line_prefix.

Example

Here is an example postgresql.conf configuration:

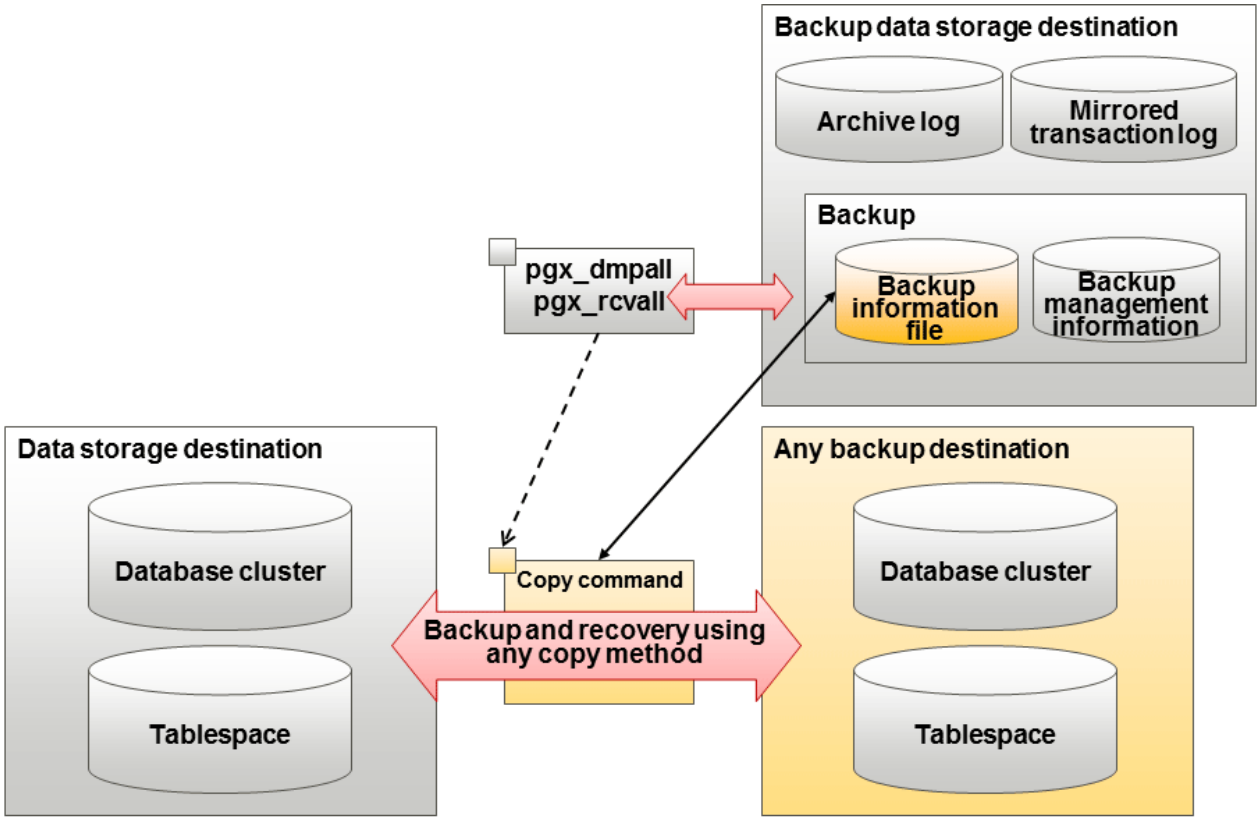
```
pgx_cache_hit_log_interval= 30min
```

Chapter 14 Backup/Recovery Using the Copy Command

By using a copy command created by the user, the pgx_dmpall command and the pgx_rcvall command can perform backup to any destination and can perform recovery from any destination using any copy method.

Copy commands must be created in advance as executable scripts for the user to implement the copy process on database clusters and tablespaces, and are called when executing the pgx_dmpall and pgx_rcvall commands.

This appendix describes backup/recovery using the copy command.



Point

- By using the high-speed copy feature of the storage device to copy the data storage destination, the processing time for backup of large databases can be greatly reduced.
- It is also possible to back up only some tablespaces using the copy command. However, database resources not backed up using the copy command are still backed up to the backup data storage destination.

Note

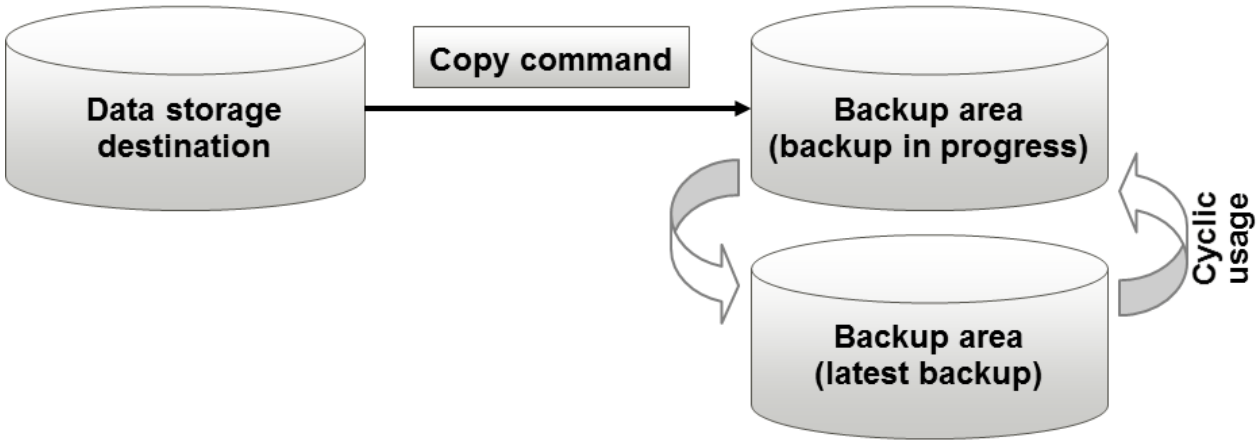
Both the backup data storage destination and the optional backup destination are necessary for recovery - if they are located in secondary media, combined management of these is necessary.

14.1 Configuration of the Copy Command

This section describes the configuration of the copy command for backup and recovery.

Cyclic usage of the backup area

Prepare two backup areas for the copy command in case an issue affects the data storage destination during backup. The copy command performs backup while cyclically using these backup areas.

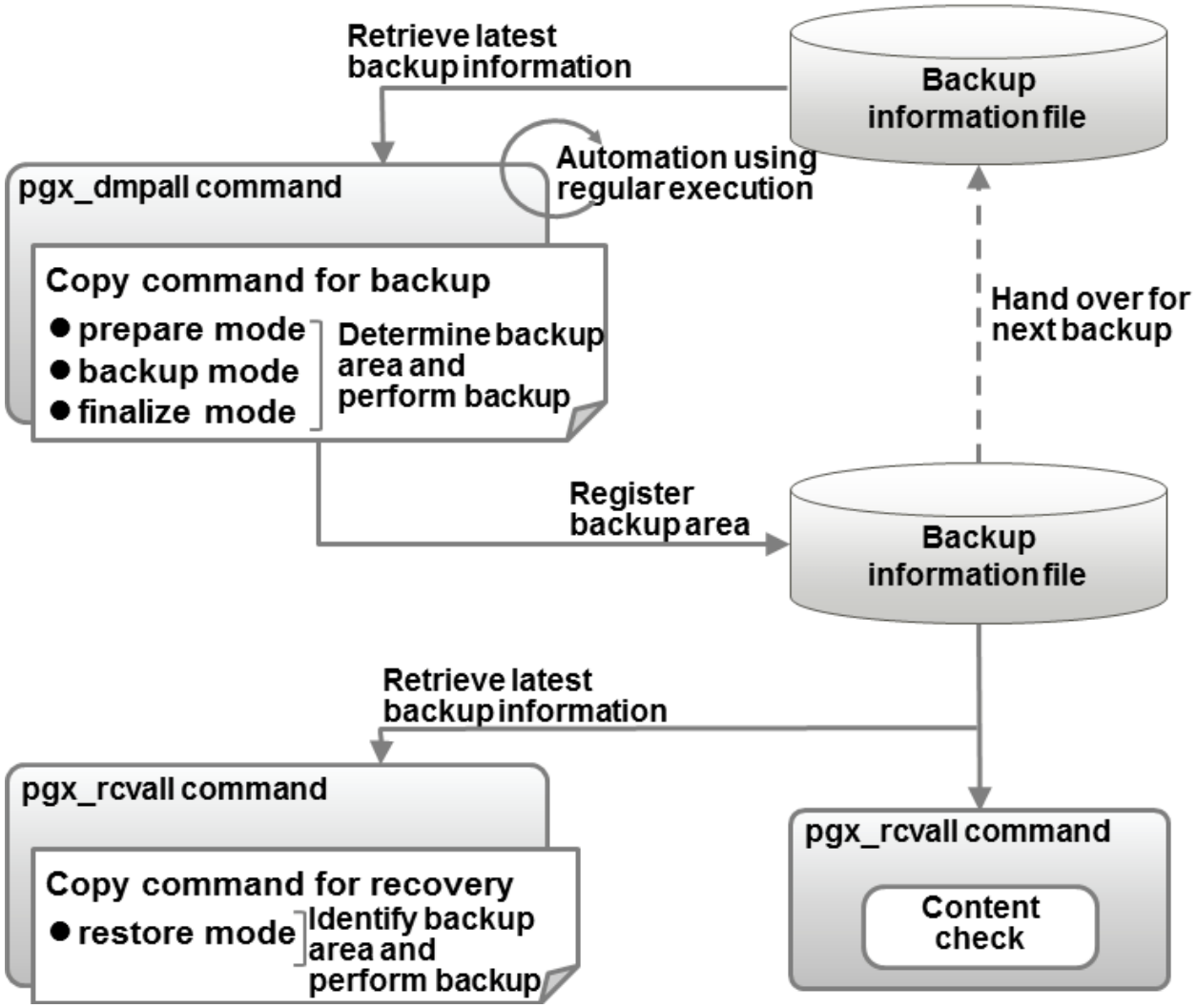


Note

The backup data storage destination cannot be used as these backup areas used by the copy command.

Backup using the backup information file

The copy command must determine the backup destination on each backup, as it is necessary to cycle through the backup areas. Backup can be automated by using the backup information file, which contains information about the backup destination.



Information

The backup information file is prepared in the backup data storage destination by the pgx_dmpall command, and contains information that can be read or updated by the copy command. This file is managed by associating it with the latest backup successfully completed by the pgx_dmpall command, so the latest backup information relating to the copy command registered by the user can be retrieved. Additionally, the content of the backup information file can be displayed using the pgx_rcvall command.

Configuration of the copy command for backup

The pgx_dmpall command calls the copy command for backup after execution for the three modes below. It is therefore necessary for the copy command for backup to implement the required processing for each of the modes.

- prepare mode

  Determines which of the two backup areas will be used for the current backup.

  The backup area to be used for the current backup is determined by reading the information relating to the latest backup destination where the backup information file was written to during the previous backup.

- backup mode

  Performs backup on the backup area determined by prepare mode, using any copy method.

- finalize mode

  Writes information relating to the destination of the current backup to the backup information file.

This enables the prepare mode to check the destination of the previous backup during the next backup.

Note

The user can use any method to hand over backup information between modes within the copy command, such as creating temporary files.

Configuration of the copy command for recovery

The pgx_rcvall command calls the copy command for recovery for the mode below. It is therefore necessary for the copy command for recovery to implement the required processing for the mode.

- restore mode

  Any copy method can be used to implement restore from the backup destination retrieved using the copy command for backup.

Point

By referring to the mode assigned to the copy command as an argument, backup and recovery can be implemented using a single copy command.

Example

Using a bash script

```
case $1 in
    prepare)
        processingRequiredForPrepareMode
        ;;
    backup)
        processingRequiredForBackupMode
        ;;
    finalize)
         processingRequiredForFinalizeMode
        ;;
    restore)
         processingRequiredForRestoreMode
        ;;
esac
```

Point

- A sample script that backs up the database cluster and tablespace directory to a specific directory is supplied to demonstrate how to write a copy command.

  The sample is stored in the directory below:

  ```
  /installDir/share/copy_command.archive.sh.sample
  ```

- A sample script that uses OPC (an advanced copy feature of Fujitsu Storage ETERNUS disk array) is supplied. Refer to "Appendix I Copy Command Samples that Use the Advanced Copy Feature of the ETERNUS Disk Array" for details.

  The samples cannot be used on SLES 12.

14.2 Backup Using the Copy Command

To perform backup using the copy command, in addition to performing the standard backup procedure, it is also necessary to create a copy command, and then execute the pgx_dmpall command specifying it. This section describes the procedure specific to using the copy command.

Preparing for backup

You must prepare for backup before actually starting the backup process.

Perform the following procedure:

1. Determine the database resources to be backed up

   Determine the database resources to be backed up using the copy command. The copy command can back up the following resources:

   - Database cluster
   - Tablespace

   To back up only some tablespaces, create a file listing them. This file is not necessary to back up all tablespaces.

   Example

   To back up only tablespaces tblspc1 and tblspc2

   ```
   tblspc1
   tblspc2
   ```

2. Prepare a backup area

   Prepare a backup area to save the database resources to be backed up, as determined in step 1.

3. Create the copy command

   Create the copy commands for backup and recovery. Refer to "14.4 Copy Command Interface" for details.

Performing backup

Execute the pgx_dmpall command with the -Y option specifying the full path of the copy command for backup created in step 3 of preparation for backup.

The example below backs up only some tablespaces, but not the database cluster, using the copy command.

Example

```
$ pgx_dmpall -D /database/inst1 -Y '/database/command/backup.sh'
  --exclude-copy-cluster -P '/database/command/tablespace_list.txt'
```

Point

- To exclude up the database cluster from backup using the copy command, specify the --exclude-copy-cluster option.
- To back up only some tablespaces using the copy command, use the -P option specifying the full path of the file created in step 1 of preparation for backup.

See

- Refer to "pgx_dmpall" in the Reference for information on the command.

Checking backup status

Use the pgx_rcvall command to check the backup status.

Execute the pgx_rcvall command with the -l option specified to output backup data information. If backup was performed using the copy command, the resources backed up using the copy command will also be output.

Example

```
$ pgx_rcvall -l -D /database/inst1
Date                Status   Dir                                  Resources backed up by the copy command
2020-05-01 13:30:40 COMPLETE /backup/inst1/2020-05-01_13-30-40 pg_data,dbspace,indexspace
```

14.3 Recovery Using the Copy Command

To perform recovery using the copy command, in addition to performing the standard recovery procedure, it is also necessary to create a copy command, and then execute the pgx_rcvall command specifying it. This section describes the procedure specific to using the copy command.

Determining the backup area of the latest backup

Check the backup information file to determine the backup area used for the latest backup, and confirm that it is in a recoverable state.

Execute the pgx_rcvall command with the --view-results-of-copying option to output the content of the backup information file.

Example

```
$ pgx_rcvall -D /database/inst1 --view-results-of-copying
```

Perform recovery

Execute the pgx_rcvall command with the -Y option specifying the full path of the copy command for recovery created in step 3 of the preparation for backup described in "14.2 Backup Using the Copy Command".

The example below recover only some tablespaces, but not the database cluster, using the copy command.

Example

```
$ pgx_rcvall -D /database/inst1 -B /backup/inst1 -Y '/database/command/recovery.sh'
```

Point

If the latest backup was performed using the copy command, the pgx_rcvall command automatically recognizes which database resources were backed up using the copy command, or whether resources were backed up to the backup data storage destination. Therefore, recovery can be performed by simply executing the pgx_rcvall command specifying the copy command for recovery.

See

Refer to "pgx_rcvall" in the Reference for information on the command.

14.4 Copy Command Interface

The following types of copy command are available:

- Copy command for backup
- Copy command for recovery

This appendix describes the interface of each copy command.

14.4.1 Copy Command for Backup

Feature

User exit (for the copy command) called from the pgx_dmpall command.

Format

The syntax for calling the copy command from the pgx_dmpall command is described below.

If the operation mode is "prepare"

```
copyCommandName prepare 'pathOfBackupInfoFile' 'pathOfBackupTargetListFile'
```

If the operation mode is "backup"

```
copyCommandName backup
```

If the operation mode is "finalize"

```
copyCommandName finalize 'pathOfBackupInfoFile'
```

Argument

- Operation mode

Mode	Description
prepare	Implements the preparation process for backing up using the copy command. Called before the PostgreSQL online backup mode is started.
backup	Implements the backup process. Called during the PostgreSQL online backup mode.
finalize	Implements the backup completion process. Called after the PostgreSQL online backup mode is completed.

Point

If using high-speed copy of the storage device (which performs high-speed retrieval of snapshots and copies data to different physical areas), it is possible to invoke the snapshot process in backup mode, and the copy process in finalize mode.

- Full path of the backup information file

  Full path of the backup information file of the latest backup, enclosed in single quotation marks. If a backup has not been performed, specify '-'.

- Full path of the backup target list file

  Full path of the file containing the resources to be backed up using the copy command, enclosed in single quotation marks. One of the following is described in each resource name.

Resource	Description
Database cluster	pg_data
Tablespace	Tablespace name

Example

To back up the database cluster and the tablespaces dbspace and indexspace using the copy command, the file should contain the following:

```
pg_data
dbspace
indexspace
```

Information

The encoding of resource names output to the backup target list file by the pgx_dmpall command is the encoding used when this command connects to the database with auto specified for the client_encoding parameter, and is dependent on the locale at the time of command execution.

The number of arguments vary depending on operation mode. The argument of each operation mode is as follows.

Operation mode	First argument	Second argument	Third argument
prepare	Operation mode	Backup information file path name	Backup target list file path name
backup		None	None
finalize		Backup information file path name	

Additionally, the access permissions for the backup information file and backup target list file are different depending on the operation mode. The access permissions of each operation mode are as follows.

Operation mode	Backup information file	Backup target list file
prepare	Can be viewed by the instance administrator only	Can be viewed by the instance administrator only
backup	-	-
finalize	Can be viewed and updated by the instance administrator only	-

Return value

Return value	Description
0	Normal end The pgx_dmpall command continues processing.
Other than 0	Abnormal end The pgx_dmpall command terminates in error.

Description

- The copy command operates with the privileges of the operating system user who executed the pgx_dmpall command. Therefore, grant copy command execution privileges to users who will execute the pgx_dmpall command. Additionally, have the copy command change users as necessary.

- To write to the backup information file, use a method such as redirection from the copy command.
- Because the copy command is called for each mode, implement all processing for each one.
- To copy multiple resources simultaneously, have the copy command copy them in parallel.

Note

- The backup information file and backup target list file cannot be deleted. Additionally, the privileges cannot be changed.
- Standard output and standard error output of the copy command are output to the terminal where the pgx_dmpall command was executed.
- If the copy command becomes unresponsive, the pgx_dmpall command will also become unresponsive. If the copy command is deemed to be unresponsive by the operating system, use an operating system command to forcibly stop it.
- Output the copy command execution trace and the result to a temporary file, so that if it terminates in error, the cause can be investigated at a later time.
- For prepare mode only, it is possible to use the PostgreSQL client application to access the database using the copy command. For all other modes, do not execute FUJITSU Enterprise Postgres commands or PostgreSQL applications.
- Enable the fsync parameter in postgresql.conf, because data on the shared memory buffer needs to have been already written to disk when backup starts.

14.4.2 Copy Command for Recovery

Feature

User exit (for the copy command) called from the pgx_rcvall command.

Format

The syntax for calling the copy command from the pgx_rcvall command is described below.

```
copyCommandName restore 'pathOfBackupInfoFile' 'pathOfBackupTargetListFile'
```

Argument

- Operation mode

Mode	Description
restore	Performs restore.

- Full path of the backup information file

  Full path of the backup information file, enclosed in single quotation marks.

- Full path of the backup target list file

  Full path of the file containing the resources to be restored using the copy command, enclosed in single quotation marks.

The access permissions for the backup information file and backup target list file are as below.

Backup information file	Backup target list file
Can be viewed by the instance administrator only	Can be viewed by the instance administrator only

Return value

Return value	Description
0	Normal end The pgx_rcvall command continues processing.
Other than 0	Abnormal end The pgx_rcvall command terminates in error.

Description

- The copy command operates with the privileges of the operating system user who executed the pgx_rcvall command. Therefore, grant copy command execution privileges to users who will execute the pgx_rcvall command. Additionally, have the copy command change users as necessary.
- The copy command is called once only in restore mode.
- To copy multiple resources simultaneously, have the copy command copy them in parallel.

Note

- The backup information file and backup target list file cannot be deleted. Additionally, the privileges cannot be changed.
- Standard output and standard error output of the copy command are output to the terminal where the pgx_rcvall command was executed.
- If the copy command becomes unresponsive, the pgx_rcvall command will also become unresponsive. If the status of the copy command is deemed to be unresponsive by the operating system, use an operating system command to forcibly stop it.
- Output the copy command execution trace and the result to a temporary file, so that if it terminates in error, the cause can be investigated at a later time.
- Do not execute FUJITSU Enterprise Postgres commands or PostgreSQL applications in the copy command.
- There may be files and directories not required for recovery using the archive log included in the backup, such as postmaster.pid, pg_wal/*subdirectory* and pg_replslot in the database cluster. If such unnecessary files and directories exist, have the copy command delete them after the restore.

Chapter 15 Actions when an Error Occurs

This chapter describes the actions to take when an error occurs in the database or an application, while FUJITSU Enterprise Postgres is operating.

Depending on the type of error, it may be necessary to recover the database cluster. The recovery process recovers the following resources:

- Data storage destination
- Transaction log storage destination (if the transaction log is stored in a separate disk from the data storage destination)
- Backup data storage destination

Note

Even if a disk is not defective, the same input-output error messages, as those generated when the disk is defective, may be output. The recovery actions differ for these error messages.

Check the status of the disk, and select one of the following actions:

- If the disk is defective

  Refer to "15.1 Recovering from Disk Failure (Hardware)", and take actions accordingly.

- If the disk is not defective

  Refer to "15.14 I/O Errors Other than Disk Failure", and take actions accordingly.

  A few examples of errors generated even if the disk is not defective include:

  - Network error with an external disk
  - Errors caused by power failure or mounting issues

Determining the cause of an error

If an error occurs, refer to the WebAdmin message and the server log, and determine the cause of the error.

See

Refer to "Configuring Parameters" in the Installation and Setup Guide for Server for information on server logs.

Approximate recovery time

The formulas for deriving the approximate recovery time of resources in each directory are given below.

If using the copy command with the pgx_rcvall command, the recovery time will depend on the implementation of the copy command.

- Data storage destination or transaction log storage destination

```
Recovery time = (usageByTheDataStorageDestination + usageByTheTransactionLogStorageDestination) /
diskWritePerformance x 1.5
```

  - *usageByTheDataStorageDestination*: Disk space used by the database cluster
  - *usageByTheTransactionLogStorageDestination*: Disk space used by the transaction log stored outside the database cluster
  - *diskWritePerformance*: Measured maximum data volume (bytes/second) that can be written per second in the system environment where the operation is performed
  - 1.5: Coefficient assuming the time excluding disk write, which is the most time-consuming step

- Backup data storage destination

```
Recovery time = usageByTheBackupDataStorageDestination / diskWritePerformance x 1.5
```

- *usageByTheBackupDataStorageDestination*: Disk space used by the backup data
- *diskWritePerformance*: Measured maximum data volume (bytes/second) that can be written per second in the system environment where the operation is performed
- 1.5: Coefficient assuming the time excluding disk write, which is the most time-consuming step

15.1 Recovering from Disk Failure (Hardware)

This section describes how to recover database clusters to a point immediately before failure, if a hardware failure occurs in the data storage disk or the backup data storage disk.

There are two methods of recovery:

- 15.1.1 Using WebAdmin
- 15.1.2 Using Server Command

Point

Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.1.1 Using WebAdmin

Recover the database cluster by following the appropriate recovery procedure below for the disk where the failure occurred.

Note

Recovery operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.

If disk failure occurs on a standby instance, it may be necessary to delete and re-create the instance.

Recovery operation can be performed on an instance that is part of a streaming replication cluster in "Master" mode. If a recovery operation is performed on a master instance, it will break the replication cluster and streaming replication will stop between the master instance and all its standby instances. In such an event, the standby instances can be promoted to standalone instances or can be deleted and re-created.

If failure occurred in the data storage disk or the transaction log storage disk

Follow the procedure below to recover the data storage disk or the transaction log storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance. WebAdmin automatically stops instances if recovery of the database cluster is performed without stopping the instance.

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a tablespace directory

   If a tablespace was defined after backup, create a directory for it.

5. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

6. Recover the database cluster

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message in the lower-right corner.

7. Run recovery

   In the [Restore Instance] dialog box, click [Yes].

   Instance restore is performed. An instance is automatically started when recovery is successful.

   Note

   WebAdmin does not support recovery of hash index. If you are using a hash index, then after recovery, execute the REINDEX command to rebuild it. Use of hash indexes is not recommended.

8. Resume applications

   Resume applications that are using the database.

Point

WebAdmin may be unable to detect disk errors, depending on how the error occurred.

If this happens, refer to "15.10.3 Other Errors" to perform recovery.

If failure occurred on the backup data storage disk

Follow the procedure below to recover the backup data storage disk.

1. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

2. Recover the backup data

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message.

3. Run backup

   Perform backup to enable recovery of the backup data. In the [Backup] dialog box, click [Yes]. The backup is performed. An instance is automatically started when backup is performed.

Point

If you click [Recheck the status], the resources in the data storage destination and the backup data storage destination are reconfirmed. As a result, the following occurs:

- If an error is not detected

  The status of the data storage destination and the backup data storage destination returns to normal, and it is possible to perform operations as usual.

- If an error is detected

  An error message is displayed in the message list again. Click [Solution], and resolve the problem by following the resolution for the cause of the error displayed in the dialog box.

15.1.2 Using Server Command

Recover the database cluster by following the appropriate recovery procedure below for the disk where the failure occurred.

If failure occurred on the data storage disk or the transaction log storage directory

Follow the procedure below to recover the data storage disk or the transaction log storage directory.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance, refer to "2.1.2 Using Server Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a storage destination directory

   - If failure occurred on the data storage disk
     Create a data storage destination directory. If a tablespace was defined, also create a directory for it.
   - If failure occurred on the translation log storage disk
     Create a transaction log storage destination directory.

   Example

   To create a data storage destination directory:

   ```
   $ mkdir /database/inst1
   $ chown fsepuser:fsepuser /database/inst1
   $ chmod 700 /database/inst1
   ```

   See

   Refer to "Preparing Directories to Deploy Resources" under "Setup" in the Installation and Setup Guide for Server for information on how to create a storage directory.

5. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

6. Recover the database cluster

   Recover the database cluster using the backup data.

   Specify the following in the pgx_rcvall command:

   - Specify the data storage location in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup data storage location in the -B option.

   Example

   ```
   > pgx_rcvall -D /database/inst1 -B /backup/inst1
   ```

   Note

   If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

   If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

   The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

```
FATAL: the database system is starting up
```

7. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

8. Resume applications

   Resume applications that are using the database.

If failure occurred on the backup data storage disk

The procedure for recovering the backup data storage disk is described below.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Confirm that transaction log mirroring has stopped	Y	N
2	Stop output of archive logs	Y	N
3	Stop applications	N	Y
4	Stop the instance	N	Y
5	Recover the failed disk	Y	Y
6	Create a backup data storage destination directory	Y	Y
7	Resume output of archive logs	Y	N
8	Resume transaction log mirroring	Y	N
9	Start the instance	N	Y
10	Run backup	Y	Y
11	Resume applications	N	Y

Y: Required
N: Not required

The procedure is as follows:

If an instance has not been stopped

1. Confirm that transaction log mirroring has stopped

   Use the following SQL function to confirm that transaction log mirroring has stopped.

```
 postgres=# SELECT pgx_is_wal_multiplexing_paused();
 pgx_is_wal_multiplexing_paused
--------------------
 t
(1 row)
```

   If transaction log mirroring has not stopped, then stop it using the following SQL function.

```
postgres=# SELECT pgx_pause_wal_multiplexing();
LOG:  multiplexing of transaction log files has been stopped
```

```
pgx_pause_wal_multiplexing
---------------------------

(1 row)
```

2. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage disk or the transaction log storage disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing archive_command

     Specify a command that will surely complete normally, such as "echo skipped archiving WAL file %f" or "/bin/true", so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reload the configuration file

     Execute the pg_ctl reload command or the pg_reload_conf SQL function to reload the configuration file.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a backup data storage destination

   Create a backup data storage destination.

   Example

   ```
   $ mkdir /database/inst1
   $ chown fsepuser:fsepuser /database/inst1
   $ chmod 700 /database/inst1
   ```

   Refer to "3.2.2 Using Server Commands" for information on how to create a backup data storage destination.

5. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

6. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

7. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D /database/inst1
   ```

If an instance has been stopped

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Server Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a backup data storage destination

   Create a backup data storage destination.

   Example

   ```
   # mkdir /backup/inst1
   # chown fsepuser:fsepuser /backup/inst1
   # chmod 700 /backup/inst1
   ```

   Refer to "3.2.2 Using Server Commands" for details.

5. Start the instance

   Start the instance. Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

6. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D /database/inst1
   ```

7. Resume applications

   Resume applications that are using the database.

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on pgx_resume_wal_multiplexing.

15.2 Recovering from Data Corruption

If data in a disk is logically corrupted and the database does not operate properly, you can recover the database cluster to its state at the time of backup.

There are two methods of recovery:

- 15.2.1 Using WebAdmin
- 15.2.2 Using the pgx_rcvall Command

Note

- Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.
- If you recover data to a point in the past, a new time series (database update history) will start from that recovery point. When recovery is complete, the recovery point is the latest point in the new time series. When you subsequently recover data to the latest state, the database update is re-executed on the new time series.

15.2.1 Using WebAdmin

If using WebAdmin, recover the data to the point immediately prior to data corruption by using the backup data.

Refer to "15.1.1 Using WebAdmin" for details.

15.2.2 Using the pgx_rcvall Command

Recover the database cluster by specifying in the pgx_rcvall command the date and time of the backup you want to read from. Then re-execute the transaction as required to recover the data.

Follow the procedure below to recover the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Server Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Confirm the backup date and time

   Execute the pgx_rcvall command to confirm the backup data saved in the backup data storage destination, and determine a date and time prior to data corruption.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.
   - The -l option displays the backup data information.

   Example

   ```
   > pgx_rcvall -D /database/inst1 -B /backup/inst1 -l
   Date                    Status          Dir
   2020-05-20 10:00:00     COMPLETE        /backup/inst1/2020-05-20_10-00-00
   ```

4. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

5. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.

- Specify the recovery date and time in the -e option.

Example

In the following examples, "May 20, 2020 10:00:00" is specified as the recovery time.

```
> pgx_rcvall -D /database/inst1 -B /backup/inst1 -e '2020-05-20 10:00:00'
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

```
FATAL:  the database system is starting up
```

6. Start the instance

   Start the instance. Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

   If necessary, re-execute transaction processing from the specified recovery time, and then resume database operations.

   Note

   The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

7. Resume applications

   Resume applications that are using the database.

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

15.3 Recovering from an Incorrect User Operation

This section describes how to recover database clusters when data has been corrupted due to erroneous user operations.

There are two methods of recovery:

- 15.3.1 Using WebAdmin
- 15.3.2 Using the pgx_rcvall Command

Note

- Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.
- If you recover data to a point in the past, a new time series (database update history) will start from that recovery point. When recovery is complete, the recovery point is the latest point in the new time series. When you subsequently recover data to the latest state, the database update is re-executed on the new time series.

- An effective restore point is one created on a time series for which you have made a backup. That is, if you recover data to a point in the past, you cannot use any restore points set after that recovery point. Therefore, once you manage to recover your target past data, make a backup.

15.3.1 Using WebAdmin

You can use WebAdmin to recover data to a backup point.

Note

Recovery operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.

If disk failure occurs on a standby instance, it may be necessary to delete and re-create the instance.

Recovery operation can be performed on an instance that is part of a streaming replication cluster in "Master" mode. If a recovery operation is performed on a master instance, it will break the replication cluster and streaming replication will stop between the master instance and all its standby instances. In such an event, the standby instances can be promoted to standalone instances or can be deleted and re-created.

Follow the procedure below to recover the data in the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance.

3. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

4. Recover the database cluster

   Log in to WebAdmin, and in the [Instances] tab, select the instance to be recovered and click .

5. Recover to the backup point

   In the [Restore Instance] dialog box, click [Yes].

   Recovery is performed. An instance is automatically started when recovery is successful.

   ### Note

   WebAdmin cannot accurately recover a hash index. If you are using a hash index, then after recovery, execute the REINDEX command for the appropriate index.

6. Resume database operations

   If necessary, re-execute transaction processing from the backup point to when an erroneous operation was performed, and then resume database operations.

15.3.2 Using the pgx_rcvall Command

The pgx_rcvall command recovers database clusters to the restore point created with the server command. Refer to "Setting a restore point" in "3.2.2 Using Server Commands" for information on how to create a restore point.

Follow the procedure below to recover the data in the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Server Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Confirm the restore point

   Execute the pgx_rcvall command to confirm the backup data saved in the backup data storage destination, and use a restore point recorded in an arbitrary file, as explained in "3.2.2 Using Server Commands", to determine a restore point prior to the erroneous operation.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup data storage destination in the -B option.
   - The -l option displays the backup data information.

   Example

   ```
   > pgx_rcvall -D /database/inst1 -B /backup/inst1 -l
   Date                    Status          Dir
   2020-05-01 10:00:00     COMPLETE        /backup/inst1/2020-05-01_10-00-00
   ```

4. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

5. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup data storage destination in the -B option.
   - The -n option recovers the data to the specified restore point.

   Example

   The following example executes the pgx_rcvall command with the restore point "batch_20200503_1".

```
> pgx_rcvall -D /database/inst1 -B /backup/inst1 -n batch_20200503_1
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall (therefore the user does not need not be concerned).

```
FATAL: the database system is starting up
```

6. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

   Note

   The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

7. Restart operation of the database

   If necessary, re-execute transaction processing from the specified recovery time to the point when an erroneous operation was performed, and then resume database operations.

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

15.4 Actions in Response to an Application Error

If there is a connection from a client that has been in the waiting state for an extended period, you can minimize performance degradation of the database by closing the problematic connection.

The following methods are available for identifying a connection to be closed:

- view(pg_stat_activity) (refer to "15.4.1 When using the view (pg_stat_activity)")
- ps command (refer to "15.4.2 Using the ps Command")
- pgAdmin (refer to "15.4.3 Using pgAdmin")

Use the system management function (pg_terminate_backend) to disconnect connections.

15.4.1 When using the view (pg_stat_activity)

When using the view (pg_stat_activity), follow the procedure below to close a connection.

1. Use psql command to connect to the postgres database.

```
> psql postgres
psql (13.3)
Type "help" for help.
```

2. Close connections from clients that have been in the waiting state for an extended period.

   Use pg_terminate_backend() to close connections that have been trying to connect for an extended period.

   However, when considering continued compatibility of applications, do not reference or use system catalogs and functions directly in SQL statements. Refer to " Notes on Application Compatibility" in the Application Development Guide for details.

   Example

   The following example closes connections where the client has been in the waiting state for at least 60 minutes.

```
select pid,usename,application_name,client_hostname,pg_terminate_backend(pid) from
pg_stat_activity where state='idle in transaction' and current_timestamp > cast(query_start +
interval '60 minutes' as timestamp);
-[ RECORD 1 ]--------+--------------
pid                  | 4684
username             | fsepuser
application_name     | apl1
```

```
client_addr          | 192.11.11.1
pg_terminate_backend | t
```

See

- Refer to "System Administration Functions" under "The SQL Language" in the PostgreSQL Documentation for information on pg_terminate_backend.
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on how to maintain application compatibility.

15.4.2 Using the ps Command

Follow the procedure below to close a connection using a standard Unix tool (ps command).

1. Execute the ps command.
   Note that "<*x*>" indicates the product version.

```
> ps axwfo user,pid,ppid,tty,command | grep postgres
fsepuser 19174 18027 pts/1                \_ grep postgres
fsepuser 20517     1 ?      /opt/fsepv<x>server64/bin/postgres -D /disk01/data
fsepuser 20518 20517 ?       \_ postgres: logger
fsepuser 20520 20517 ?       \_ postgres: checkpointer
fsepuser 20521 20517 ?       \_ postgres: background writer
fsepuser 20522 20517 ?       \_ postgres: walwriter
fsepuser 20523 20517 ?       \_ postgres: autovacuum launcher
fsepuser 20524 20517 ?       \_ postgres: archiver
fsepuser 20525 20517 ?       \_ postgres: stats collector
fsepuser 18673 20517 ?       \_ postgres: fsepuser postgres 192.168.100.1(49448) idle
fsepuser 16643 20517 ?       \_ postgres: fsepuser db01 192.168.100.11(49449) UPDATE waiting
fsepuser 16644 20517 ?       \_ postgres: fsepuser db01 192.168.100.12(49450) idle in transaction
```

   Process ID 16643 may be a connection that was established a considerable time ago by the UPDATE statement, or a connection that has occupied resources (waiting).

2. Close connections from clients that have been in the waiting state for an extended period.

   Use pg_terminate_backend() to close the connection with the process ID identified in step 1 above.

   The example below disconnects the process with ID 16643.

   However, when considering continued compatibility of applications, do not reference or use system catalogs and functions directly in SQL statements.

```
postgres=# SELECT pg_terminate_backend (16643);
 pg_terminate_backend
----------------------
t
(1 row)
```

See

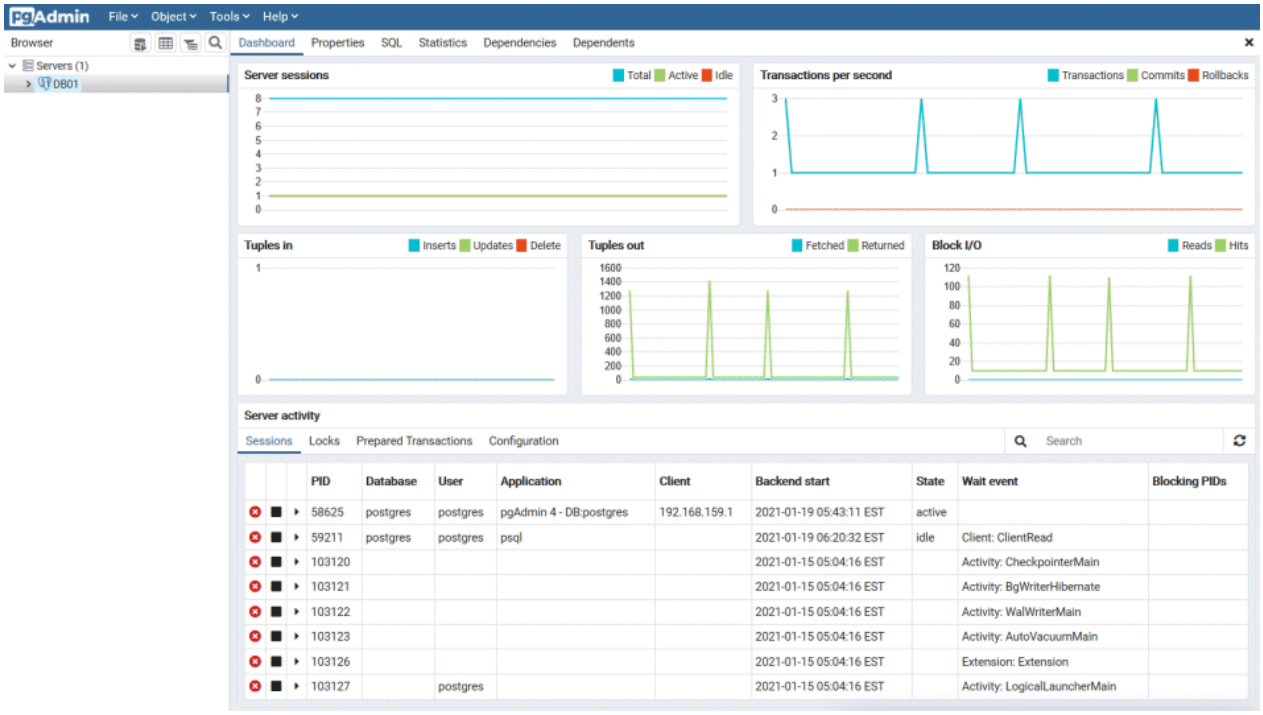
- Refer to "System Administration Functions" under "The SQL Language" in the PostgreSQL Documentation for information on pg_terminate_backend.
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on how to maintain application compatibility.

15.4.3 Using pgAdmin

If using pgAdmin, follow the procedure below to close connections.

1. In the [Browser] pane, click the relevant database server.
2. Close the client connections that have been in a wait state for an extended period.

   Click the [Dashboard] tab. In the [Server activity] section, select the connections that have been in an "idle" or "idle in transaction" state for an extended period. For each of these connections, click to close the session.



15.5 Actions in Response to an Access Error

If access is denied, grant privileges allowing the instance administrator to operate the following directories, and then re-execute the operation. Also, refer to the event log and the server log, and confirm that the file system has not been mounted as read-only due to a disk error. If the file system has been mounted as read-only, mount it properly and then re-execute the operation.

- Data storage destination
- Tablespace storage destination
- Transaction log storage destination
- Backup data storage destination

See

Refer to "Preparing Directories to Deploy Resources" under "Setup" in the Installation and Setup Guide for Server for information on the privileges required for the directory.

15.6 Actions in Response to Insufficient Space on the Data Storage Destination

If the data storage destination runs out of space, check if the disk contains any unnecessary files and delete them so that operations can continue.

If deleting unnecessary files does not solve the problem, you must migrate data to a disk with larger capacity.

There are two methods of migrating data:

- 15.6.1 Using a Tablespace
- 15.6.2 Replacing the Disk with a Larger Capacity Disk

15.6.1 Using a Tablespace

FUJITSU Enterprise Postgres enables you to use a tablespace to change the storage destination of database objects, such as tables and indexes, to a different disk.

The procedure is as follows:

1. Create a tablespace

   Use the CREATE TABLESPACE command to create a new tablespace in the prepared disk.

2. Modify the tablespace

   Use the ALTER TABLE command to modify tables for the newly defined tablespace.

See

Refer to "SQL Commands" under "Reference" in the PostgreSQL Documentation for information on the CREATE TABLESPACE command and ALTER TABLE command.

15.6.2 Replacing the Disk with a Larger Capacity Disk

Before replacing the disk with a larger capacity disk, migrate resources at the data storage destination using the backup and recovery features.

There are two methods of performing backup and recovery:

- 15.6.2.1 Using WebAdmin
- 15.6.2.2 Using Server Commands

The following sections describe procedures that use each of these methods to replace the disk and migrate resources at the data storage destination.

Note

- Before replacing the disk, stop applications and instances that are using the database.
- It is recommended that you back up the database cluster following recovery. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.6.2.1 Using WebAdmin

Follow the procedure below to replace the disk and migrate resources at the data storage destination by using WebAdmin.

1. Back up files

   If the disk at the data storage destination contains any required files, back up the files. It is not necessary to back up the data storage destination.

2. Stop applications

   Stop applications that are using the database.

3. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.1 Using WebAdmin" for details.

4. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Recover the database cluster

   Log in to WebAdmin, and perform recovery operations. Refer to steps 4 ("Create a tablespace directory ") to 7 ("Run recovery") under "If failure occurred in the data storage disk or the transaction log storage disk" in "15.1.1 Using WebAdmin" for information on the procedure. An instance is automatically started when recovery is successful.

7. Resume applications

   Resume applications that are using the database.

8. Restore the files

   Restore the files backed up in step 1.

15.6.2.2 Using Server Commands

Follow the procedure below to replace the disk and migrate resources at the data storage destination by using server commands.

1. Back up files

   If the disk at the data storage destination contains any required files, back up the files. It is not necessary to back up the data storage destination.

2. Stop applications

   Stop applications that are using the database.

3. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.2 Using Server Commands" for details.

4. Stop the instance

   After backup is complete, stop the instance. Refer to "2.1.2 Using Server Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a data storage destination

   Create a data storage destination. If a tablespace was defined, also create a directory for it.

   Example

   ```
   $ mkdir /database/inst1
   $ chown fsepuser:fsepuser /database/inst1
   $ chmod 700 /database/inst1
   ```

7. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

8. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.

   Example

```
> pgx_rcvall -D /database/inst1 -B /backup/inst1
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall (therefore the user does not need not be concerned).

```
FATAL: the database system is starting up
```

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

9. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

   Note

   The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the pgx_rcvall command to end and then execute the REINDEX command for the appropriate index.

10. Resume applications

    Resume applications that are using the database.

11. Restore files

    Restore the files backed up in step 1.

15.7 Actions in Response to Insufficient Space on the Backup Data Storage Destination

If space runs out on the backup data storage destination, check if the disk contains any unnecessary files and delete them, and then make a backup as required.

If deleting unnecessary files does not solve the problem, take the following action:

- 15.7.1 Temporarily Saving Backup Data
- 15.7.2 Replacing the Disk with a Larger Capacity Disk

15.7.1 Temporarily Saving Backup Data

This method involves temporarily moving backup data to a different directory, saving it there, and securing disk space on the backup data storage destination so that a backup can be made normally.

Use this method if you need time to prepare a larger capacity disk.

If space runs out on the backup data storage destination, archive logs can no longer be stored in the backup data storage destination. As a result, transaction logs continue to accumulate in the data storage destination or the transaction log storage destination.

If action is not taken soon, the transaction log storage destination will become full, and operations may not be able to continue.

To prevent this, secure space in the backup data storage destination, so that archive logs can be stored.

There are two methods of taking action:

- 15.7.1.1 Using WebAdmin
- 15.7.1.2 Using Server Commands

15.7.1.1 Using WebAdmin

Follow the procedure below to recover the backup data storage disk.

1. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform recovery. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

   ```
   > mkdir /mnt/usb/backup/
   > mv /backup/inst1/* /mnt/usb/backup/
   ```

2. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.1 Using WebAdmin" for details.

3. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in /mnt/usb.

   Example

   ```
   > rm -rf /mnt/usb/backup
   ```

15.7.1.2 Using Server Commands

The following describes the procedure for recovering the backup storage disk.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Stop transaction log mirroring	Y	N
2	Stop output of archive logs	Y	N
3	Stop applications	N	Y
4	Stop the instance	N	Y
5	Temporarily save backup data	Y	Y
6	Resume output of archive logs	Y	N
7	Resume transaction log mirroring	Y	N

No	Step	Instance stopped	
		No	Yes
8	Start an instance	N	Y
9	Run backup	Y	Y
10	Resume applications	N	Y
11	Delete temporarily saved backup data	Y	Y

Y: Required
N: Not required

The procedure is as follows:

Performing recovery while the instance is active

1. Stop transaction log mirroring

   Stop transaction log mirroring.

   ```
   postgres=# SELECT pgx_pause_wal_multiplexing();
   LOG:  multiplexing of transaction log files has been stopped
   pgx_pause_wal_multiplexing
   ---------------------------

   (1 row)
   ```

2. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage disk or the transaction log storage disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing the archive_command parameter

     Specify a command that will surely complete normally, such as "echo skipped archiving WAL file %f" or "/bin/true", so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reloading the configuration file

     Run the pg_ctl reload command or the pg_reload_conf SQL function.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

3. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

   ```
   > mkdir /mnt/usb/backup/
   > mv /backup/inst1/* /mnt/usb/backup/
   ```

4. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

5. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

6. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following option in the pgx_dmpall command:

   - Specify the directory of the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

     Example

     ```
     > pgx_dmpall -D /database/inst1
     ```

7. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in /mnt/usb.

   Example

   ```
   > rm -rf /mnt/usb/backup
   ```

If an instance has been stopped

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Server Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform recovery. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

   ```
   > mkdir /mnt/usb/backup/
   > mv /backup/inst1/* /mnt/usb/backup/
   ```

4. Start the instance

   Start the instance. Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

5. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

     Example

```
> pgx_dmpall -D /database/inst1
```

6. Resume applications

   Resume applications that are using the database.

7. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in /mnt/usb.

   Example

```
> rm -rf /mnt/usb/backup
```

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on the pgx_is_wal_multiplexing_paused and pgx_resume_wal_multiplexing.

15.7.2 Replacing the Disk with a Larger Capacity Disk

This method involves replacing the disk at the backup data storage destination with a larger capacity disk, so that it does not run out of free space again. After replacing the disk, back up data to obtain a proper backup.

There are two methods of performing backup:

- 15.7.2.1 Using WebAdmin
- 15.7.2.2 Using Server Commands

Note

Before replacing the disk, stop applications that are using the database.

15.7.2.1 Using WebAdmin

Follow the procedure below to recover the backup storage disk.

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

```
> mkdir /mnt/usb/backup/
> mv /backup/inst1/* /mnt/usb/backup/
```

3. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

4. Run backup

   Log in to WebAdmin, and perform recovery operations. Refer to steps 2 ("Recover the backup data") and 3 ("Run backup") under "If failure occurred on the backup storage disk" in "15.1.1 Using WebAdmin".

5. Restore files

   Restore the files backed up in step 1.

6. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in /mnt/usb.

   Example

```
> rm -rf /mnt/usb/backup
```

15.7.2.2 Using Server Commands

The procedure for recovering the backup data storage disk is described below.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Back up files	Y	Y
2	Temporarily save backup data	Y	Y
3	Confirm that transaction log mirroring has stopped	Y	N
4	Stop output of archive logs	Y	N
5	Stop applications	N	Y
6	Stop the instance	N	Y
7	Replace with a larger capacity disk	Y	Y
8	Create a backup storage directory	Y	Y
9	Resume output of archive logs	Y	N
10	Resume transaction log mirroring	Y	N
11	Start the instance	N	Y
12	Run backup	Y	Y
13	Resume applications	N	Y
14	Restore files	Y	Y
15	Delete temporarily saved backup data	Y	Y

Y: Required
N: Not required

The procedure is as follows:

If an instance has not been stopped

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

   ```
   > mkdir /mnt/usb/backup/
   > mv /backup/inst1/* /mnt/usb/backup/
   ```

3. Confirm that transaction log mirroring has stopped

   Use the following SQL function to confirm that transaction log mirroring has stopped.

   ```
    postgres=# SELECT pgx_is_wal_multiplexing_paused();
    pgx_is_wal_multiplexing_paused
   -------------------
    t
   (1 row)
   ```

   If transaction log mirroring has not stopped, then stop it using the following SQL function.

   ```
   postgres=# SELECT pgx_pause_wal_multiplexing();
   LOG:  multiplexing of transaction log files has been stopped
   pgx_pause_wal_multiplexing
   ---------------------------

   (1 row)
   ```

4. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage destination disk or the transaction log storage destination disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing the archive_command parameter

     Specify a command that will surely complete normally, such as "echo skipped archiving WAL file %f" or "/bin/true", so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reloading the configuration file

     Run the pg_ctl reload command or the pg_reload_conf SQL function.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a backup data storage destination

   Create a backup data storage destination.

Example

```
# mkdir /backup/inst1
# chown fsepuser:fsepuser /backup/inst1
# chmod 700 /backup/inst1
```

Refer to "3.2.2 Using Server Commands" for details.

7. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

8. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

9. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D /database/inst1
   ```

10. Restore files

    Restore the files backed up in step 1.

11. Delete temporarily saved backup data

    If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

    The following example deletes backup data that was temporarily saved in /mnt/usb.

    Example

    ```
    > rm -rf /mnt/usb/backup
    ```

If an instance has been stopped

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (/backup/inst1) under /mnt/usb/backup.

   Example

   ```
   > mkdir /mnt/usb/backup/
   > mv /backup/inst1/* /mnt/usb/backup/
   ```

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Server Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a backup data storage destination

   Create a backup data storage destination.

   Example

   ```
   # mkdir /backup/inst1
   # chown fsepuser:fsepuser /backup/inst1
   # chmod 700 /backup/inst1
   ```

   Refer to "3.2.2 Using Server Commands" for details.

7. Start the instance

   Start the instance. Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

8. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D /database/inst1
   ```

9. Resume applications

   Resume applications that are using the database.

10. Restore files

    Restore the files backed up in step 1.

11. Delete temporarily saved backup data

    If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

    The following example deletes backup data that was temporarily saved in /mnt/usb.

    Example

    ```
    > rm -rf /mnt/usb/backup
    ```

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on the pgx_is_wal_multiplexing_paused and pgx_resume_wal_multiplexing.

15.8 Actions in Response to Insufficient Space on the Transaction Log Storage Destination

If the transaction log storage destination runs out of space, check if the disk contains any unnecessary files and delete them so that operations can continue.

If deleting unnecessary files does not solve the problem, you must migrate data to a disk with larger capacity.

15.8.1 Replacing the Disk with a Larger Capacity Disk

Before replacing the disk with a larger capacity disk, migrate resources at the transaction log storage destination using the backup and recovery features.

There are two methods of performing backup and recovery:

- 15.8.1.1 Using WebAdmin
- 15.8.1.2 Using Server Commands

The following sections describe procedures that use each of these methods to replace the disk and migrate resources at the transaction log storage destination.

Note

- Before replacing the disk, stop applications that are using the database.
- It is recommended that you back up the database cluster following recovery. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.8.1.1 Using WebAdmin

Follow the procedure below to replace the disk and migrate resources at the transaction log storage destination by using WebAdmin.

1. Back up files

   If the disk at the transaction log storage destination contains any required files, back up the files. It is not necessary to back up the transaction log storage destination.

2. Back up the database cluster

   Back up the latest data storage destination resources and transaction log storage destination resources (refer to "3.2.1 Using WebAdmin" for details).

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance. WebAdmin automatically stops instances if recovery of the database cluster is performed without stopping the instance.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a tablespace directory

   If a tablespace was defined after backing up, create a directory for it.

7. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

8. Recover the database cluster

   Log in to WebAdmin, and perform recovery operations. Refer to steps 4 ("Create a tablespace directory ") to 7 ("Run Recovery") under " If failure occurred in the data storage disk or the transaction log storage disk " in "15.1.1 Using WebAdmin" for information on the procedure. An instance is automatically started when recovery is successful.

9. Resume applications

   Resume applications that are using the database.

10. Restore files

    Restore the files backed up in step 1.

15.8.1.2 Using Server Commands

Follow the procedure below to replace the disk and migrate resources at the transaction log storage destination by using server commands.

1. Back up files

   If the disk at the transaction log storage destination contains any required files, back up the files. It is not necessary to back up the transaction log storage destination.

2. Back up the database cluster

   Use server commands to back up the latest data storage destination resources and transaction log storage destination resources. Refer to "3.2.2 Using Server Commands" for information on how to perform backup.

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   After backup is complete, stop the instance. Refer to "2.1.2 Using Server Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a transaction log storage destination

   Create a transaction log storage destination. If a tablespace was defined, also create a directory for it.

   Example

   ```
   # mkdir /tranlog/inst1
   # chown fsepuser:fsepuser /tranlog/inst1
   # chmod 700 /tranlog/inst1
   ```

7. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

8. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.

   Example

   ```
   > pgx_rcvall -D /database/inst1 -B /backup/inst1
   ```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

```
FATAL:  the database system is starting up
```

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

9. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Server Commands" for information on how to start an instance.

Note

The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

10. Resume applications

    Resume applications that are using the database.

11. Restore files

    Restore the files backed up in step 1.

15.9 Errors in More Than One Storage Disk

If an error occurs in the storage destination disks or resources are corrupted, determine the cause of the error from system logs and server logs and remove the cause.

If errors occur in either of the following combinations, you cannot recover the database.

Recreate the instance, and rebuild the runtime environment.

Data storage disk	Transaction log storage disk	Backup data storage disk
Error	-	Error
-	Error	Error

See

Refer to "Setup" in the Installation and Setup Guide for Server for information on how to create an instance and build the runtime environment.

15.10 Actions in Response to Instance Startup Failure

If an instance fails to start, refer to the system log and the server log, and determine the cause of the failure.

If using WebAdmin, remove the cause of the error. Then, click [Solution] and [Recheck the status] and confirm that the instance is in the normal state.

The following sections describe common causes of errors and the actions to take.

15.10.1 Errors in the Configuration File

If you have directly edited the configuration file using a text editor or changed the settings using WebAdmin, refer to the system log and the server log, confirm that no messages relating to the files below have been output.

- postgresql.conf
- pg_hba.conf

See

Refer to the following for information on the parameters in the configuration file:

- "Configuring Parameters" in the Installation and Setup Guide for Server
- "Appendix A Parameters"
- "Server Configuration" and "Client Authentication" under "Server Administration" in the PostgreSQL Documentation

15.10.2 Errors Caused by Power Failure or Mounting Issues

If mounting is cancelled after restarting the server, for example, because the disk device for each storage destination disk was not turned on, or because automatic mounting has not been set, then starting an instance will fail.

Refer to "15.14.2 Errors Caused by Power Failure or Mounting Issues", and take actions accordingly.

15.10.3 Other Errors

This section describes the recovery procedure to be used if you cannot take any action or the instance cannot start even after you have referred to the system log and the server log.

There are two methods of recovery:

- 15.10.3.1 Using WebAdmin
- 15.10.3.2 Using Server Commands

Note that recovery will not be possible if there is an error at the backup data storage destination. If the problem cannot be resolved, contact Fujitsu technical support.

15.10.3.1 Using WebAdmin

Follow the procedure below to perform recovery.

1. Delete the data storage destination directory and the transaction log storage destination directory

   Back up the data storage destination directory and the transaction log storage destination directory before deleting them.

2. Reconfirm the status

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message.

   Click [Recheck the status] to reconfirm the storage destination resources.

3. Run recovery

   Restore the database cluster after WebAdmin detects an error.

Refer to "15.2.1 Using WebAdmin" for details.

15.10.3.2 Using Server Commands

Follow the procedure below to recover the database.

1. Delete the data storage destination directory and the transaction log storage destination directory

   Save the data storage destination directory and the transaction log storage destination directory, and then delete them.

2. Execute recovery

   Use the pgx_rcvall command to recover the database cluster.

   Refer to "15.2.2 Using the pgx_rcvall Command" for details.

15.11 Actions in Response to Failure to Stop an Instance

If an instance fails to stop, refer to the system log and the server log, and determine the cause of the failure.

If the instance cannot stop despite taking action, perform the following operation to stop the instance.

There are two methods of recovery:

- 15.11.1 Using WebAdmin
- 15.11.2 Using Server Commands

15.11.1 Using WebAdmin

In the [Instances] tab, click and select the Fast stop mode or the Immediate stop mode to stop the instance. Forcibly terminate the server process from WebAdmin if the instance cannot be stopped.

Refer to "2.1.1 Using WebAdmin" for information on the stop modes.

15.11.2 Using Server Commands

There are three methods:

- Stopping the Instance Using the Fast Mode

  If backup is in progress, then terminate it, roll back all executing transactions, forcibly close client connections, and then stop the instance.

- Stopping the Instance Using the Immediate Mode

  Forcibly terminate the instance immediately. A crash recovery is run when the instance is restarted.

- Forcibly Stopping the Server Process

  Reliably stops the server process when the other methods are unsuccessful.

15.11.2.1 Stopping the Instance Using the Fast Mode

Specify "-m fast" in the pg_ctl command to stop the instance.

If the instance fails to stop when you use this method, stop the instance as described in "15.11.2.2 Stopping the Instance Using the Immediate Mode" or "15.11.2.3 Forcibly Stopping the Server Process".

Example

```
> pg_ctl stop -D /database/inst1 -m fast
```

15.11.2.2 Stopping the Instance Using the Immediate Mode

Specify "-m immediate " in the pg_ctl command to stop the instance.

If the instance fails to stop when you use this method, stop the instance as described in "15.11.2.3 Forcibly Stopping the Server Process".

Example

```
> pg_ctl stop -D /database/inst1 -m immediate
```

15.11.2.3 Forcibly Stopping the Server Process

If both the Fast mode and the Immediate mode fail to stop the instance, use the kill command or the kill parameter of the pg_ctl command to forcibly stop the server process.

The procedure is as follows:

1. Execute the ps command
   Note that "<*x*>" indicates the product version.

   ```
   > ps axwfo user,pid,ppid,tty,command | grep postgres
   fsepuser 19174 18027 pts/1                \_ grep postgres
   fsepuser 20517     1 ?        /opt/fsepv<x>server64/bin/postgres -D /database/inst1
   fsepuser 20518 20517 ?         \_ postgres: logger
   fsepuser 20520 20517 ?         \_ postgres: checkpointer
   fsepuser 20521 20517 ?         \_ postgres: background writer
   fsepuser 20522 20517 ?         \_ postgres: walwriter
   fsepuser 20523 20517 ?         \_ postgres: autovacuum launcher
   fsepuser 20524 20517 ?         \_ postgres: archiver
   fsepuser 20525 20517 ?         \_ postgres: stats collector
   ```

   The process ID (20517) indicates the server process.

2. Forcibly stop the server process

   As instance manager, forcibly stop the server process.

   Using the pg_ctl command

   ```
   > pg_ctl kill SIGQUIT 20517
   ```

   Using the kill command

   ```
   > kill -s SIGQUIT 20517
   ```

15.12 Actions in Response to Failure to Create a Streaming Replication Standby Instance

When creating a streaming replication standby instance using WebAdmin, if the instance creation fails, refer to the system log and the server log, and determine the cause of the failure.

When an error occurs in the creation of the standby instance using WebAdmin, it is unlikely that the partially created standby instance can be resumed to complete the operation.

In such a scenario, fix the cause of the error, delete the partially created standby instance, and then create a new standby instance. This recommendation is based on the following assumptions:

- As the instance is yet to be created completely, there are no applications connecting to the database.
- The standby instance is in error state and is not running.
- There are no backups for the standby instance and as a result, it cannot be recovered.

See

Refer to "Deleting Instances" in the Installation and Setup Guide for details on how to delete an instance.

15.13 Actions in Response to Error in a Distributed Transaction

If a system failure (such as server failure) occurs in an application that uses distributed transactions (such as .NET TransactionScope), then transactions may be changed to the in-doubt state.

At that point, resources accessed by the transaction will be locked, and rendered unusable by other transactions.

The following describes how to check for in-doubt transactions, and how to resolve them.

How to check for in-doubt transactions

The following shows how to check for them:

If the server fails

1. An in-doubt transaction will have occurred if a message similar to the one below is output to the log when the server is restarted.

   Example

   ```
   LOG: Restoring prepared transaction 2103.
   ```

2. Refer to system view pg_prepared_xacts to obtain information about the prepared transaction.

   If the transaction identifier of the prepared transaction in the list (in the transaction column of pg_prepared_xacts) is the same as the identifier of the in-doubt transaction obtained from the log output when the server was restarted, then that row is the information about the in-doubt transaction.

   Example

   ```
   postgres=# select * from pg_prepared_xacts;
    transaction |   gid     |   prepared |  owner   | database
   -------------+-----------+------------+----------+----------
   2103 | 374cc221-f6dc-4b73-9d62-d4fec9b430cd | 2020-05-06 16:28:48.471+08 | postgres |
   postgres (1 row)
   ```

   Information about the in-doubt transaction is output to the row with the transaction ID 2103 in the transaction column.

If the client fails

If there are no clients connected and there is a prepared transaction in pg_prepared_xacts, then you can determine that the transaction is in the in-doubt state.

If at least one client is connected and there is a prepared transaction in pg_prepared_xacts, you cannot determine whether there is a transaction in the in-doubt state. In this case, use the following query to determine the in-doubt transaction from the acquired database name, user name, the time PREPARE TRANSACTION was executed, and the information about the table name accessed.

```
select gid,x.database,owner,prepared,l.relation::regclass as relation from pg_prepared_xacts x
left join pg_locks l on l.virtualtransaction = '-1/'||x.transaction and l.locktype='relation';
```

If it still cannot be determined from this information, wait a few moments and then check pg_prepared_xacts again.

If there is a transaction that has continued since the last time you checked, then it is likely that it is the one in the in-doubt state.

Point

As you can see from the explanations in this section, there is no one way to definitively determine in-doubt transactions.

Consider collecting other supplementary information (for example, logging on the client) or performing other operations (for example, allocating database users per job).

How to resolve in-doubt transactions

From the system view pg_prepared_xacts mentioned above, obtain the global transaction identifier (in the gid column of pg_prepared_xacts) for the in-doubt transaction, and issue either a ROLLBACK PREPARED statement or COMMIT PREPARED statement to resolve the in-doubt transaction.

Example

- Rolling back in-doubt transactions

```
postgres=# rollback prepared '374cc221-f6dc-4b73-9d62-d4fec9b430cd';
ROLLBACK PREPARED
```

- Committing in-doubt transactions

```
postgres=# commit prepared '374cc221-f6dc-4b73-9d62-d4fec9b430cd';
COMMIT PREPARED
```

15.14 I/O Errors Other than Disk Failure

Even if a disk is not defective, the same input-output error messages, as those generated when the disk is defective, may be output.

A few examples of such errors are given below. The appropriate action for each error is explained respectively.

- 15.14.1 Network Error with an External Disk
- 15.14.2 Errors Caused by Power Failure or Mounting Issues

15.14.1 Network Error with an External Disk

This is an error that occurs in the network path to/from an external disk.

Determine the cause of the error by checking the information in the system log and the server log, the disk access LED, network wiring, and network card status. Take appropriate action to remove the cause of the error, for example, replace problematic devices.

15.14.2 Errors Caused by Power Failure or Mounting Issues

These are errors that occur when the disk device is not turned on, automatic mounting of the disk was not set, or mounting was accidentally cancelled.

In this case, check the information in the system log and the server log, the disk access LED, and whether the disk is mounted correctly. If problems are detected, take appropriate action.

If mounting has been cancelled, it is possible that mounting was accidentally cancelled, or automatic mounting at the time of starting the operating system is not set. In this case, set the mounting to be performed automatically.

15.15 Anomaly Detection and Resolution

The following operations performed via the command line interface will result in an anomaly in WebAdmin:

- Changes to the port and backup_destination parameters in postgresql.conf
- Changes to Mirroring Controller configuration of cluster replication added via WebAdmin

This section describes when WebAdmin checks for such anomalies, and what takes place when an anomaly is detected.

15.15.1 Port Number and Backup Storage Path Anomalies

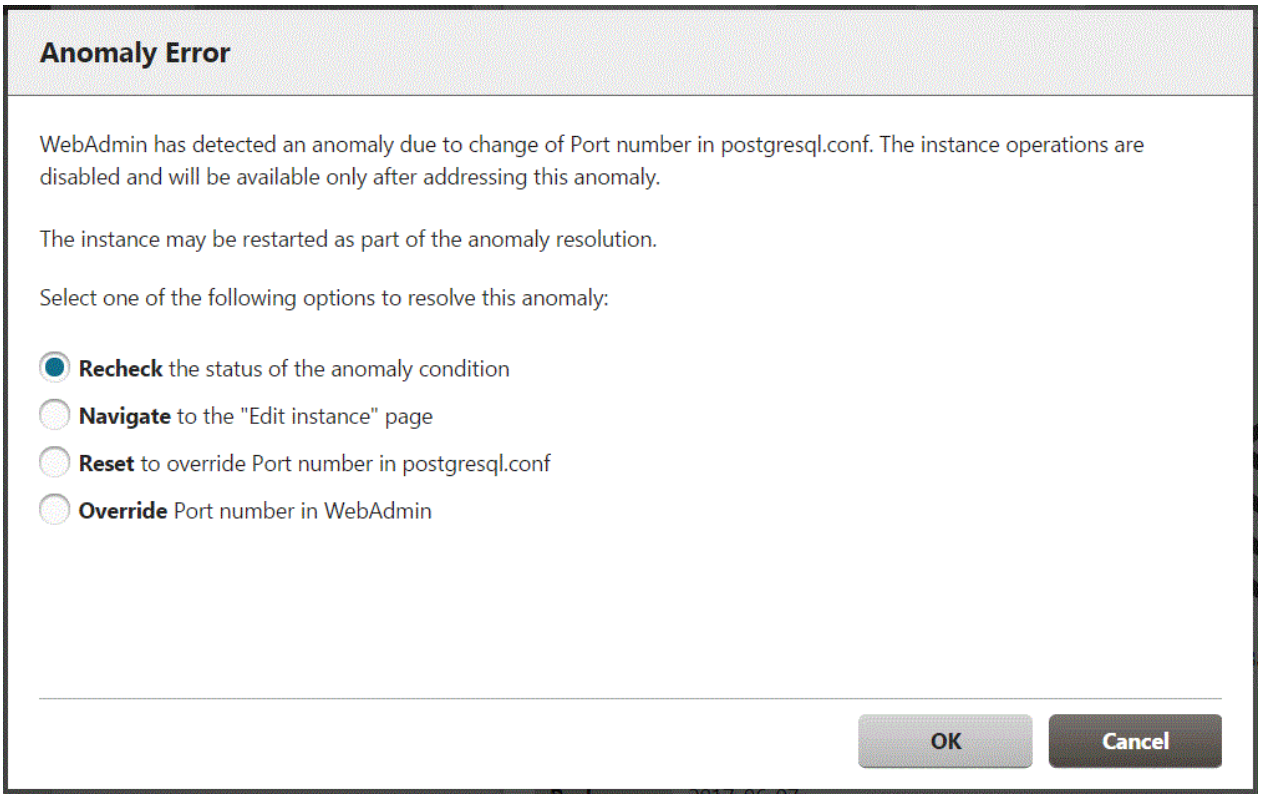
An anomaly occurs when the value of [Port number] and/or [Backup storage path] in WebAdmin is different from the value of its corresponding parameter in postgresql.conf - port and backup_destination, respectively.

WebAdmin checks for anomalies when an instance is selected for viewing or any instance operation is performed. Anomalies will be identified for the selected instance only.

The following occurs when an anomaly is detected in port number and/or backup storage path:

- All instance operation buttons are disabled, except for "Edit instance", "Refresh instance", and "Delete Mirroring Controller"
- A red error status indicator is displayed on the instance icon
- For an anomaly specific to backup storage path, a red error status indicator is displayed on the [Backup storage] disk icon, and [Backup storage status] is set to "Error"
- The message, "WebAdmin has detected an anomaly with...", is displayed in the [Message] section along with an associated [Solution] button

Click [Solution]. The [Anomaly Error] dialog box is displayed.



Select the required option, click [OK], and then resolve the anomaly error.

Refer to "Editing instance information" in the Installation and Setup Guide for Server for information on the [Edit instance] page.

Note

Critical errors encountered during anomaly resolution will be displayed, however, rollback of the instance to its previous state is not supported.

15.15.2 Mirroring Controller Anomalies

The following conditions will cause a Mirroring Controller anomaly:

- The Mirroring Controller management folder or configuration files have been deleted
- The permissions to the Mirroring Controller management folder or configuration files have been changed such that:
  - The instance administrator's access to Mirroring Controller configuration is denied
  - Users other than an instance administrator have access privileges to Mirroring Controller configuration files

WebAdmin checks for anomalies when Mirroring Controller status check is performed.

The following occurs when a Mirroring Controller anomaly is detected:

- All Mirroring Controller functionality is disabled for the replication cluster, except for "Delete Mirroring Controller"
- [Mirroring Controller status] is set to "Error"
- Either of the following messages is displayed in the [Message] section

  "Failed to access the Mirroring Controller management folder or configuration files '*path*'. Mirroring Controller functionality has been disabled. Consider deleting Mirroring Controller and adding it again."

  "Failed to find the Mirroring Controller management folder or configuration files '*path*'. Mirroring Controller functionality has been disabled. Consider deleting Mirroring Controller and adding it again."

Appendix A Parameters

This appendix describes the parameters to be set in the postgresql.conf file of FUJITSU Enterprise Postgres.

The postgresql.conf file is located in the data storage destination.

Information

The maximum value that can be expressed as a 4-byte signed integer changes according to the operating system. Follow the definition of the operating system in use.

- core_directory (string)

  This parameter specifies the directory where the corefile is to be output. If this parameter is omitted, the data storage destination is used by default. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- core_contents (string)

  This parameter specifies the contents to be included in the corefile.

  - full: Outputs all contents of the server process memory to the corefile.
  - none: Does not output a corefile.
  - minimum: Outputs only non-shared memory server processes to the corefile. This reduces the size of the corefile. However, in some cases, this file may not contain sufficient information for examining the factor that caused the corefile to be output.

  If this parameter is omitted, "minimum" is used by default. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- keystore_location (string)

  This parameter specifies the directory that stores the keystore file. Specify a different location from other database clusters. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- tablespace_encryption_algorithm (string)

  This parameter specifies the encryption algorithm for tablespaces that will be created. Valid values are "AES128", "AES256", and "none". If you specify "none", encryption is not performed. The default value is "none". To perform encryption, it is recommended that you specify "AES256". Only superusers can change this setting.

- backup_destination (string)

  This parameter specifies the absolute path of the directory where pgx_dmpall will store the backup data. Specify a different location from other database clusters. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

  Place this directory on a different disk from the data directory to be backed up and the tablespace directory. Ensure that users do not store arbitrary files in this directory, because the contents of this directory are managed by the database system.

- search_path (string)

  When using the SUBSTR function compatible with Oracle databases, set "oracle" and "pg_catalog" in the search_path parameter. You must specify "oracle" before "pg_catalog".

Example

```
search_path = '"$user", public, oracle, pg_catalog'
```

Information

- The search_path feature specifies the priority of the schema search path. The SUBSTR function in Oracle database is defined in the oracle schema.
- Refer to "Statement Behavior" under "Server Administration" in the PostgreSQL Documentation for information on search_path.

- track_waits (string)

  This parameter enables collection of statistics for pgx_stat_lwlock and pgx_stat_latch.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is assumed.

  Only superusers can change this setting.

- track_sql (string)

  This parameter enables collection of statistics for pgx_stat_sql.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is assumed.

  Only superusers can change this setting.

Parameters for the in-memory feature

- reserve_buffer_ratio (numerical value)

  This parameter specifies the proportion of shared memory to be used for a stable buffer table.

  - Minimum value: 0
  - Maximum value: 80

  If this parameter is omitted, 0 will be used.

- vci.cost_threshold (numerical value)

  This parameter specifies the lowest cost that selects an execution plan that uses a VCI. If the cost of the best execution plan that does not use a VCI is lower than this value, that execution plan will be selected.

  - Minimum value: 0
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 18000 will be used.

- vci.control_max_workers (numerical value)

  This parameter specifies the number of background workers that manage VCI. The number of workers for the entire instance is limited by max_worker_processes, so add the value specified here to max_worker_processes.

  - Minimum value: 1
  - Maximum value: 8388607

  If this parameter is omitted or a value outside this range is specified, 8 will be used.

- vci.enable (string)

  This parameter enables or disables VCI.

  - on: Enables VCI.
  - off: Disables VCI.

If this parameter is omitted, "on" will be used.

- vci.log_query (string)

  This parameter enables or disables log output when VCI is not used due to insufficient memory specified by vci.max_local_ros.

  - on: Enables log output.
  - off: Disables log output.

  If this parameter is omitted, "off" will be used.

- vci.maintenance_work_mem (numerical value)

  This parameter specifies the maximum memory size used for maintenance of VCI (when executing CREATE INDEX, for example).

  - Minimum value: 1 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 256 MB will be used.

- vci.max_local_ros (numerical value)

  This parameter specifies the maximum memory size used for VCI scan.

  - Minimum value: 64 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 64 MB will be used.

- vci.max_parallel_degree (numerical value)

  This parameter specifies the maximum number of background workers used for parallel scan. The number of workers for the entire instance is limited by max_worker_processes, so add the value specified here to max_worker_processes.

  A value from -8388607 to 8388607 can be specified.

  - Integer (1 or greater): Parallel scan is performed using the specified degree of parallelism.
  - 0: Stops the parallel scan process.
  - Negative number: The specified value minus the maximum number of CPUs obtained from the environment is used as the degree of parallelism and parallel scan is performed.

  If this parameter is omitted or a value outside this range is specified, 0 will be used.

- vci.shared_work_mem (numerical value)

  This parameter specifies the maximum memory size used for VCI parallel scan.

  - Minimum value: 32 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 1 GB will be used.

Parameters for the Global Meta Cache feature

- pgx_global_metacache (numerical value)

  Specifies the memory size of the GMC area.

  Specify a value calculated by the formula below.

  A value lower than the calculated value will still work, but the meta cache may not be able to fit into the GMC area.

  In this case, the system will discard the meta cache it thinks it is no longer needed, but if it is needed again, the meta cache will need to be expanded and will not perform well.

  If the value is less than 10 MB and is set to a nonzero value that disables the feature, the database startup fails because the Global Meta Cache feature cannot operate.

A setting of 0 disables the Global Meta Cache feature. The default is 0.

Changing this setting requires restarting the database.

```
Size of GMC area
 = Max(10MB,
     (All user table x 0.4 KB
      + All user Indexes x 0.3 KB
      + All user columns x 0.8 KB) x 1.5 (*1) )

*1) Safety Factor (1.5)
This value takes into account the case where both GMC before and after the change temporarily exist
at the same time in shared memory when the table definition is changed or the row of the system
catalog is changed.
```

- track_gmc (string)

  This parameter enables collection of statistics for pgx_stat_gmc.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is used.

  Only superusers can change this setting.

Parameters for the Local Meta Cache Limit feature

- pgx_catalog_cache_max_size(numerical value)

  Specifies the maximum amount of memory that the backend process should use as the catalog cache.

  You can enable catalog cache deletion by setting it to 8 KB or more.

  A setting of 0 disables the catalog cache removal. The default is 0.

  If no units are specified, they are treated as KB.

  - Minimum value: 8KB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  When calculating the parameter settings, the factors that determine the cache size are calculated as the number of tables, the number of indexes, and the number of columns. What is kept as a catalog cache or relation cache also includes objects such as databases, roles, or procedures, but these are small compared to the above factors and do not need to be factored into them. It also includes a calculation method for pgx_relacion_cache_max_size because the given memory is distributed between the catalog cache and the relation cache.

Note

The calculation method here assumes that all backends have similar access and that the transaction also has access to a similar number of resources. If you have a small number of singular backends or transactions, consider excluding them as errors.

1. Determine how much memory a backend process can use. Decide by subtracting the memory size required by the entire system such as the database cache from the installed memory and dividing the rest by the number of connections.
2. For best performance, use the following formula to calculate the total memory size of the catalog cache when the backend holds the catalog cache for all resources accessed during its lifetime.
   The amount of memory varies depending on whether Global Meta Cache is enabled or disabled. Enabling Global Meta Cache reduces the amount of memory required because most of the cache is located on shared memory.

   ```
   When Global Meta Cache is enabled:
     (Number of tables to access + Number of indexes to access + Number of columns to access)
         × 0.1KB × 1.5 (*1)
   When Global Meta Cache is disabled:
     { Number of tables to access × 0.5KB(pg_class tuple size)
   ```

```
        + Number of indexes to access × 0.5KB(pg_index tuple size)
        + Number of columns to access × 1.0KB(pg_statistic tuple size)} × 1.5 (*1)
```

```
*1) Safety Factor (1.5)
The system catalog contains columns with variable-length types. For example, the tuple size in
pg_class is a constant value multiplied by the number of tables, while relname in pg_class is
variable length data.
It is not practical to calculate every definition in detail, so we added 50% to the above
formula.
```

3. In the same way as in 2., calculate the relation cache using the following formula.

   ```
   (1.4KB × Number of tables to access + 2.4KB × Number of indexes to access) × 1.5 (*1)
   ```

   ```
   *1) Safety Factor (1.5)
   The relation cache is structured to facilitate the use of table and index definitions, holds
   pointers to various objects, and is sized to include them. It is variable length because the
   type of object allocated by the table definition and its size change. Since it is not
   realistic to calculate for all definitions, 50% is added.
   ```

4. If the value of 1. ≥ the value of 2. + the value of 3., the backend process can keep all caches to the extent allowed, so there is no need to limit the caches. If you want to cap for safety, set the value of 2. to pgx_catalog_cache_max_size and the value of 3. to pgx_relation_cache_max_size.
5. If the value of 1. < the value of 2. + the value of 3. then you need to limit the cache. However, this parameter does not limit the size of the cache used by a transaction. Therefore, take the following steps.
6. Calculate the catalog cache used by a transaction using the formula in 2.
7. Calculate the relation cache used by a transaction using the formula in 3.
8. If the value of 1. < the value of 6. + the value of 7., then the value of 1. needs to be increased. In other words, in some cases, it may be necessary to increase the installed memory or reduce the number of connections.
9. If the value of 1. ≥ the value of 6. + the value of 7., the condition of 1. can be satisfied by limiting the cache with this parameter. Divide the value of 1. by the ratio of 2. and 3. and set it as a parameter. Set the value distributed to 2. to pgx_catalog_cache_max_size and the value distributed to 3. to pgx_relation_cache_max_size.
10. The value calculated in 9. is a provisional value. If you cannot meet your target performance, first try to shift the focus of allocation to the relation cache. This is because when executing SQL, the relation cache generated based on the catalog cache is mainly referenced, so it is advantageous to leave a large amount of relation cache. If the performance is still not satisfied, adjust the parameters by referring to "13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature".

Note

Be careful when partitioning the table.

The cached definition changes depending on whether the parent table is specified in the SQL statement or the child table is specified. In particular, note that if you specify a parent table, the definitions of all child tables are cached. This is because when you specify a parent table in an SQL statement, you need to know the definitions of all the child tables in order to determine which child table will contain the desired data. Note that the column information of the parent table is not cached.

When specifying the parent table:

```
Number of tables to access = Number of parent tables to access + Number of defined child tables
Number of columns = Number of defined columns x number of defined child tables
```

When specifying the child table directly:

```
Number of tables to access = Number of child tables actually accessed
Number of columns = Number of defined columns x number of child tables actually accessed
```

Example)

Suppose the parent table T (1 index, 3 columns) is split from child tables T1 to T5 (1 index, 3 columns, respectively). If the parent table T is specified in SQL, when the child tables that contain the data to be queried are limited to T1 and T2, and when accessing the data using the indexes defined by T1 and T2, calculate as follows.

```
Number of tables = 1(parent table) + 5(child table) = 6
Number of indexes = 2 (index to access)
Number of columns = 3 (number of columns) x 5 (child table) = 15
```

If you specify child tables T1 and T2 in SQL and use the indexes defined on T1 and T2 when accessing data, the calculation is as follows.

```
Number of tables = 2(child table)
Number of indexes = 2 (index to access)
Number of columns = 3 (number of columns) x 2 (child table) = 6
```

- pgx_relation_cache_max_size(numerical value)

  Specifies the maximum amount of memory that the backend process should use as the relation cache.

  You can enable catalog cache deletion by setting it to 8 KB or more.

  A setting of 0 disables the relation cache removal. The default is 0.

  If no units are specified, they are treated as KB.

  - Minimum value: 8KB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  For the calculation method for parameter setting, refer to the calculation method of pgx_catalog_cache_max_size.

- pgx_cache_hit_log_interval(numerical value)

  Specifies the time interval to output a message indicating the cache reference status for each backend process.

  When the transaction ends, if the time set in this parameter has elapsed since the previous message was output, the message is output.

  If set to 0, a message will be output each time the transaction ends.

  Setting -1 disables the output. The default value is 10min.

  If no units are specified, they are treated as ms.

  Even if pgx_catalog_cache_max_size and pgx_relation_cache_max_size are disabled, the message output of the corresponding cache will be invalid.

  Immediately after connecting to the server, a small transaction occurs before the request from the user application, such as for user authentication. Since it is meaningless to know the hit rate for these, a message will be output at the end of the transaction that started after the time set in this parameter has elapsed after connecting to the server.

  For the same reason, setting a small value such as 0 may result in a message being printed at the end of such a small transaction.

  You can check which transaction the message corresponds to from the information output at the beginning.

  This information depends on the setting of the parameter log_line_prefix.

  - Minimum value: 0
  - Maximum value: 2147483647ms

See

Refer to "Server Configuration" under "Server Administration" in the PostgreSQL Documentation for information on other postgresql.conf parameters.

Appendix B System Administration Functions

This appendix describes the system administration functions of FUJITSU Enterprise Postgres.

See

Refer to "System Administration Functions" under "The SQL Language" in the PostgreSQL Documentation for information on other system administration functions.

B.1 WAL Mirroring Control Functions

The following table lists the functions that can be used for backup and recovery based on WAL mirroring.

Table B.1 WAL mirroring control functions

Name	Return type	Description
pgx_pause_wal_multiplexing()	void	Stops WAL multiplexing
pgx_resume_wal_multiplexing()	void	Resumes WAL multiplexing
pgx_is_wal_multiplexing_paused()	boolean	Returns true if WAL multiplexing has stopped

If WAL multiplexing has not been configured, these functions return an error. Setting the backup_destination parameter in postgresql.conf configures WAL multiplexing.

Only superusers can execute these functions.

B.2 Transparent Data Encryption Control Functions

The following table lists the functions that can be used for transparent data encryption.

Table B.2 Transparent data encryption control functions

Name	Return type	Description
pgx_open_keystore(*passphrase*)	void	Opens the keystore
pgx_set_master_key(*passphrase*)	void	Sets the master encryption key
pgx_set_keystore_passphrase(*oldPassphrase*, *newPassphrase*)	void	Changes the keystore passphrase

The pgx_open_keystore function uses the specified passphrase to open the keystore. When the keystore is opened, the master encryption key is loaded into the database server memory. In this way, you can access the encrypted data and create encrypted tablespaces. If the keystore is already open, this function returns an error.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block.

The pgx_set_master_key function generates a master encryption key and stores it in the keystore. If the keystore does not exist, this function creates a keystore. If the keystore already exists, this function modifies the master encryption key. If the keystore has not been opened, this function opens it.

The passphrase is a string of 8 to 200 bytes.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block. Processing is not affected by whether the keystore is open.

The pgx_set_keystore_passphrase function changes the keystore passphrase. Specify the current passphrase in *oldPassphrase*, and a new passphrase in *newPassphrase*.

The passphrase is a string of 8 to 200 bytes.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block. Processing is not affected by whether the keystore is open.

B.3 Data Masking Control Functions

The table below lists the functions that can be used for data masking.

Table B.3 Data masking control functions

Name	Return type	Description
pgx_alter_confidential_policy	boolean	Changes masking policies
pgx_create_confidential_policy	boolean	Creates masking policies
pgx_drop_confidential_policy	boolean	Deletes masking policies
pgx_enable_confidential_policy	boolean	Enables or disables masking policies
pgx_update_confidential_values	boolean	Changes replacement characters when full masking is specified for masking type

B.3.1 pgx_alter_confidential_policy

Description

Changes masking policies

Format

The format varies depending on the content to be changed. The format is shown below.

- Common format

```
common_arg:
[schema_name    := 'schemaName',]
table_name    := 'tableName',
policy_name     := 'policyName'
```

- Add a masking target to a masking policy

```
pgx_alter_confidential_policy(
commonArg,
[action        := 'ADD_COLUMN', ]
column_name    := 'colName'
[, function_type    := 'FULL'] |
[, function_type    := 'PARTIAL', partialOpt] |
[, function_type    := 'REGEXP', regexpOpt]
)


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement    := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

- Delete a masking target from a masking policy

```
pgx_alter_confidential_policy(
commonArg,
action        := 'DROP_COLUMN',
column_name    := 'colName'
)
```

- Change the masking condition

```
pgx_alter_confidential_policy(
commonArg,
action        := 'MODIFY_EXPRESSION',
expression    := 'expr'
)
```

- Change the content of a masking policy set for a masking target

```
pgx_alter_confidential_policy(
commonArg,
action        := 'MODIFY_COLUMN',
column_name    := 'colName'
[, function_type    := 'FULL'] |
[, function_type    := 'PARTIAL', partialOpt] |
[, function_type    := 'REGEXP', regexpOpt]
)


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement        := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

- Change the masking policy description

```
pgx_alter_confidential_policy(
commonArg,
action        := 'SET_POLICY_DESCRIPTION',
policy_description    := 'policyDesc'
)
```

- Change the masking target description

```
pgx_alter_confidential_policy(
commonArg,
action        := 'SET_COLUMN_DESCRIPTION',
column_name    := 'colName',
column_description    := 'colDesc'
)
```

Argument

The argument varies depending on the content to be changed. Details are as follows.

- Common arguments

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	schema_name	varchar(63)	Schema name of table for which a masking policy is applied	'public'
	table_name	varchar(63)	Name of table for which a masking policy is applied	Mandatory
	policy_name	varchar(63)	Masking policy name	Mandatory

- Add a masking target to a masking policy

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'ADD_COLUMN'	'ADD_COLUMN'
	column_name	varchar(63)	Masking target name	Mandatory
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

- Delete a masking target from a masking policy

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'DROP_COLUMN'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory

- Change the masking condition

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'MODIFY_EXPRESSION'	Mandatory
	expression	varchar(1024)	Masking condition to be changed	Mandatory

- Change the content of a masking policy set for a masking target

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'MODIFY_COLUMN'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

- Change the masking policy description

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'SET_POLICY_DESCRIPTION'	Mandatory
	policy_description	varchar(1024)	Masking policy description	Mandatory

- Change the masking target description

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'SET_COLUMN_DESCRIPTION'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory
	column_description	varchar(1024)	Masking target description	Mandatory

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional									
	ADD_COLUMN			DROP_COLUMN	MODIFY_EXPRESSION	MODIFY_COLUMN			SET_POLICY_DESCRIPTION	SET_COLUMN_DESCRIPTION
	Full masking	Partial masking	Regular expression masking			Full masking	Partial masking	Regular expression masking		
schema_name	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
table_name	N	N	N	N	N	N	N	N	N	N

Argument	Mandatory or optional									
	ADD_COLUMN			DROP_COLUMN	MODIFY_EXPRESSION	MODIFY_COLUMN			SET_POLICY_DESCRIPTION	SET_COLUMN_DESCRIPTION
	Full masking	Partial masking	Regular expression masking			Full masking	Partial masking	Regular expression masking		
policy_name	N	N	N	N	N	N	N	N	N	N
action	Y	Y	Y	N	N	N	N	N	N	N
column_name	N	N	N	N	-	N	N	N	-	N
function_type	Y	N	N	-	-	Y	N	N	-	-
expression	-	-	-	-	N	-	-	-	-	-
policy_description	-	-	-	-	-	-	-	-	N	-
column_description	-	-	-	-	-	-	-	-	-	N
function_parameters	-	N	-	-	-	-	N	-	-	-
regexp_pattern	-	-	N	-	-	-	-	N	-	-
regexp_replacement	-	-	N	-	-	-	-	N	-	-
regexp_flags	-	-	Y	-	-	-	-	Y	-	-

Y: Can be omitted; N: Cannot be omitted; -: Ignored when specified

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example 1

Adding masking policy p1 to masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'ADD_COLUMN', column_name := 'c2', function_type := 'PARTIAL', function_parameters := 'VVVFVVVVFVVVV,
VVV-VVVV-VVVV, *, 4, 11');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 2

Deleting masking target c1 from masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'DROP_COLUMN', column_name := 'c1');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 3

Changing the masking condition for masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'MODIFY_EXPRESSION', expression := 'false');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 4

Changing the content of masking policy p1 set for masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'MODIFY_COLUMN', column_name := 'c2', function_type := 'FULL');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 5

Changing the description of masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'SET_POLICY_DESCRIPTION', policy_description := 'this policy is an example.');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 6

Changing the description of masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'SET_COLUMN_DESCRIPTION', column_name := 'c2', column_description := 'c2 column is FULL.');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_alter_confidential_policy system management function can be specified in any order.
- The action parameters below can be specified. When action parameters are omitted, ADD_COLUMN is applied.

Parameter	Description
ADD_COLUMN	Adds a masking target to a masking policy.
DROP_COLUMN	Deletes a masking target from a masking policy.
MODIFY_EXPRESSION	Changes expression.
MODIFY_COLUMN	Changes the content of a masking policy set for a masking target.
SET_POLICY_DESCRIPTION	Changes policy_description.
SET_COLUMN_DESCRIPTION	Changes column_description.

- The function_parameters argument is enabled when the function_type is PARTIAL. If the function_type is other than PARTIAL, it will be ignored.

- The arguments below are enabled when the function_type is REGEXP. If the function_type is other than REGEXP, these arguments will be ignored.
  - regexp_pattern
  - regexp_replacement
  - regexp_flags

See

- Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.
- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.

B.3.2 pgx_create_confidential_policy

Description

Creates masking policies

Format

The format varies depending on the masking type. The format is shown below.

```
pgx_create_confidential_policy(
[schema_name        := 'schemaName',]
table_name        := 'tableName',
policy_name         := 'policyName',
expression        := 'expr'
[, enable            := 'policyStatus']
[, policy_description    := 'policyDesc']
[, column_name        := 'colName'
     [, function_type    := 'FULL'] |
     [, function_type    := 'PARTIAL', partialOpt] |
     [, function_type    := 'REGEXP', regexpOpt]
     [, column_description    := 'colDesc']
])


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement        := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

Argument

Details are as follows.

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	schema_name	varchar(63)	Schema name of table for which the masking policy is created	'public'
	table_name	varchar(63)	Name of table for which the masking policy is created	Mandatory

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
	policy_name	varchar(63)	Masking policy name	Mandatory
	expression	varchar(1024)	Masking condition	Mandatory
	enable	boolean	Masking policy status - 't': Enabled - 'f': Disabled	't'
	policy_description	varchar(1024)	Masking policy description	NULL
	column_name	varchar(63)	Masking target name	NULL
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
	column_description	varchar(1024)	Masking target description	NULL
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional		
	Full masking	Partial masking	Regular expression masking
schema_name	Y	Y	Y
table_name	N	N	N
policy_name	N	N	N
expression	N	N	N
enable	Y	Y	Y
policy_description	Y	Y	Y
column_name	Y	Y	Y
function_type	Y	Y	Y
column_description	Y	Y	Y
function_parameters	-	N	-
regexp_pattern	-	-	N
regexp_replacement	-	-	N
regexp_flags	-	-	Y

Y: Can be omitted; N: Cannot be omitted; -: Ignored when specified

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example 1

Creating masking policy p1 that does not contain a masking target

```
postgres=# select pgx_create_confidential_policy(table_name := 't1', policy_name := 'p1',
expression := '1=1');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 2

Creating masking policy p1 that contains masking target c1 of which the masking type is full masking

```
postgres=# select pgx_create_confidential_policy(schema_name := 'public', table_name := 't1',
policy_name := 'p1', expression := '1=1', enable := 't', policy_description := 'this policy is an
example.', column_name := 'c1', function_type := 'FULL', column_description := 'c1 column is FULL.');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 3

Creating masking policy p1 that contains masking target c2 of which the masking type is partial masking

```
postgres=# select pgx_create_confidential_policy( table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c2', function_type := 'PARTIAL', function_parameters :=
'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 4

Creating masking policy p1 that contains masking target c3 of which the masking type is regular expression masking

```
postgres=# select pgx_create_confidential_policy( table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c3', function_type := 'REGEXP', regexp_pattern := '(.*)(@.*)',
regexp_replacement := 'xxx\2', regexp_flags := 'g');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_create_confidential_policy system management function can be specified in any order.
- If column_name is omitted, only masking policies that do not contain masking target will be created.
- One masking policy can be created for each table. Use the pgx_alter_confidential_policy system management function to add a masking target to a masking policy.

- The function_parameters argument is enabled when the function_type is PARTIAL. If the function_type is other than PARTIAL, it will be ignored.
- The arguments below are enabled when the function_type is REGEXP. If the function_type is other than REGEXP, these arguments will be ignored.
  - regexp_pattern
  - regexp_replacement
  - regexp_flags

Note

If a table for which a masking policy is to be applied is deleted, delete the masking policy as well.

See

- Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.
- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.

B.3.3 pgx_drop_confidential_policy

Description

Deletes masking policies

Format

```
pgx_drop_confidential_policy(
[schema_name    := 'schemaName', ]
table_name     := 'tableName',
policy_name    := 'policyName'
)
```

Argument

Details are as follows.

Argument	Data type	Description	Default value
schema_name	varchar(63)	Schema name of table for which a masking policy is deleted	'public'
table_name	varchar(63)	Name of table for which a masking policy is deleted	Mandatory
policy_name	varchar(63)	Masking policy name	Mandatory

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional
schema_name	Y
table_name	N
policy_name	N

Y: Can be omitted; N: Cannot be omitted

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Deleting masking policy p1

```
postgres=# select pgx_drop_confidential_policy(table_name := 't1', policy_name := 'p1');
 pgx_drop_confidential_policy
------------------------------
 t
(1 row)
```

Description

The arguments for the pgx_drop_confidential_policy system management function can be specified in any order.

Note

If a table for which a masking policy is to be applied is deleted, delete the masking policy as well.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.3.4 pgx_enable_confidential_policy

Description

Enables or disables masking policies

Format

```
pgx_enable_confidential_policy(
[schema_name    := 'schemaName', ]
table_name     := 'tableName',
policy_name    := 'policyName',
enable        := 'policyStatus'
)
```

Argument

Details are as follows.

Argument	Data type	Description	Default value
schema_name	varchar(63)	Schema name of table for which a masking policy is enabled or disabled	'public'
table_name	varchar(63)	Name of table for which a masking policy is enabled or disabled	Mandatory
policy_name	varchar(63)	Masking policy name	Mandatory
enable	boolean	Masking policy status - 't': Enabled	Mandatory

Argument	Data type	Description	Default value
		- 'f': Disabled	

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional
schema_name	Y
table_name	N
policy_name	N
enable	N

Y: Can be omitted; N: Cannot be omitted

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Enabling masking policy p1

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1', enable :=
't');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

Description

The arguments for the pgx_enable_confidential_policy system management function can be specified in any order.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.3.5 pgx_update_confidential_values

Description

Changes replacement characters when full masking is specified for masking type

Format

```
pgx_update_confidential_values(
[number_value    := 'numberValue']
[, char_value    := 'charValue']
[, varchar_value    := 'varcharValue']
[, date_value    := 'dateValue']
[, ts_value    := 'tsValue']
)
```

Argument

Details are as follows.

Argument	Data type	Description
number_value	integer	Replacement character in numeric type
char_value	varchar(1)	Replacement character in char type
varchar_value	varchar(1)	Replacement character in varchar type
date_value	date	Replacement character in date type
ts_value	timestamp	Replacement character in timestamp type

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Using '*' as a replacement character in char type and varchar type

```
postgres=# select pgx_update_confidential_values(char_value := '*', varchar_value := '*');
 pgx_update_confidential_values
--------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_update_confidential_values system management function can be specified in any order.
- Specify one or more arguments for the pgx_update_confidential_values system management function. A replacement character is not changed for an omitted argument.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.4 VCI Data Load Control Function

The table below lists the function that loads VCI data to buffer cache.

Table B.4 VCI data load control function

Name	Return type	Description
pgx_prewarm_vci(vci_index regclass)	int8	Loads the VCI data to buffer cache.

pgx_prewarm_vci loads the specified VCI data to buffer cache and returns the number of blocks of the loaded VCI data.

The aggregation process using VCI may take time immediately after an instance is started, because the VCI data has not been loaded to buffer cache. Therefore, the first aggregation process can be sped up by executing pgx_prewarm_vci after an instance is started.

The amount of memory required for preloading is the number of blocks returned by pgx_prewarm_vci multiplied by the size of one block.

This function can only be executed if the user has reference privilege to the VCI index and execution privilege to the pg_prewarm function.

B.5 High-Speed Data Load Control Functions

The table below lists the functions that can be used for high-speed data load.

Table B.5 High-speed data load control functions

Name	Return type	Description
pgx_loader	bigint	Creates dynamic shared memory, starts parallel workers and loads data
pgx_loader_recovery	smallint	Resolves in-doubt transactions

The pgx_loader command executes the above functions internally.

Appendix C System Views

This appendix describes how to use the system views in FUJITSU Enterprise Postgres.

See

Refer to "System Views" under "Internals" in the PostgreSQL Documentation for information on other system views.

C.1 pgx_tablespaces

The pgx_tablespaces catalog provides information related to the encryption of tablespaces.

Column	Type	References	Description
spctablespace	oid	pg_tablespace.oid	Tablespace OID
spcencalgo	text		Tablespace encryption algorithm

The spcencalgo string displays one of the following values:

- none: Tablespace is not encrypted
- AES128: AES with key length of 128 bits
- AES256: AES with key length of 256 bits

C.2 pgx_stat_lwlock

The pgx_stat_lwlock view displays statistics related to lightweight locks, with each type of content displayed on a separate line.

Table C.1 pgx_stat_lwlock view

Column	Type	Description
lwlock_name	name	Name of the lightweight lock
total_waits	bigint	Number of waits caused by the lightweight lock
total_wait_time	double precision	Number of milliseconds spent in waits caused by the lightweight lock
stats_reset	timestamp with timezone	Last time at which this statistics was reset

C.3 pgx_stat_latch

The pgx_stat_latch view displays statistics related to latches, with each type of wait information within FUJITSU Enterprise Postgres displayed on a separate line.

Table C.2 pgx_stat_latch view

Column	Type	Description
latch_name	name	Name of the latch
total_waits	bigint	Number of waits caused a wait
total_wait_time	double precision	Number of milliseconds spent in waits caused by the latch
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.4 pgx_stat_walwriter

The pgx_stat_walwriter view displays statistics related to WAL writing, in a single line.

Table C.3 pgx_stat_walwriter view

Column	Type	Description
dirty_writes	bigint	Number of times old WAL buffers were written to the disk because the WAL buffer was full when WAL records were added
writes	bigint	Number of WAL writes
write_blocks	bigint	Number of WAL write blocks
total_write_time	double precision	Number of milliseconds spent on WAL writing
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.5 pgx_stat_sql

The pgx_stat_sql view displays statistics related to SQL statement executions, with each type of SQL statement displayed on a separate line.

Table C.4 pgx_stat_sql view

Column	Type	Description
selects	bigint	Number of SELECT statements executed In database multiplexing mode, this number includes the SELECT statements executed in Mirroring Controller. Mirroring Controller executes the SELECT statement using the interval specified for the heartbeat_interval of the server definition file (milliseconds).
inserts	bigint	Number of INSERT statements executed
deletes	bigint	Number of DELETE statements executed
updates	bigint	Number of UPDATE statements executed
selects_with_parallelism	bigint	Number of times parallel scan was used in SELECT statements
inserts_with_parallelism	bigint	Not used
deletes_with_parallelism	bigint	Not used
updates_with_parallelism	bigint	Not used
copies_with_parallelism	bigint	Not used
declares	bigint	Number of DECLARE statements executed (number of cursor OPENs)
fetches	bigint	Number of FETCH statements executed
checkpoints	bigint	Number of CHECKPOINT statements executed
clusters	bigint	Number of CLUSTER statements executed
copies	bigint	Number of COPY statements executed
reindexes	bigint	Number of REINDEX statements executed
truncates	bigint	Number of TRUNCATE statements executed
locks	bigint	Number of times a lock occurred
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.6 pgx_stat_gmc

The pgx_stat_gmc view provides information about the GMC areas.

Table C.5 pgx_stat_gmc view

Column	Type	Description
searches	bigint	Number of times the cache table is searched.
hits	bigint	Number of times the cache table is hit.
size	bigint	The current amount of memory (bytes) used in the GMC area.
stats_reset	timestamp with timezone	Last time these statistics were reset.

Appendix D Tables Used by Data Masking

This appendix explains tables used by the data masking feature.

Note

These tables are updated by the data masking control function, so do not use SQL statements to directly update these tables.

D.1 pgx_confidential_columns

This table provides information on masking target for which masking policies are set.

Column	Type	Description
schema_name	varchar(63)	Schema name of table for which a masking policy is applied
table_name	varchar(63)	Name of table for which a masking policy is applied
policy_name	varchar(63)	Masking policy name
column_name	varchar(63)	Masking target name
function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking
function_parameters	varchar(1024)	Masking format for partial masking
regexp_pattern	varchar(1024)	Search pattern for regular expression masking
regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking
regexp_flags	varchar(20)	Regular expression flags
column_description	varchar(1024)	Masking target description

Execution example

```
postgres=# select * from pgx_confidential_columns;
 schema_name | table_name | policy_name | column_name | function_type |
function_parameters           | regexp_pattern | regexp_replacement | regexp_flags |
column_description
-------------+------------+-------------+-------------+---------------
+---------------------------------------+----------------+--------------------+-------------
+--------------------
 public      | t1         | p1          | c1          | FULL          |
|                |                     |             |
 public      | t1         | p1          | c2          | PARTIAL       | VVVFVVVVFVVVV, VVV-VVVV-VVVV,
*, 4, 11 |                |                     |             |
(2  row)
```

D.2 pgx_confidential_policies

This table provides information on masking policies.

Column	Type	Description
schema_name	varchar(63)	Schema name of table for which a masking policy is applied

Column	Type	Description
table_name	varchar(63)	Name of table for which a masking policy is applied
policy_name	varchar(63)	Masking policy name
expression	varchar(1024)	Masking condition
enable	boolean	Masking policy status - 't': Enabled - 'f': Disabled
policy_description	varchar(1024)	Masking policy description

Execution example

```
postgres=# select * from pgx_confidential_policies;
 schema_name | table_name | policy_name | expression | enable | policy_description
-------------+------------+-------------+------------+--------+--------------------
 public      | t1         | p1          | 1=1        | t      |
(1 row)
```

D.3 pgx_confidential_values

This table provides information on replacement characters when full masking is specified for masking type.

Column	Data type	Description	Default value
number_value	integer	Numeric	0
char_value	varchar(1)	char type	Spaces
varchar_value	varchar(1)	varchar type	Spaces
date_value	date	date type	'1970-01-01'
timestamp_value	timestamp	timestamp type	'1970-01-01 00:00:00'

Execution example

```
postgres=# select * from pgx_confidential_values;
 number_value | char_value | varchar_value | date_value |      ts_value
--------------+------------+---------------+------------+---------------------
            0 |            |               | 1970-01-01 | 1970-01-01 00:00:00
(1 row)
```

Appendix E Tables Used by High-Speed Data Load

This appendix describes the tables used by high-speed data load.

E.1 pgx_loader_state

The pgx_loader_state table provides information about transactions prepared by high-speed data load.

Column	Type	Description
id	serial	Unique identifier. This value is assigned from the pgx_loader_state_id_seq sequence.
gid	text	Global transaction identifier assigned to a transaction.
state	text	State of the transaction. The value can be one of the following: - commit: The prepared transaction has been committed. - rollback: The prepared transaction is in in-doubt state.
master_pid	integer	Process ID of the backend process (master process) that executed the pgx_loader control function.
role_oid	integer	Role identifier (OID). A prepared transaction can only be completed by the same user who executed the original transaction or by a superuser.
relation_oid	integer	Object identifier (OID).

Note

The pgx_loader_state table and pgx_loader_state_id_seq sequence are updated by high-speed data load. Do not update these database objects directly using SQL.

Appendix F Starting and Stopping the Web Server Feature of WebAdmin

To use WebAdmin for creating and managing a FUJITSU Enterprise Postgres instance on a server where FUJITSU Enterprise Postgres is installed, you must first start the Web server feature of WebAdmin.

- Using WebAdmin in a single-server configuration

  You must start the Web server on the server on which FUJITSU Enterprise Postgres and WebAdmin are installed.

- Using WebAdmin in a multiserver configuration

  You must start the Web server on all servers on which WebAdmin has been installed.

This appendix describes how to start and stop the Web server feature of WebAdmin.

Note that "<*x*>" in paths indicates the product version.

See

Refer to "Installing WebAdmin in a Multiserver Configuration" in the Installation and Setup Guide for Server for information on multiserver installation.

F.1 Starting the Web Server Feature of WebAdmin

Follow the procedure below to start the Web server feature of WebAdmin.

1. Change to superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Start the Web server feature of WebAdmin

   Execute the WebAdminStart command to start the Web server feature of WebAdmin.

   Example

   If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

   ```
   # cd /opt/fsepv<x>webadmin/sbin
   # ./WebAdminStart
   ```

F.2 Stopping the Web Server Feature of WebAdmin

This section describes how to stop the Web server feature of WebAdmin.

Follow the procedure below to stop the Web server feature of WebAdmin.

1. Change to superuser

   Acquire superuser privileges on the system.

   Example

   ```
   $ su -
   Password:******
   ```

2. Stop the Web server feature of WebAdmin

   Execute the WebAdminStop command to stop the Web server feature of WebAdmin.

Example

If WebAdmin is installed in /opt/fsepv<*x*>webadmin:

```
# cd /opt/fsepv<x>webadmin/sbin
# ./WebAdminStop
```

Appendix G WebAdmin Wallet

This appendix describes how to use the Wallet feature of WebAdmin.

When a remote instance or a standby instance is created, it is necessary to provide user name and password for authentication with the remote machine or the database instance.

The Wallet feature in WebAdmin is a convenient way to create and store these credentials.

Once created, these credentials can be repeatedly used in one or more instances.

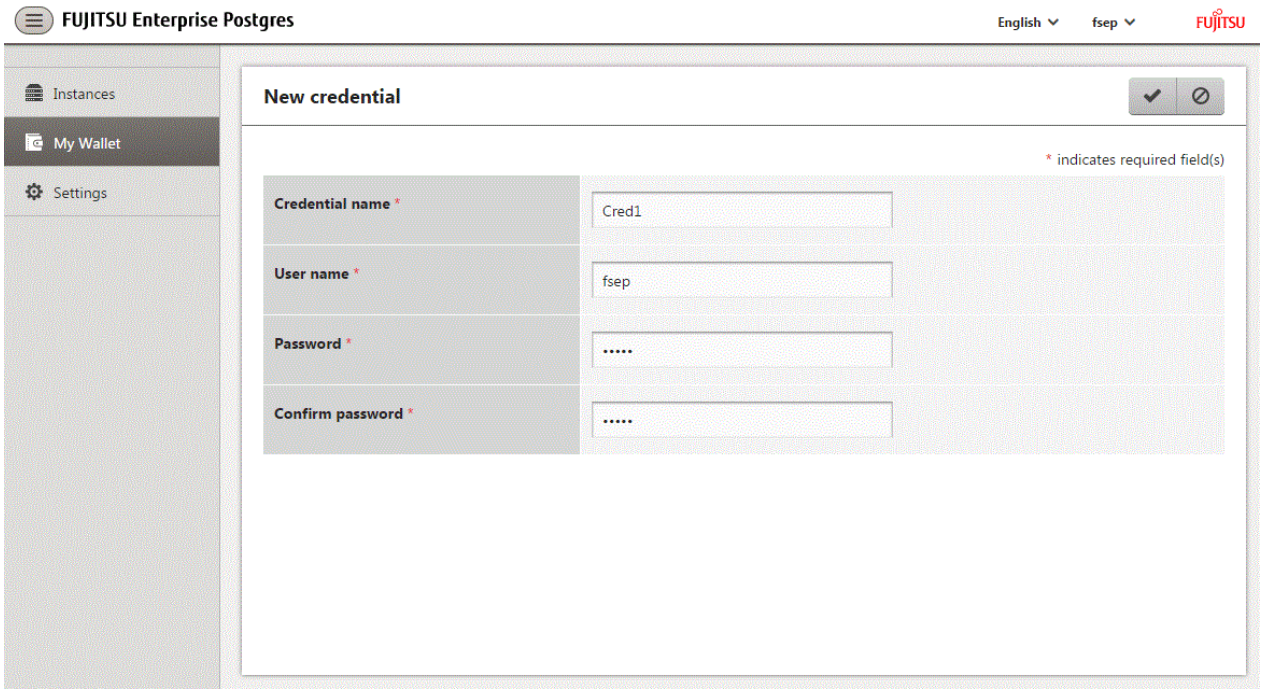
Note

It is not mandatory to create a credential in the Wallet. It is possible to create a remote instance or a standby instance without creating any credential in the Wallet.

If no credential is created beforehand, a user name and password can be entered in the instance creation page. When creating a "Remote" instance, if operating system credentials are entered without using a credential stored in the Wallet, WebAdmin automatically creates a credential with the given user name and password, and stores it in the user's wallet for future use.

G.1 Creating a Credential

1. In the [My Wallet] tab, click ➕. The [New credential] page will be displayed.
2. Enter the information for the credentials.



Enter the following items. Credential name, User name and Password should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".

- [Credential name]: Name of the credential

  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters

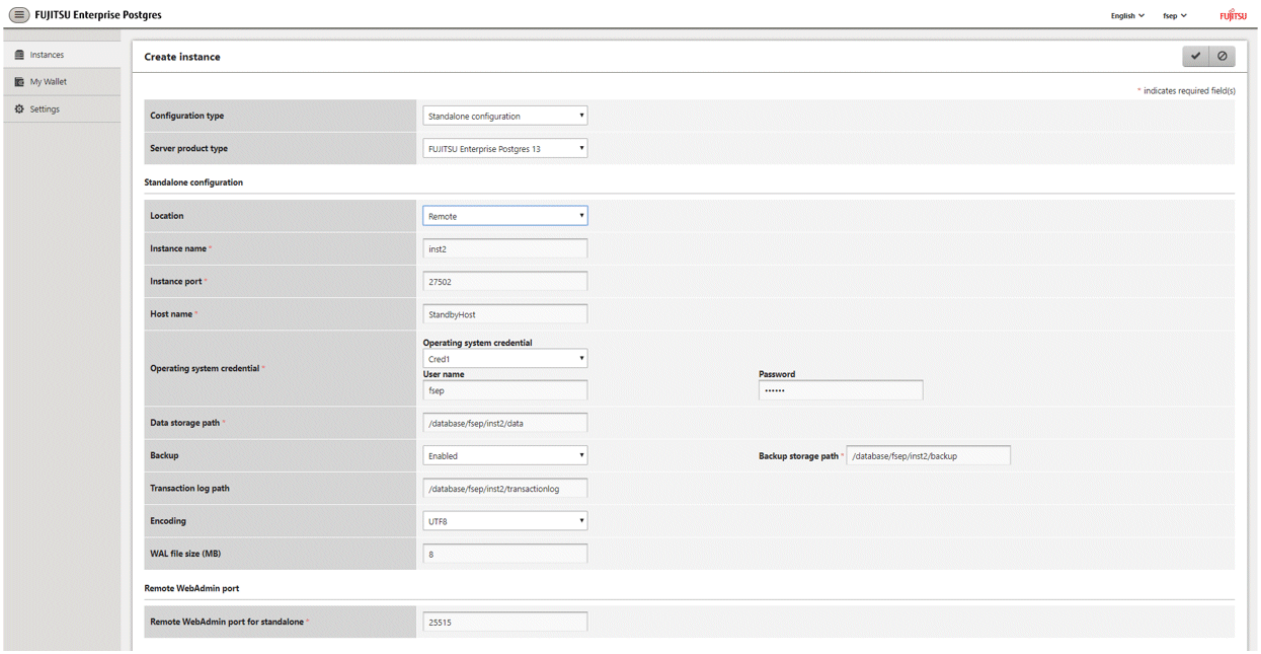
- [User name]: The operating system user name or database instance user name that will be used later
- [Password]: Password for the user
- [Confirm password]: Reenter the password.

3. Click ✔ to store the credential.

G.2 Using a Credential

Once a credential is created in the Wallet, it can be used during remote instance creation or standby instance creation.

The following page uses the credential that was created in the previous section.



When "Cred1" is selected in [Operating system credential], the user name and password are automatically populated from the credential.

Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix I Copy Command Samples that Use the Advanced Copy Feature of the ETERNUS Disk Array

Backup/recovery scripts that use OPC, an advanced copy feature of the FUJITSU Storage ETERNUS disk array (hereafter referred to as ETERNUS disk array), are supplied as copy command samples for use by the pgx_dmpall and pgx_rcvall commands.

Users can copy the samples to any file and make changes appropriate to their environment or operations.

The samples are stored in the directories below:

- Basic version

```
/installDir/share/copy_command.esf_acm1.sh.sample
```

- Advanced version

```
/installDir/share/copy_command.esf_acm2.sh.sample
```

See

The samples use the replication management command of the FUJITSU Storage ETERNUS SF AdvancedCopy Manager (hereafter referred to as ACM) for operating the advanced copy features of the ETERNUS disk array. Refer to the relevant manual for details.

Prerequisite for using the samples

To use the samples, it is necessary to configure the settings of the advanced copy features of the ETERNUS disk array in advance. The samples assume that the replication source/volume has been configured, its contents have been physically copied to the replication volume, and that the tracking process has been started.

Sample content (advanced version)

The sample uses two replication volumes as the replication source on which the database cluster and tablespace are located, alternating between them for each backup. It then registers to the backup information file the replication volume (group) used for the latest backup.

In addition, the backup information file is also used to determine the replication volume to restore during recovery.

The processing for each operation mode is described below:

prepare mode

1. The backup information file is read, and the replication volume to be used for the current backup is determined.
2. The completion status of physical copies to all replication volumes is checked using the swsrpstat command of ACM.
3. The replication volume determined in step 1 is written to a temporary file for later use by the backup mode.

backup mode

1. The temporary file is read, and the replication volume information is retrieved.
2. The file system buffer is written using the sync command of the operating system.
3. The file system targeted for backup is frozen using the fsfreeze command of the operating system.
4. Snapshot retrieval (implementation of a logical copy) is performed using the swsrpmake command of ACM.
5. The file system frozen in step 3 is unfrozen using the fsfreeze command of the operating system.

   Steps 3 to 5 are performed for all file systems targeted for backup.

finalize mode

1. The completion status of physical copies to all replication volumes is checked using the swsrpstat command of ACM.

2. Information about the replication volume used for the current backup is written to the backup information file.

restore mode

1. The backup information file is read, and the replication volume to be used for recovery is determined.
2. The file system targeted for recovery is unmounted using the umount command of the operating system.
3. Physical copy from the replication volume is performed using the swsrpmake command of ACM.
4. The file system targeted for recovery is mounted using the mount command of the operating system.
5. The completion status of physical copy from the replication volume is checked using the swsrpstat command of ACM.

   Steps 2 to 5 are performed for all file systems targeted for recovery.
6. Files and directories not needed for archive recovery are deleted.

Note

- The samples cannot be used on SLES 12.
- The samples use the sudo command of the operating system so that operation of the commands and file systems of ACM is performed by the superuser of the operating system. Therefore, determine if these implementations satisfy the security standards on the database server, and if necessary, perform implementations using other means.
- The samples temporarily freeze the file system of the data storage destination (replication source volume) to protect the file system from copy processing by advanced copy features of the ETERNUS disk array. Therefore, consider the following:
  - Consider freeze time during the timeout period of an SQL statement.

    When using a feature that links with the database, such as a cluster feature that accesses the data storage destination, consider freeze time in relation to the timeout periods below.
    - When performing database multiplexing

      Misdetection may occur during abnormality monitoring, so it is necessary to consider the monitoring interval, timeout period and number of retries for abnormality monitoring, and consider temporarily stopping only the Mirroring Controller process during backup.
    - When performing failover operations using PRIMECLUSTER

      If a failure occurs while the file system is frozen, switching is triggered when PRIMECLUSTER detects an issue, but will be performed only after the system is unfrozen. In addition, if it takes time for the system to unfreeze, the active node may trigger operating system panic, resulting in a switch.

Appendix J Collecting Failure Investigation Data

If the cause of an error that occurs while building the environment or during operations is unclear, data must be collected for initial investigation.

This appendix describes how to collect data for initial investigation.

Use FJQSS (Information Collection Tool) to collect data for initial investigation.

See

Refer to the FJQSS manual for information on how to use FJQSS.

Note

- When using FJQSS to collect data for initial investigation, you must set the following environment variables:
  - Environment variables required for using FUJITSU Enterprise Postgres

    Refer to "Configure the environment variables" under the procedure for creating an instance in "Using the initdb Command" in the Installation and Setup Guide for Server for information on the values to be set in the environment variables.
  - PGDATA

    Set the data storage destination.
  - PGDATABASE

    Set the database name from which you want to collect data for initial investigation.
  - PGPORT

    Set the instance port number. This does not need to be set if the default port number (27500) has not been changed.
  - PGUSER

    Set the database superuser.
    Set the database superuser so that client authentication is possible.
    FJQSS establishes a TCP/IP connection with the template1 database and collects data from the database.
  - FSEP_HOME

    Set the FUJITSU Enterprise Postgres installation directory.
- Refer to "Collecting Failure Investigation Data" in the Cluster Operation Guide (Database Multiplexing) for information on how to collect failure investigation data when performing database multiplexing.

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FUJITSU

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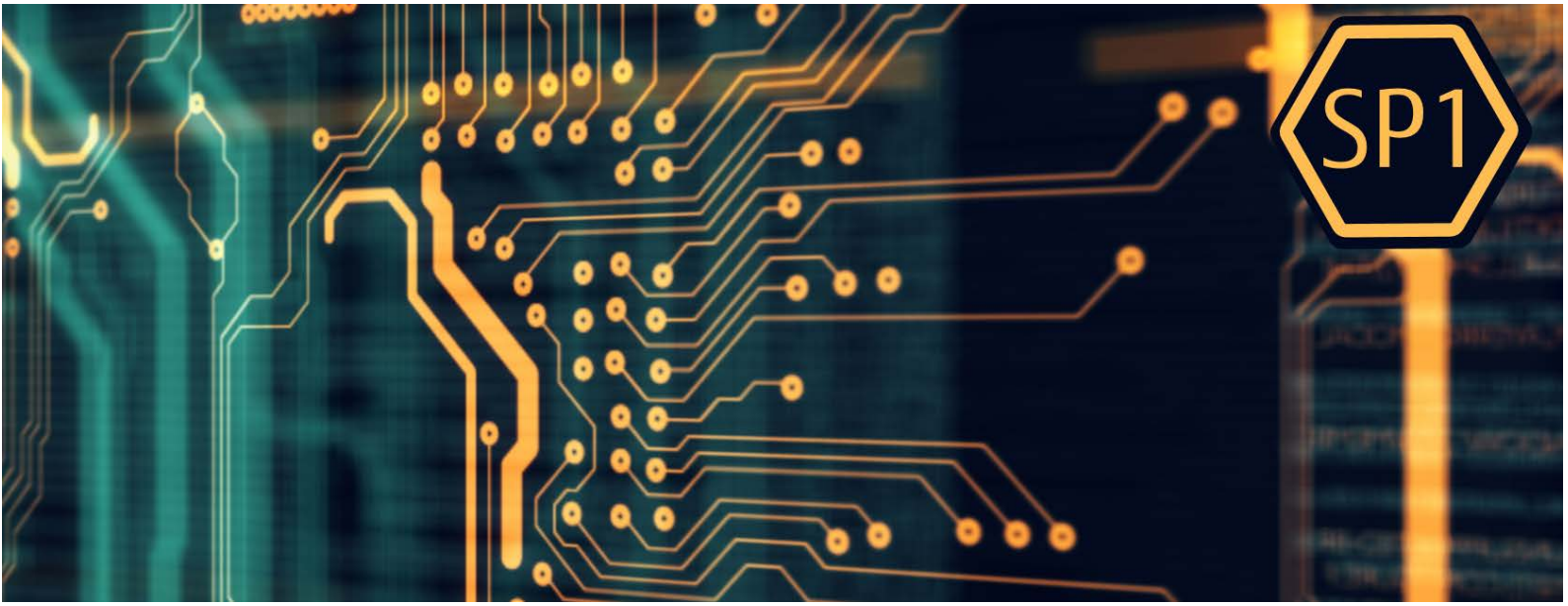

Operation Guide

(Windows)

Windows

J2UL-2681-01ENZ0(00)
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Preface

Purpose of this document

The FUJITSU Enterprise Postgres database system extends the PostgreSQL features and runs on the Windows platform.

This document is the FUJITSU Enterprise Postgres Operation Guide.

Intended readers

This document is intended for those who install and operate FUJITSU Enterprise Postgres.

Readers of this document are assumed to have general knowledge of:

- PostgreSQL
- SQL
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Operating FUJITSU Enterprise Postgres

Describes how to operate FUJITSU Enterprise Postgres.

Chapter 2 Starting an Instance and Creating a Database

Describes how to start a FUJITSU Enterprise Postgres instance, and how to create a database.

Chapter 3 Backing Up the Database

Describes how to back up the database.

Chapter 4 Configuring Secure Communication Using Secure Sockets Layer

Describes communication data encryption between the client and the server.

Chapter 5 Protecting Storage Data Using Transparent Data Encryption

Describes how to encrypt the data to be stored in the database.

Chapter 6 Data Masking

Describes the data masking feature.

Chapter 7 Periodic Operations

Describes the periodic database operations that must be performed on FUJITSU Enterprise Postgres.

Chapter 8 Streaming Replication Using WebAdmin

Describes how to create a streaming replication cluster using WebAdmin.

Chapter 9 Installing and Operating the In-memory Feature

Describes how to install and operate the in-memory feature.

Chapter 10 Parallel Query

Describes the factors taken into consideration by FUJITSU Enterprise Postgres when performing parallel queries.

Chapter 11 High-Speed Data Load

Describes how to install and operate high-speed data load.

Chapter 12 Global Meta Cache

Describes how to use Grobal Meta Cache feature.

Chapter 13 Local Meta Cache Limit

Describes how to use Local Meta Cache Limit feature.

Chapter 14 Backup/Recovery Using the Copy Command

Describes backup and recovery using the copy command created by the user.

Chapter 15 Actions when an Error Occurs

Describes how to perform recovery when disk failure or data corruption occurs.

Appendix A Parameters

Describes the FUJITSU Enterprise Postgres parameters.

Appendix B System Administration Functions

Describes the system administration functions of FUJITSU Enterprise Postgres.

Appendix C System Views

Describes how to use the system view in FUJITSU Enterprise Postgres.

Appendix D Tables Used by Data Masking

Describes the tables used by the data masking feature.

Appendix E Tables Used by High-Speed Data Load

Describes the tables used by high-speed data load.

Appendix F Starting and Stopping the Web Server Feature of WebAdmin

Describes how to start and stop WebAdmin (Web server feature).

Appendix G WebAdmin Wallet

Describes how to use the Wallet feature of WebAdmin.

Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters

Describes characters not allowed in WebAdmin.

Appendix I Collecting Failure Investigation Data

Describes how to collect information for initial investigation.

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Chapter 1 Operating FUJITSU Enterprise Postgres

This chapter describes how to operate FUJITSU Enterprise Postgres.

1.1 Operating Methods

There are two methods of managing FUJITSU Enterprise Postgres operations:

- Operation management using GUI tools
- Operation management using commands

See

Before performing database multiplexing using database multiplexing, refer to "Database Multiplexing Mode" in the Cluster Operation Guide (Database Multiplexing).

Operation management using GUI tools

This involves managing operations using the WebAdmin and pgAdmin GUI tools.

- Management using WebAdmin

  This removes the requirement for complex environment settings and operational design for backup and recovery that is usually required for running a database. It enables you to easily and reliably monitor the state of the database, create a streaming replication cluster, back up the database, and restore it even if you do not have expert knowledge of databases.

- Management using pgAdmin

  When developing applications and maintaining the database, you can use pgAdmin to perform simple operations on database objects, such as:

  - Rebuild indexes and update statistics
  - Create, delete, and update database objects

  In addition, from pgAdmin of FUJITSU Enterprise Postgres, you can use the expanded features provided by FUJITSU Enterprise Postgres on the PostgreSQL SQL commands.

  See

  Refer to pgAdmin Help for information on the expanded features of pgAdmin provided by FUJITSU Enterprise Postgres.

Operation management using commands

You can use commands for configuring and operating the database and managing operations.

Note

- You cannot combine WebAdmin and server commands to perform the following operations:
  - Use commands to operate an instance created using WebAdmin.
  - Use WebAdmin to recover a database backed up using commands.

  For instances created with WebAdmin, however, backup can be obtained with the pgx_dmpall command. Also, WebAdmin can perform recovery by using the backup obtained with the pgx_dmpall command.

- To operate an instance created using the initdb command in WebAdmin, the instance needs to be imported using WebAdmin.

- You can perform backup and restoration in pgAdmin, but the backup data obtained with WebAdmin and pgx_dmpall is not compatible with the backup data obtained with pgAdmin.
- Refer to pgAdmin Help for other notes on pgAdmin.

Features used in each phase

The following table lists the features used in each phase for GUI-based operations and command-based operations.

Operation		Operation with the GUI	Operation with commands
Setup	Creating an instance	WebAdmin is used. The server machine capacity, and the optimum parameter for operations using WebAdmin, are set automatically.	The configuration file is edited directly using the initdb command.
	Creating a standby instance	WebAdmin is used. WebAdmin performs a base backup of the source instance and creates a standby instance.	A standby instance is created using the pg_basebackup command.
	Changing the configuration files	WebAdmin is used.	The configuration file is edited directly.
Starting and stopping an instance		WebAdmin is used.	The net command or sc command of the operating system is used.
Creating a database		This is defined using pgAdmin of the GUI tool, or using the psql command or the application after specifying the DDL statement.	
Backing up the database		WebAdmin, or the pgx_dmpall command, is used.	It is recommended that the pgx_dmpall command be used. Recovery to the latest database can be performed.
Database recovery		WebAdmin is used.	To use the backup that was performed using the pgx_dmpall command, the pgx_rcvall command is used.
Monitoring	Database errors	The status in the WebAdmin window can be checked. (*1)	The messages that are output to the database server log are monitored (*1)
	Disk space	The status in the WebAdmin window can be checked. A warning will be displayed if the free space falls below 20%. (*1)	This is monitored using the fsutil command (check free space), and the dir command (check used space), of the operating system, for example. (*1)
	Connection status	This can be checked using pgAdmin of the GUI tool, or referencing pg_stat_activity of the standard statistics view from psql or the application.	

*1: This can be used together with system log monitoring using operations management middleware (Systemwalker Centric Manager, for example).

1.2 Starting WebAdmin

This section describes how to start and log in to WebAdmin.

1.2.1 Logging in to WebAdmin

This section describes how to log in to WebAdmin.

User environment

It is recommended to use the following browsers with WebAdmin:

- Internet Explorer 11
- Microsoft Edge (Build41 or later)

WebAdmin will work with other browsers, such as Firefox and Chrome, however, the look and feel may be slightly different.

Startup URL for WebAdmin

In the browser address bar, type the startup URL of the WebAdmin window in the following format:

```
http://hostNameOrIpAddress:portNumber/
```

- *hostNameOrIpAddress*: The host name or IP address of the server where WebAdmin is installed.
- *portNumber*: The port number of WebAdmin. The default port number is 27515.

Example

For a server with IP address "192.0.2.0" and port number "27515"

```
http://192.0.2.0:27515/
```

The startup URL window shown below is displayed. From this window you can log in to WebAdmin or access the product documentation.

Note

- You must start the Web server feature of WebAdmin before using WebAdmin.

- Refer to "Appendix F Starting and Stopping the Web Server Feature of WebAdmin" for information on how to start the Web server feature of WebAdmin.

Log in to WebAdmin

Click [Launch WebAdmin] in the startup URL window to start WebAdmin and display the login window.

To log in, specify the following values:

- [User name]: User name (OS user account) of the instance administrator
- [Password]: Password corresponding to the user name

Point

Use the OS user account as the user name of the instance administrator. Refer to "Creating an Instance Administrator" in the Installation and Setup Guide for Server for details.

1.3 Starting pgAdmin

This section describes how to start pgAdmin, how to add an instance required for managing a database, and how to connect to and disconnect from the instance.

You can use pgAdmin on the Windows client.

1.3.1 Starting pgAdmin

This section explains how to start pgAdmin if you are using it from the product "FUJITSU Enterprise Postgres Client (*AA*bit) *x* SP*z*" (where *AA* is "32" or "64", "*x*" is the product version, and "*z*" is the product level (*x* SP*z*)).

Windows(R) 8.1

From the [Apps] view, start [pgAdmin 4 (*AA*bit) (*x* SP*z*)].

Windows(R) 10, Windows Server(R) 2016, or Windows Server(R) 2019

Click [Start] >> [All apps] >> [FUJITSU Enterprise Postgres Client(*AA*bit) *x* SP*z*] and start [pgAdmin 4 (*AA*bit) (*x* SP*z*)].

Note

- You must start the instance to be connected to before using pgAdmin.
- Refer to "2.1 Starting and Stopping an Instance" for information on how to start an instance.
- When using pgAdmin4 with Microsoft Edge, enable network access by loopback in Microsoft Edge. Also, add Microsoft Edge to the loopback exclusion list.

1.3.2 Adding an Instance

This section describes how to add an instance to be connected to.

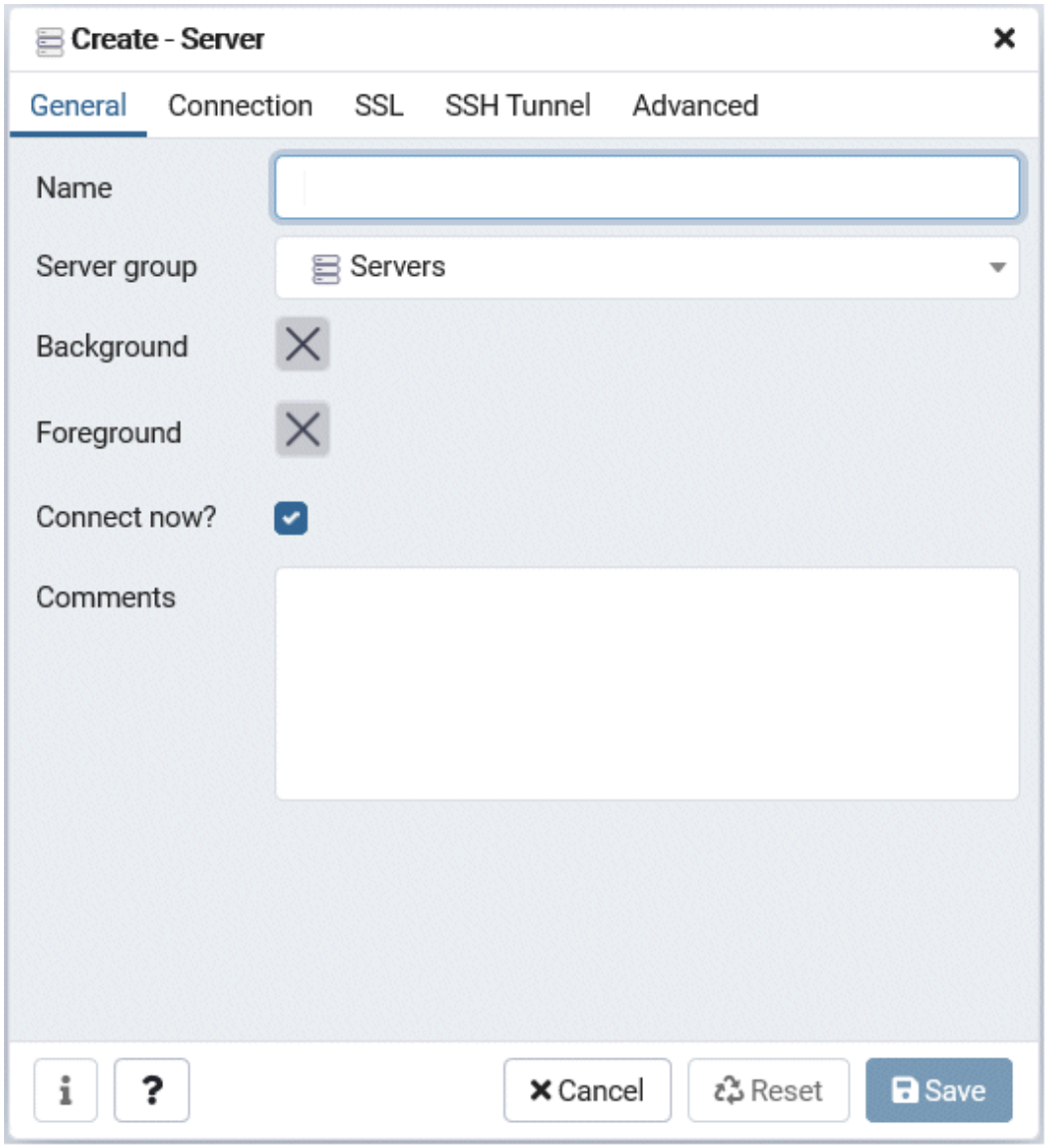
Note

If you use a link-local address with version 6 of the TCP/IP protocol, you may encounter the following error when registering the server with pgAdmin. Therefore, do not use link-local addresses.

```
unsupported format character '"' (0x22) at index 96
```

1. In the [Browser] pane, right-click [Servers], and then click [Create] >> [Server].

2. In the [Create - Server] window, specify a value for each item.



[General] tab

- [Name]: Name of the instance to be managed

[Connection] tab

- [Host name/address]: Host name or IP address of the server where FUJITSU Enterprise Postgres is installed
- [Port]: Port number of the instance
- [Username]: User name of the instance administrator
- [Password]: Password for the user name specified in [Username]

When you add an instance using pgAdmin, the instance is automatically connected to immediately after the addition is completed.

Note

If you select [Save password], the FUJITSU Enterprise Postgres connection password is stored in the following location. Set the appropriate access permissions for the password file to protect it from unauthorized access.

- %APPDATA%\Roaming\pgAdmin\pgadmin4.db

1.3.3 Connecting/Disconnecting an Instance

This section describes how to connect pgAdmin to an instance, and how to disconnect it.

Note

To connect to an instance created using WebAdmin, you must first configure the settings in the [Client authentication] window of WebAdmin to permit connection from pgAdmin.

See

Refer to "Changing the settings" in the Installation and Setup Guide for Server for information on the [Client authentication] window of WebAdmin.

Connecting to an instance

Starting pgAdmin does not connect it to any instance.

To connect to an instance, in the [Browser] pane, right-click the instance, and then click [Connect Server].

If a password was not saved when the instance was added, enter a password in the password entry window that is displayed.

Disconnecting from an instance

To disconnect from an instance, in the [Browser] pane, right-click the server, and then click [Disconnect Server].

1.4 Operations Using Commands

You can operate and manage the database using the following commands:

- Server commands

  This group of commands includes commands for creating a database cluster and controlling the database. You can run these commands on the server where the database is operating.

  To use these commands, you must configure the environment variables.

  See

  - Refer to "PostgreSQL Server Applications" under "Reference" in the PostgreSQL Documentation, or "Reference" for information on server commands.
  - Refer to "Configure the environment variables" in the procedure to create instances in "Using the initdb Command" in the Installation and Setup Guide for Server for information on configuring the environment variables.

- Client commands

  This group of commands includes the psql command and commands for extracting the database cluster to a script file. These commands can be executed on the client that can connect to the database, or on the server on which the database is running.

  To use these commands, you must configure the environment variables.

  See

  - Refer to "PostgreSQL Client Applications" under "Reference" in the PostgreSQL Documentation, or "Reference" for information on client commands.

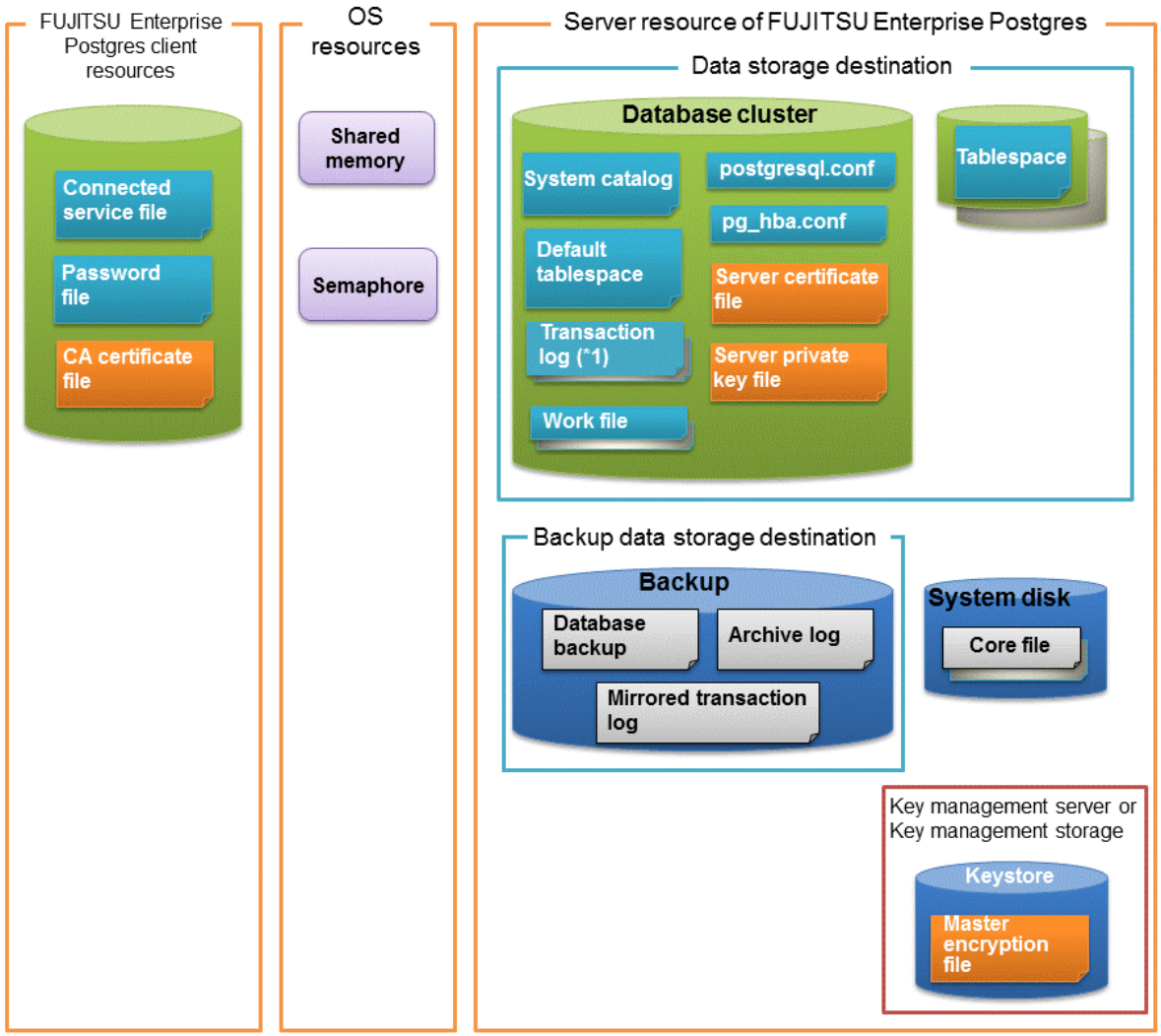
- Refer to "Configuring Environment Variables" in the Installation and Setup Guide for Client for information on the values to be set in the environment variables.

1.5 Operating Environment of FUJITSU Enterprise Postgres

This section describes the operating environment and the file composition of FUJITSU Enterprise Postgres.

1.5.1 Operating Environment

The following figure shows the configuration of the FUJITSU Enterprise Postgres operating environment. The tables given below list the roles of the OS resources and FUJITSU Enterprise Postgres resources.



*1: To distribute the I/O load, place the transaction log on a different disk from the data storage destination.

Table 1.1 OS resources

Type	Role
Shared memory	Used when a database process exchanges information with an external process.
Semaphore	

Table 1.2 FUJITSU Enterprise Postgres client resources

Type	Role
Connection service file	Specifies information, such as the host name, user name, and password, for connecting to FUJITSU Enterprise Postgres.
Password file	Securely manages the password for connecting to FUJITSU Enterprise Postgres.
CA certificate file	CA (certificate authority) certificate used for server authentication when encrypting communication data.

Table 1.3 Server resources of FUJITSU Enterprise Postgres

Type	Role
Database cluster	Database storage area on the database storage disk. It is a collection of databases managed by an instance.
System catalog	Contains information required for the system to run, including the database definition information and the operation information created by the user.
Default tablespace	Contains table files and index files stored by default.
Transaction log	Contains log information in case of a crash recovery or rollback. This is the same as the WAL (Write Ahead Log).
Work file	Work file used when executing applications or commands.
postgresql.conf	Contains information that defines the operating environment of FUJITSU Enterprise Postgres.
pg_hba.conf	FUJITSU Enterprise Postgres uses this file to authenticate individual client hosts.
Server certificate file	Contains information about the server certificate to be used when encrypting communication data and authenticating a server.
Server private key file	Contains information about the server private key to be used when encrypting communication data and authenticating a server
Tablespace	Stores table files and index files in a separate area from the database cluster. Specify a space other than that under the database cluster.
Backup	Stores the data required for recovering the database when an error, such as disk failure, occurs.
Database backup	Contains the backup data for the database.
Archive log	Contains the log information for recovery.
Mirrored transaction log (mirrored WAL)	Enables a database cluster to be restored to the state immediately before an error even if both the database cluster and transaction log fail when performing backup/recovery operations using the pgx_dmpall command or WebAdmin.
Core file	FUJITSU Enterprise Postgres process core file that is output when an error occurs during a FUJITSU Enterprise Postgres process.
Key management server or key management storage	Server or storage where the master encryption key file is located.
Master encryption key file	Contains the master encryption key to be used when encrypting storage data. The master encryption key file is managed on the key management server or key management storage.

1.5.2 File Composition

FUJITSU Enterprise Postgres consists of the following files for controlling and storing the database. The table below shows the relationship between the number of such files and their location within a single instance.

Table 1.4 Number of files within a single instance and how to specify their location

File type	Required	Quantity	How to specify the location
Program files	Y	Multiple	Note that "<*x*>" indicates the product version. By default, the following location is used: %Program Files%\Fujitsu\fsepv<*x*>server64
Database cluster	Y	1	Specify using WebAdmin or server commands.
Tablespace	Y	Multiple	Specify a space other than that under the database cluster, using pgAdmin or the DDL statement.
Backup	Y	Multiple	Specify using WebAdmin or server commands.
Core file	Y	Multiple	Specify using WebAdmin, server commands, or postgresql.conf.
Server certificate file (*1)	N	1	Specify using postgresql.conf.
Server private key file (*1)	N	1	Specify using postgresql.conf.
Master encryption key file (*1)	N	1	Specify the directory created as the key store using postgresql.conf.
Connection service file (*1)	N	1	Specify using environment variables.
Password file (*1)	N	1	Specify using environment variables.
CA certificate file (*1)	N	1	Specify using environment variables.

Y: Mandatory
N: Optional

*1: Set manually when using the applicable feature.

Note

If anti-virus software is used, set scan exception settings for directories so that none of the files that comprise FUJITSU Enterprise Postgres are scanned for viruses. Alternatively, if the files that comprise FUJITSU Enterprise Postgres are to be scanned for viruses, stop FUJITSU Enterprise Postgres and perform the scan when tasks that use FUJITSU Enterprise Postgres are not operating.

1.6 Notes on Compatibility of Applications Used for Operations

When you upgrade FUJITSU Enterprise Postgres to a newer version, there may be some effect on applications due to improvements or enhancements in functionality.

Take this into account when creating applications so that you can maintain compatibility after upgrading to a newer version of FUJITSU Enterprise Postgres.

See

Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

1.7 Notes on Upgrading Database Instances

When upgrading FUJITSU Enterprise Postgres 9.4 or newer database instances to FUJITSU Enterprise Postgres 10 or later using pg_upgrade, there are certain steps you need to follow.

Before using pg_upgrade, remove the following extensions from all databases in the instance, except "template0":

- pg_stat_statements
- pgx_io
- pgx_paging
- pgx_network
- pgx_network_err
- pgx_cpu
- pgx_memory
- pgx_swap
- pgx_disk
- pgx_process
- pgx_log
- oracle_compatible
- pg_dbms_stats
- pg_hint_plan

For all databases except "template0", execute the following command to remove these extensions:

```
DROP EXTENSION extensionName;
```

Once the pg_upgrade operation is complete, for all databases except "template0", execute the following command to re-create these extensions as required:

```
CREATE EXTENSION extensionName;
```

Note

- It is strongly recommended to back up the database using pg_dump before performing pg_upgrade or using DROP EXTENSION.
- If there are any columns created in the user tables using a data type from these extensions, then DROP EXTENSION will also drop these columns. Therefore, it is essential that alternate upgrade mechanisms are considered instead of pg_upgrade, in such scenarios. These may include pg_dump/pg_restore.

1.7.1 Additional Steps for upgrading to FUJITSU Enterprise Postgres with Vertical Clustered Index (VCI) Enabled

When upgrading FUJITSU Enterprise Postgres 11.0 or earlier instances that are using the VCI extension to FUJITSU Enterprise Postgres 12 or later using pg_upgrade, additional steps must be performed because of the incompatibility of the VCI extension between FUJITSU Enterprise Postgres 12 or later and FUJITSU Enterprise Postgres 11 or earlier.

Follow the procedure below in all databases in the FUJITSU Enterprise Postgres 11 or earlier instance, except "template0".

Before upgrading

1. Obtain the CREATE INDEX Definitions

   Run the query below to list all the VCI indexes created in the database. Ensure that these indexes are re-created in the FUJITSU Enterprise Postgres 12 or later instance after pg_upgrade has finished.

```
SELECT nspname || '.' || relname AS index_relname,* FROM pg_class, pg_namespace
  WHERE relnamespace = pg_namespace.oid AND relam IN (SELECT oid FROM pg_am WHERE amname='vci');
```

   For each index_relname listed above, execute the commands below to obtain the CREATE INDEX definition (to use the same SQL syntax while re-creating the indexes on the FUJITSU Enterprise Postgres 12 or later instance).

```
SELECT pg_get_indexdef('indexName'::regclass);
```

2. Drop the VCI indexes and VCI extension along with all its dependencies.

   To remove all the VCI indexes and VCI internal objects that are created in FUJITSU Enterprise Postgres, execute the commands below. VCI internal objects will be created in FUJITSU Enterprise Postgres 12 or later automatically when CREATE EXTENSION for VCI is executed.

```
DROP EXTENSION VCI CASCADE;
```

   Note

   To restore the VCI extension in the FUJITSU Enterprise Postgres 11 or earlier instance, execute CREATE EXTENSION.

After upgrading

Once the pg_upgrade operation is complete, for all databases except "template0", execute CREATE EXTENSION to create the VCI extension, and then execute CREATE INDEX for all the VCI indexes as required.

Chapter 2 Starting an Instance and Creating a Database

This chapter describes basic operations, from starting an instance to creating a database.

2.1 Starting and Stopping an Instance

This section describes how to start and stop an instance.

- 2.1.1 Using WebAdmin
- 2.1.2 Using Commands

Point

To automatically start or stop an instance when the operating system on the database server is started or stopped, refer to "Configuring Automatic Start and Stop of an Instance" in the Installation and Setup Guide for Server and configure the settings.

Note

The collected statistics are initialized if an instance is stopped in the "Immediate" mode or if it is abnormally terminated. To prepare for such initialization of statistics, consider regular collection of the statistics by using the SELECT statement. Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for information on the statistics.

2.1.1 Using WebAdmin

WebAdmin enables you to start or stop an instance and check its operating status.

Starting an instance

Start an instance by using the [Instances] tab in WebAdmin.

is displayed when an instance is stopped.

To start a stopped instance, click .

Stopping an instance

Stop an instance by using the [Instances] tab in WebAdmin.

 is displayed when an instance is active.

To stop an active instance, click .

Stop mode

Select the mode in which to stop the instance. The following describes the operations of the modes:

Stop mode	Connected clients	Backup being executed using the command
Smart mode (*1)	Waits for all connected clients to be disconnected.	Waits for backups being executed using the command to finish.
Fast mode	Rolls back all transactions being executed and forcibly disconnects clients.	Terminates backups being executed using the command.
Immediate mode	All server processes are terminated immediately. Crash recovery is executed the next time the instance is started.	

Stop mode	Connected clients	Backup being executed using the command
Kill process mode	Send SIGKILL to the process and abort all active transactions. This will lead to a crash-recovery run at the next restart.	

*1: When the processing to stop the instance in the Smart mode has started and you want to stop immediately, use the following procedure:

1. Restart the Web server feature of WebAdmin.
2. In the [Instances] tab, click .
3. In the [Instances] tab, click , and select the Immediate mode to stop the instance.

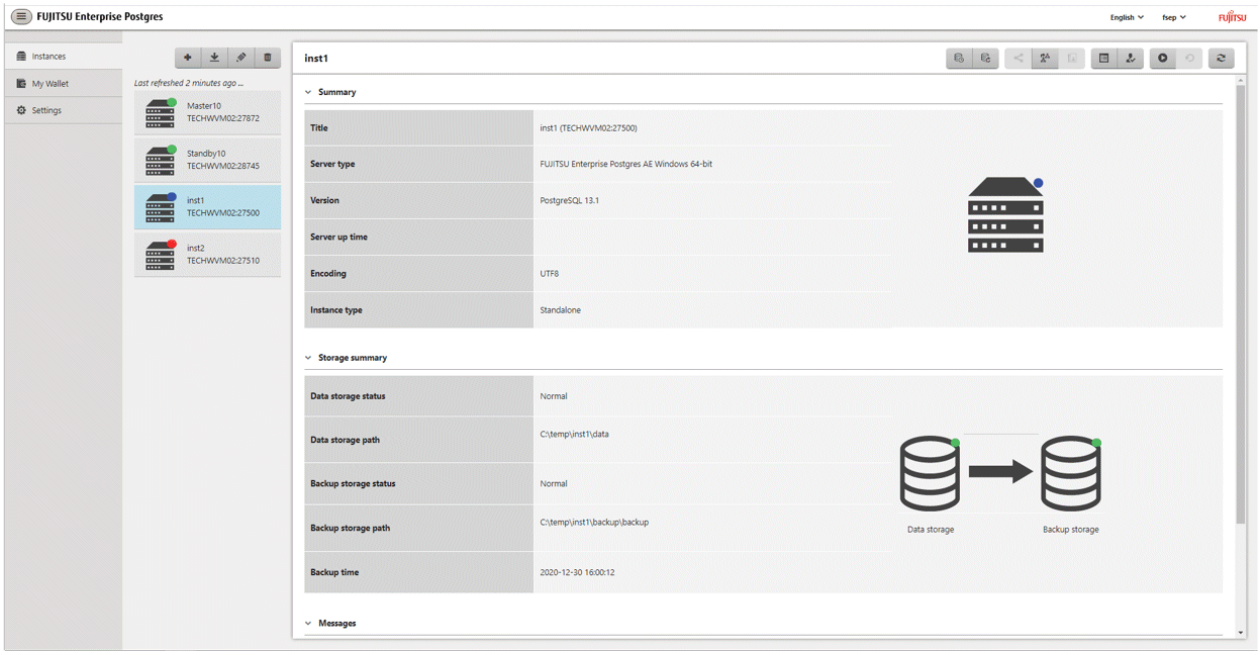
Checking the operating status of an instance

You can check the operating status of an instance by using the [Instances] tab. The following indicators are used to show the status of a resource.

Status indicator	Explanation
	The resource is operating normally.
	The resource is stopped.
	There is an error in the resource.
	An operation is in progress on this resource or the status is being checked.
	The resource is not operating optimally and needs intervention.

If an instance stops abnormally, remove the cause of the stoppage and start the instance by using WebAdmin.

Figure 2.1 Example of operating status indicators



Note

- When operating WebAdmin, click to update the status. WebAdmin will reflect the latest status of the operation or the instance resources from the server.
- If an error occurs while communicating with the server, there may be no response from WebAdmin. When this happens, close the browser and then log in again. If this does not resolve the issue, check the event log of the server and confirm whether a communication error has occurred.
- The following message is output during startup of an instance when the startup process is operating normally, therefore, the user does not need to be aware of this message:

```
FATAL:  the database system is starting up
```

2.1.2 Using Commands

The Windows service-related commands enable you to start or stop an instance and to check its operating state.

If you are to use Windows services, you should register instances in Windows services.

See

Refer to "When an instance was created with WebAdmin" in "Configuring Automatic Start and Stop of an Instance" in the Installation Guide for Server for information on registering instances in Windows services.

Note

While it is also possible for you to execute the pg_ctl command to start and stop instances without having to register instances in Windows services, it is recommended that you use Windows services to start and stop instances for the following reason:

- If you use the pg_ctl command to start an instance, the instance will be started as a user process. Therefore, when you close the [Command Prompt] window in which you executed the command, Windows forces the postgres process to stop.

Starting an instance

You can start an instance by specifying the service name in the net start command or sc start command.

Also, you can use the following procedure to start an instance in the Windows services window:

1. Display the [Services] window

   In the [Administrative Tools], click [Services].

2. Start a service

   Select the instance name that you wish to start from the services list, and click [Start Service].

Stopping an instance

You can stop an instance by specifying the service name in the net stop command or sc stop command.

Also, you can use the following procedure to stop an instance in the Windows services window:

1. Display the [Services] window

   In the [Administrative Tools], click [Services].

2. Stop the service

   Select the instance name that you wish to stop from the services list, and click [Stop Service]. If you stop a service while applications and commands are running, FUJITSU Enterprise Postgres will force those applications and commands to close and will stop normally.

Checking the operating state of an instance

Use the following procedure to check if an instance is operating correctly immediately after performing the operation to start an instance:

1. Display the [Services] window

   In the [Start] menu, select [Administrative Tools], and then click [Services].

2. Check the state of the service

   In the services list, check the state of the services for the applicable FUJITSU Enterprise Postgres.

To check the operating state of an instance during operation, use the pg_ctl command.

Specify the following in the pg_ctl command:

- Specify "status" as the mode.
- Specify the data storage destination directory in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

Example

When the instance is active:

```
> pg_ctl status -D D:\database\inst1
pg_ctl: server is running (PID: 1234)
```

When the instance is inactive:

```
> pg_ctl status -D D:\database\inst1
pg_ctl: no server running
```

Information

You can also use the net start command or sc query command to check the operating state of an instance.

See

Refer to "pg_ctl" in "Reference" in the PostgreSQL Documentation for information on the pg_ctl command.

2.2 Creating a Database

This section explains how to create a database.

- 2.2.1 Using pgAdmin
- 2.2.2 Using Client Commands

2.2.1 Using pgAdmin

Follow the procedure below to define a database using pgAdmin.

1. In the pgAdmin window, right-click [Databases] in the [Browser] pane, and then click [Create] >> [Database] to display a [Create - Database] window.
2. Specify appropriate values for the following items in the [Create - Database] window.
   - [General] tab
     - [Database]: Name of the database to be managed
3. Click [Save] to create the database.

2.2.2 Using Client Commands

Follow the procedure below to define a database using client commands.

An example of operations on the server is shown below.

1. Use psql command to connect to the postgres database.
   Execute psql postgres.

```
> psql postgres
psql (13.3)
Type "help" for help.
```

2. Create the database.
   To create the database, execute the CREATE DATABASE databaseName; statement.

```
postgres=# CREATE DATABASE db01;
CREATE DATABASE
```

3. Confirm that the database is created.
   Execute \l+, and confirm that the name of the database created in step 2 is displayed.

```
postgres=# \l+
```

4. Disconnect from the postgres database.
   Execute \q to terminate the psql command.

```
postgres=# \q
```

You can create a database using the createdb command.

See

Refer to "Creating a Database" in "Tutorial" in the PostgreSQL Documentation for information on creating a database using the createdb command.

Chapter 3 Backing Up the Database

This chapter describes how to back up the database.

Backup methods

The following backup methods enable you to recover data to a backup point or to the state immediately preceding disk physical breakdown or data logical failure.

- Backup using WebAdmin

  This method enables you to back up data through intuitive window operations using the GUI.

  WebAdmin is used for recovery.

- Backup using the pgx_dmpall command

  Execute the pgx_dmpall command with a script to perform automatic backup.

  To back up data automatically, you must register the process in the automation software of the operating system. Follow the procedure given in the documentation for your operating system.

  The pgx_rcvall command is used for recovery.

Information

By using a copy command created by the user, the pgx_dmpall command and the pgx_rcvall command can back up database clusters and tablespaces to any destination and recover them from any destination using any copy method. Refer to "Chapter 14 Backup/Recovery Using the Copy Command" for details.

Approximate backup time

The formula for deriving the approximate backup time when you use WebAdmin or the pgx_dmpall command is as follows:

```
backupTime = dataStorageDestinationUsage / diskWritePerformance x 1.5
```

- *dataStorageDestinationUsage*: Disk usage at the data storage destination
- *diskWritePerformance*: Maximum data volume (bytes/second) that can be written per second in the system environment where operation is performed
- 1.5: Coefficient to factor in tasks other than disk write (which is the most time-consuming step)

If using the copy command with the pgx_dmpall command, the backup time will depend on the implementation of the copy command.

Note

- Backup operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.
- Use the selected backup method continuously.

  There are several differences, such as the data format, across the backup methods. For this reason, the following restrictions apply:

  - It is not possible to use one method for backup and another for recovery.
  - It is not possible to convert one type of backup data to a different type of backup data.
- Mirrored WALs can be used only for backup/recovery using the pgx_dmpall command or WebAdmin.
- There are several considerations for the backup of the keystore and backup of the database in case the data stored in the database is encrypted. Refer to the following for details:

  - 5.6.4 Backing Up and Recovering the Keystore
  - 5.7 Backing Up and Restoring/Recovering the Database

- If you have defined a tablespace, back it up. If you do not back it up, directories for the tablespace are not created during recovery, which may cause the recovery to fail. If the recovery fails, refer to the event log, create the tablespace, and then perform the recovery process again.
- If performing backups with WebAdmin, the following password file is temporarily created during backup for WebAdmin to connect to the database:
  - *userProfileFolder**localSettingsFolder*\Fujitsu\fsep_*version**instanceName*\pgpass.conf

  Therefore, when you are backing up corefiles created in the core_directory parameter of postgresql.conf, or log files created in the log_directory parameter of postgresql.conf, ensure not to back up the password files located in the same directories at the same time.

Information

The following methods can also be used to perform backup. Performing a backup using these methods allows you to restore to the point when the backup was performed.

- Backup using an SQL-based dump

  Dump the data by using SQL. This backup method also enables data migration.
- File system level backup

  This backup method requires you to stop the instance and use OS commands to backup database resources as files.
- Backup by continuous archiving

  This is the standard backup method for PostgreSQL.

Refer to "Backup and Restore" in "Server Administration" in the PostgreSQL Documentation for information on these backup methods.

3.1 Periodic Backup

It is recommended that you perform backup periodically.

Backing up data periodically using WebAdmin or the pgx_dmpall command has the following advantages:

- This method reduces disk usage, because obsolete archive logs (transaction logs copied to the backup data storage destination) are deleted. It also minimizes the recovery time when an error occurs.

Backup cycle

The time interval when backup is performed periodically is called the backup cycle. For example, if backup is performed every morning, the backup cycle is 1 day.
The backup cycle depends on the jobs being run, but on FUJITSU Enterprise Postgres it is recommended that operations are run with a backup cycle of at least once per day.

3.2 Backup Methods

This section describes the methods for backing up the database.

- 3.2.1 Using WebAdmin
- 3.2.2 Using Server Commands

3.2.1 Using WebAdmin

You can use WebAdmin to perform backup and check the backup status.

Note

- If backup is disabled for an instance, you will not be able to back up or restore the instance. Refer to "[Backup]" in "Creating an Instance" in the Installation and Setup Guide for Server for details.
- If the data to be stored in the database is to be encrypted, it is necessary to enable the automatic opening of the keystore before doing so. Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for details.
- WebAdmin uses the labels "Data storage path", "Backup storage path" and "Transaction log path" to indicate "data storage destination", "backup data storage destination" and "transaction log storage destination" respectively. In this manual these terms are used interchangeably.

Backup operation

Follow the procedure below to back up the database.

1. Select the database to back up

   In the [Instances] tab, select the instance to be backed up and click .

2. Back up the database

   The [Backup] dialog box is displayed. To perform backup, click [Yes].
   An instance is automatically started when backup is performed.

Backup status

If an error occurs and backup fails, [Error] is displayed adjacent to [Data storage status] or [Backup storage status] in the [Instances] tab. An error message is also displayed in the message list.

In this case, the backup data is not optimized. Ensure that you check the backup result whenever you perform backup. If backup fails, [Solution] appears to the right of the error message. Clicking this button displays information explaining how to resolve the cause of the error. Remove the cause of failure, and perform backup again.

3.2.2 Using Server Commands

Use the pgx_dmpall command and pgx_rcvall command to perform backup and check the backup result.

Preparing for backup

You must prepare for backup before actually starting the backup process.

Follow the procedure below.

See

Refer to "Preparing Directories to Deploy Resources" in the Installation and Setup Guide for Server for information on the location of directories required for backup and for points to take into account.

1. Prepare the backup data storage disk

   For backup, prepare a separate disk unit from the database storage disk and mount it using the operating system commands.

2. Create a directory where the backup data will be stored

   Create an empty directory.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the directory.

See

Refer to [Help and Support] in Windows(R) for information on [Properties].

3. Specify the settings required for backup

   Stop the instance, and set the following parameters in the postgresql.conf file.

   Start the instance after editing the postgresql.conf file.

Parameter name	Setting	Description
backup_destination	Name of the directory where the backup data will be stored	Specify the name of the directory where the backup data will be stored. Appropriate privileges that allow only the instance administrator to access the directory must already be set. Place the backup data storage destination directory outside the data storage destination directory, the tablespace directory, and the transaction log storage destination directory.
archive_mode	on	Specify the archive log mode. Specify [on] (execute).
archive_command	'cmd /c ""*installationDirectory*\\bin\ \pgx_walcopy.cmd" "%p" "*backupDataStorageDestinationDirectory*\ \archived_wal\\%f"""	Specify the path name of the command that will save the transaction log and the storage destination. Note the following when specifying the path: - Specify \\ as the path delimiter. - Enclose the path in double quotes ("") if it contains spaces.

   Refer to "Appendix A Parameters" and "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on the parameters.

Backup operation (file backup)

Use the pgx_dmpall command to perform file backup. You can even embed the pgx_dmpall command in OS automation software to perform backup.

The backup data is stored in the directory specified in the backup_destination parameter of postgresql.conf.

Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

Example

```
> pgx_dmpall -D D:\database\inst1
```

Note

Backup stores the data obtained during the backup and the backup data of the data obtained during previous backup.

If the data to be stored in the database is encrypted, refer to the following and back up the keystore:

- 5.6.4 Backing Up and Recovering the Keystore

Backup status

Use the pgx_rcvall command to check the backup status.

Specify the following values in the pgx_rcvall command:

- The -l option indicates backup data information.
- Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

```
> pgx_rcvall -l -D D:\database\inst1
Date                    Status          Dir
2020-05-01 13:30:40     COMPLETE        E:/backup/inst1/2020-05-01_13-30-40
```

If an error occurs and backup fails, a message is output to the event log.

In this case, the backup data is not optimized. Ensure that you check the backup result whenever you perform backup. If backup fails, remove the cause of failure and perform backup again.

See

Refer to "pgx_dmpall" and "pgx_rcvall" in the Reference for information on the pgx_dmpall command and pgx_rcvall command.

Setting a restore point

In case you want to recover your database to a certain point in time, you can name this particular point in time, which is referred to as the restore point, by using the psql command.

By setting a restore point before executing an application, it becomes easy to identify up to which point in time the data will be reverted.

A restore point can be set to any point in time after a backup is executed. However, if a restore point is set before a backup is executed, the database cannot be recovered to that point in time. This is because restore points are recorded in the archive logs, and the archive logs are discarded when backups are executed.

Example

The following example uses the psql command to connect to the database and execute the SQL statement to set a restore point.

However, when considering continued compatibility of applications, do not use functions directly in SQL statements. Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

```
postgres=# SELECT pg_create_restore_point('batch_20200503_1');
LOG:  restore point "batch_20200503_1" created at 0/20000E8
STATEMENT:  select pg_create_restore_point('batch_20200503_1');
 pg_create_restore_point
-------------------------
 0/20000E8
(1 row)
```

Refer to "15.3.2 Using the pgx_rcvall Command" for information on using a restore point to recover the database.

Note

- Name restore points so that they are unique within the database. Add the date and time of setting a restore point to distinguish it from other restore points, as shown below:
  - YYMMDD_HHMMSS
    - YYMMDD: Indicates the date
    - HHMMSS: Indicates the time
- There is no way to check restore points you have set. Keep a record in, for example, a file.

See

Refer to "System Administration Functions" under "Functions and Operators" in the PostgreSQL Documentation for information on pg_create_restore_point.

Chapter 4 Configuring Secure Communication Using Secure Sockets Layer

If communication data transferred between a client and a server contains confidential information, encrypting the communication data can protect it against threats, such as eavesdropping on the network.

4.1 Configuring Communication Data Encryption

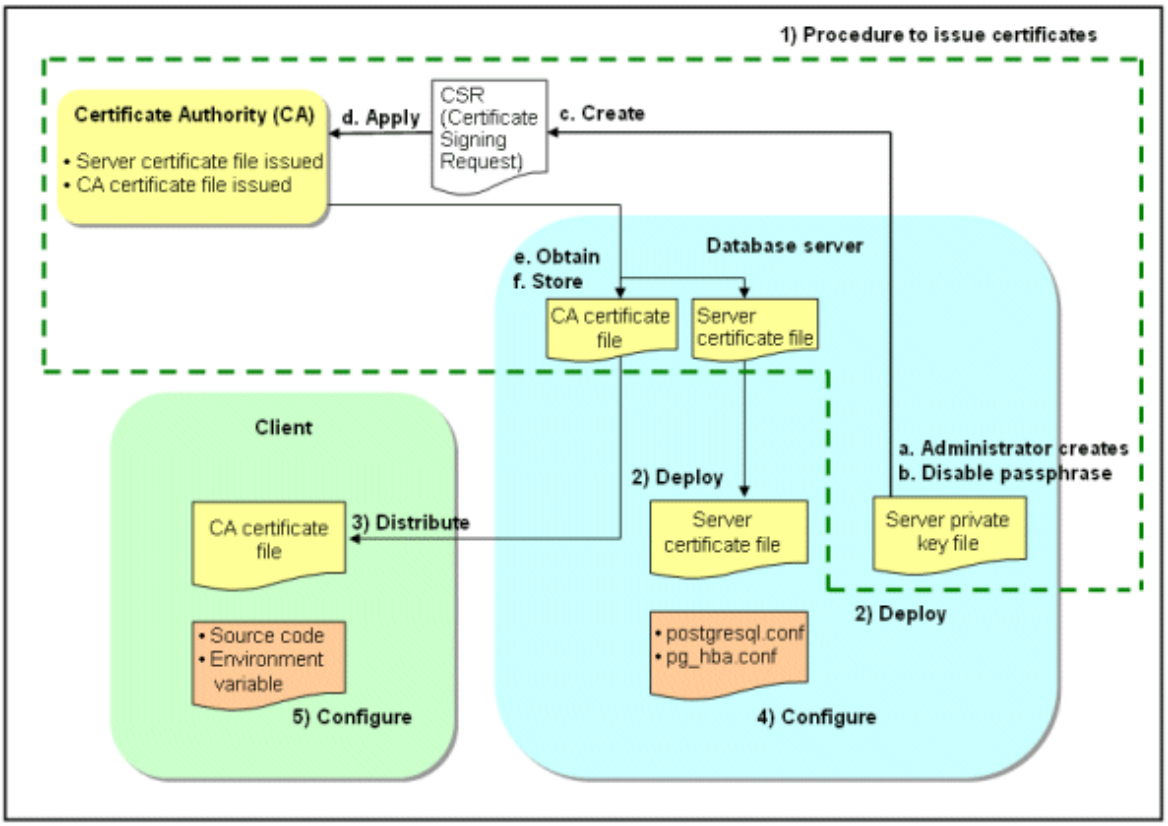
To encrypt communication data transferred between a client and a server, configure communication data encryption as described below. Communication data encryption not only protects the communication content, but it also guards against man-in-the-middle (MITM) attacks (for example, data and password theft through server impersonation).

Table 4.1 Configuration procedure

Configuration procedure
1) Issue a certificate
2) Deploy a server certificate file and a server private key file
3) Distribute a CA certificate file to the client
4) Configure the operating environment for the database server
5) Configure the operating environment for the client

The following figure illustrates the environment for communication data encryption.

Figure 4.1 Environment for communication data encryption



4.1.1 Issuing a Certificate

For authenticating servers, you must acquire a certificate issued by the certificate authority (CA).
FUJITSU Enterprise Postgres supports X.509 standard PEM format files. If the certificate authority issues a file in DER format, use a tool such as the openssl command to convert the DER format file to PEM format.

The following provides an overview of the procedure. Refer to the procedure published by the public or independent certificate authority (CA) that provides the certificate file for details.

a. Create a server private key file

b. Disable the passphrase for the server private key file

c. Create a CSR (signing request for obtaining a server certificate) from the server private key file

d. Apply to the certificate authority (CA) for a server certificate

e. Obtain a server certificate file and a CA certificate file from the certificate authority (CA)

f. Store the server certificate file and the CA certificate file
   Note: If you lose or destroy the certificates, you will need to have them re-issued.

The above procedure enables you to prepare the following files:

- Server private key file
- Server certificate file
- CA certificate file

4.1.2 Deploying a Server Certificate File and a Server Private Key File

Create a directory on the local disk of the database server and store the server certificate file and the server private key file in it.
Use the operating system features to set access privileges for the server certificate file and the server private key file so that only the database administrator has load privileges.
Back up the server certificate file and the server private key file in the event that data corruption occurs and store them securely.

4.1.3 Distributing a CA Certificate File to the Client

Create a directory on the local disk of the client and place the distributed CA certificate file there. Use the operating system features to set load privileges to protect the CA certificate file against accidental deletion.

4.1.4 Configuring the Operating Environment for the Database Server

See

Refer to "Secure TCP/IP Connections with SSL" under "Server Administration" in the PostgreSQL Documentation for details.

4.1.5 Configuring the Operating Environment for the Client

See

Refer to the following sections in the Application Development Guide for details, depending on your application development environment:

- "Settings for Encrypting Communication Data" under "Setup" in "JDBC Driver"
- "Settings for Encrypting Communication Data" under "Setup" in "C Library (libpq)"
- "Settings for Encrypting Communication Data" under "Setup" in "Embedded SQL in C"

4.1.6 Performing Database Multiplexing

When you perform communication that uses database multiplexing and a Secure Socket Layer server certificate, certificates with the same "Common Name" must be used. To ensure this, take one of the following actions:

- Create one server certificate, replicate it, and place a copy on each server used for database multiplexing.
- Create a server certificate with the same "Common Name" for each server used for database multiplexing.

See

Refer to "Using the Application Connection Switch Feature" in the Application Development Guide for information on how to specify applications on the client.

Chapter 5 Protecting Storage Data Using Transparent Data Encryption

This chapter describes how to encrypt data to be stored in the database.

5.1 Protecting Data Using Encryption

With PostgreSQL, data in a database is protected from access by unauthorized database users through the use of authentication and access controls. However, the OS file is not protected from attackers who bypass the database server's authentication and access controls.

With FUJITSU Enterprise Postgres, data inside the OS file is encrypted, so valuable information is protected even if the file or disk is stolen.

Data to be stored in a database is encrypted when it is written to the data file, and decrypted when it is read.

This is performed automatically by the instance, so the user and the application need not be aware of key management and encryption or decryption. This process is called TDE (Transparent Data Encryption).

The characteristics of TDE are described below.

Encryption mechanisms

Two-layer encryption key and the keystore

In each tablespace, there is a tablespace encryption key that encrypts and decrypts all the data within. The tablespace encryption key is encrypted by the master encryption key and saved.
Only one master encryption key exists in a database cluster. It is encrypted based on a passphrase specified by the user and stored in a keystore. FUJITSU Enterprise Postgres provides a file-based keystore. Attackers who do not know the passphrase cannot read the master encryption key from the keystore.

Strong encryption algorithms

TDE uses the Advanced Encryption Standard (AES) as its encryption algorithm. AES was adopted as a standard in 2002 by the United States Federal Government, and is used throughout the world.

Faster encryption and decryption based on hardware

TDE minimizes the overhead of encryption and decryption by using the AES-NI (Advanced Encryption Standard New Instructions) built into Intel(R) Xeon(R) processors since the 5600 series. This means that even in situations where previously the minimum encryption target was selected as a tradeoff between performance and security, it is now possible to encrypt all the data of an application.

Refer to the Intel Corporation's website for information on the list of processors equipped with AES-NI.

Zero overhead storage areas

Encryption does not change the size of data stored in tables, indexes, or WAL. There is, therefore, no need for additional estimates or disks.

Scope of encryption

All user data within the specified tablespace

The tablespace is the unit for specifying encryption. All tables, indexes, temporary tables, and temporary indexes created in the encrypted tablespace are encrypted. There is no need for the user to consider which tables and strings to encrypt.

Refer to "5.4 Encrypting a Tablespace" for details.

Backup data

The pgx_dmpall command and pg_basebackup command create backup data by copying the OS file. Backups of the encrypted data are, therefore, also encrypted. Information is protected from leakage even if the backup medium is stolen.

WAL and temporary files

WAL, which is created by updating encrypted tables and indexes, is encrypted with the same security strength as the update target. When large merges and sorts are performed, the encrypted data is written to a temporary file in encrypted format.

Streaming replication support

You can combine streaming replication and transparent data encryption. The data and WAL encrypted on the primary server is transferred to the standby server in its encrypted format and stored.

Note

The following are not encrypted:

- pg_dump and pg_dumpall output files
- Files output by the COPY command
- Notification event payloads that communicate using the LISTEN or NOTIFY command
- Checksum validation is not performed on encrypted tablespaces during backup and when using the pg_checksum utility.

5.2 Setting the Master Encryption Key

To use transparent data encryption, you must create a keystore and set the master encryption key.

1. In the keystore_location parameter of postgresql.conf, specify the directory to store the keystore.

   Specify a different location for each database cluster.

   ```
   keystore_location = 'C:\\key\\store\\location'
   ```

   Refer to "Appendix A Parameters" for information on postgresql.conf.

   After editing the postgresql.conf file, either start or restart the instance.

   - Using WebAdmin

     Refer to "2.1.1 Using WebAdmin", and restart the instance.

   - Using commands

     Refer to "2.1.2 Using Commands", and restart the instance.

2. Execute an SQL function, such as the one below, to set the master encryption key. This must be performed by the superuser. Execute it as the database superuser.

   ```
   SELECT pgx_set_master_key('passphrase');
   ```

   The value "passphrase" is the passphrase that will be used to open the keystore. The master encryption key is protected by this passphrase, so avoid specifying a short simple string that is easy to guess.

   Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_master_key function.

Note

Note that if you forget the passphrase, you will not be able to access the encrypted data. There is no method to retrieve a forgotten passphrase and decrypt data. Do not, under any circumstances, forget the passphrase.

The pgx_set_master_key function creates a file with the name keystore.ks in the keystore storage destination. It also creates a master encryption key from random bit strings, encrypts it with the specified passphrase, and stores it in keystore.ks. At this point, the keystore is open.

5.3 Opening the Keystore

To create encrypted tablespaces and access the encrypted data, you must first open the keystore. When you open the keystore, the master encryption key is loaded into the database server memory and becomes usable for encryption and decryption.

You need to open the keystore each time you start the instance. To open the keystore, the database superuser must execute the following SQL function.

```
SELECT pgx_open_keystore('passphrase');
```

The value "passphrase" is the passphrase specified during creation of the keystore.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_open_keystore function.

Note that, in the following cases, the passphrase must be entered when starting the instance, because the encrypted WAL must be decrypted for recovery. In this case, the above-mentioned pgx_open_keystore function cannot be executed.

- If performing crash recovery at the time of starting the instance
- If performing recovery using continuous archiving

For the above cases, select one of the following methods:

- Use an automatically opening keystore

  Select this method if ease of operation has priority over enhanced security. When using an automatically opening keystore, the content of the keystore file is decrypted and a copy of the keystore file is generated. Although the content of this file is obfuscated, the level of security becomes slightly weaker.

  Select this method if performing operations using WebAdmin.

- Enter a passphrase when starting an instance

  Select this method if enhanced security has priority over ease of operation.

  Specify the --keystore-passphrase in the pg_ctl command and start the instance. This displays the prompt that asks for the passphrase to be entered.

  ```
  > pg_ctl --keystore-passphrase start
  Enter the passphrase:
  The server is currently initiating
  >
  ```

  After performing the above operation, use the pg_ctl command to stop the instance.

  Then start the instance in Windows services. Refer to "2.1.2 Using Commands" for information on how to start an instance in Windows services.

Point

When using an automatically opening keystore, you do not need to enter the passphrase and you can automatically open the keystore when the database server starts. Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for details.

5.4 Encrypting a Tablespace

The keystore must be open before you can create an encrypted tablespace.

When creating a tablespace that will be encrypted, configure the encryption algorithm in the runtime parameters. For example, to create a tablespace with the name secure_tablespace using AES with a key length of 256 bits as the encryption algorithm, configure as shown below.

```
-- Specify the encryption algorithm for the tablespace to be created below
SET tablespace_encryption_algorithm = 'AES256';
CREATE TABLESPACE secure_tablespace LOCATION 'C:\My\Data\Dir';
-- Specify that the tablespace to be created below is not to be encrypted
SET tablespace_encryption_algorithm = 'none';
```

Or

```
CREATE TABLESPACE secure_tablespace LOCATION '\My\Data\Dir' WITH (tablespace_encryption_algorithm =
'AES256' );
```

When the tablespace is empty, the encryption algorithm can be modified with the command below.

```
ALTER TABLESPACE secure_tablespace SET (tablespace_encryption_algorithm=AES256);
```

Trying to set the encryption algorithm for a non-empty tablespace causes an error.

You can use AES with a key length of 128 bits or 256 bits as the encryption algorithm. It is recommended that you use 256-bit AES. Refer to "Appendix A Parameters" for information on how to specify the runtime parameters.

If user provides both GUC and command line options while creating the tablespace, the preference is given to the command line option.

The pg_default and pg_global tablespaces cannot be encrypted.

Create tables and indexes in the encrypted tablespace that you created. Relations created in the encrypted tablespace are automatically encrypted.

Example

Example 1: Specifying an encrypted tablespace when creating it

```
CREATE TABLE my_table (...)
    TABLESPACE secure_tablespace;
```

Example 2: Not explicitly specifying a tablespace when creating it and instead using the default tablespace

```
SET default_tablespace = 'secure_tablespace';
CREATE TABLE my_table (...);
```

The process is the same for encrypting temporary tables and temporary indexes. In other words, either explicitly specify the TABLESPACE clause or list encrypted tablespaces in the temp_tablespaces parameter, and then execute CREATE TEMPORARY TABLE or CREATE INDEX.

Point

If an encrypted tablespace is specified in the TABLESPACE clause of the CREATE DATABASE statement, relations created in the database without explicitly specifying a tablespace will be encrypted. Furthermore, the system catalog will also be encrypted, so the source code of user-defined functions is also protected.

Example: Specifying a tablespace in a database definition statement

```
CREATE DATABASE DB01 TABLESPACE=SP01 ... ;
```

Part of the data is also stored in the system catalog - to encrypt this data as well, specify an encrypted tablespace as above and create a database.

Note

An encrypted tablespace cannot be created from the window used for creating the pgAdmin tablespace, or from the query tool. To create an encrypted tablespace, click [PSQL Console] from the [Plugins] menu and create an encrypted tablespace in the psql console window.

5.5 Checking an Encrypted Tablespace

The pgx_tablespaces system view displays information about whether each tablespace has been encrypted, and about the encryption algorithm. Refer to "C.1 pgx_tablespaces" for information on strings.

You can discover which tablespaces have been encrypted by executing the following SQL statements.

However, when considering continued compatibility of applications, do not reference system catalogs (pg_tablespace) directly in SQL statements.

```
SELECT spcname, spcencalgo
FROM pg_tablespace ts, pgx_tablespaces tsx
WHERE ts.oid = tsx.spctablespace;
```

Example

```
postgres=# SELECT spcname, spcencalgo FROM pg_tablespace ts, pgx_tablespaces tsx WHERE ts.oid =
tsx.spctablespace;
      spcname      | spcencalgo
-------------------+------------
 pg_default        | none
 pg_global         | none
 secure_tablespace | AES256
(3 rows)
```

See

Refer to "Notes on Application Compatibility" in the Application Development Guide for information on how to maintain application compatibility.

5.6 Managing the Keystore

This section describes how to manage the keystore and the master encryption key to guard against the threat of theft.

5.6.1 Changing the Master Encryption Key

Using the same encryption key for an extended period gives attackers an opportunity to decipher the encrypted data. It is recommended that you change the key at regular intervals, or whenever the key is exposed to risk.

Adhere to the industry's best practices for encryption algorithms and key management when considering how often the key should be changed. For example, the NIST in the United States has published "NIST Special Publication 800-57". The PCI DSS also refers to this publication. This publication recommends changing the master encryption key once a year.

To change the master encryption key, execute the pgx_set_master_key function, which is the same function used for configuring the key. Refer to "5.2 Setting the Master Encryption Key" for details.

After changing the master encryption key, you must immediately back up the keystore.

5.6.2 Changing the Keystore Passphrase

In security policies for organizations, it is usually a requirement that the passphrase be changed whenever a security administrator who knows the passphrase is removed from duties due to transfer or retirement. It is also recommended that the passphrase be changed if it is ever exposed to risks due to deception such as social engineering.

To change the keystore passphrase, execute the following SQL function as a superuser.

```
SELECT pgx_set_keystore_passphrase('oldPassphrase', 'newPassphrase');
```

After changing the passphrase, you must immediately back up the keystore.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_keystore_passphrase function.

5.6.3 Enabling Automatic Opening of the Keystore

When using an automatically opening keystore, you do not need to enter the passphrase and you can automatically open the keystore when the instance starts. Execute the pgx_keystore command to enable automatic opening of the keystore.

```
> pgx_keystore --enable-auto-open C:\key\store\location\keystore.ks
Enter the passphrase:
Automatic opening of the keystore is now enabled
>
```

See

Refer to "pgx_keystore" in the Reference for information on pgx_keystore command.

When automatic opening is enabled, an automatically opening keystore is created in the same directory as the original keystore. The file name of the automatically opening keystore is keystore.aks. The file keystore.aks is an obfuscated copy of the decrypted content of the keystore.ks file. As long as this file exists, there is no need to enter the passphrase to open the keystore when starting the instance.

Do not delete the original keystore file, keystore.ks. It is required for changing the master encryption key and the passphrase. When you change the master encryption key and the passphrase, keystore.aks is recreated from the original keystore file, keystore.ks.

Protect keystore.ks, keystore.aks, and the directory that stores the keystore so that only the user who starts the instance can access them.

Configure the permission of the files so that only the user who starts the instance can access the SQL functions and commands that create these files. Accordingly, manually configure the same permission mode if the files are restored.

Set the permission mode in [Properties] in Windows(R) Explorer.

See

Refer to [Help and Support] in Windows(R) for information on [Properties].

An automatically opening keystore will only open on the computer where it was created.

To disable automatic opening of the keystore, delete keystore.aks.

Note

- To use WebAdmin for recovery, you must enable automatic opening of the keystore.
- Refer to "5.7 Backing Up and Restoring/Recovering the Database" after enabling or reconfiguring encryption to back up the database.
- Specify a different directory from those below as the keystore storage destination:
  - Data storage destination
  - Tablespace storage destination
  - Transaction log storage destination
  - Backup data storage destination

5.6.4 Backing Up and Recovering the Keystore

Back up the keystore at the following times in case it is corrupted or lost. Note that you must store the database and the keystore on separate data storage media. Storing both on the same data storage medium risks the danger of the encrypted data being deciphered if the medium is stolen. A passphrase is not required to open an automatically opening keystore, so store this type of keystore in a safe location.

- When the master encryption key is first configured
- When the master encryption key is changed
- When the database is backed up
- When the keystore passphrase is changed

Point

Do not overwrite an old keystore when backing up a keystore. This is because during database recovery, you must restore the keystore to its state at the time of database backup. When the backup data of the database is no longer required, delete the corresponding keystore.

Example

- Back up the database and the keystore on May 1, 2020.

```
> pgx_dmpall -D D:\database\inst1
> copy C:\key\store\location\keystore.ks C:\keybackup\keystore_20200501.ks
```

  Specify the following in the pgx_dmpall command:

  - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

- Change the master encryption key, and back up the keystore on May 5, 2020.

```
> psql -c "SELECT pgx_set_master_key('passphrase')" postgres
> copy C:\key\store\location\keystore.ks C:\keybackup\keystore_20200505.ks
```

  Specify the following in the psql command:

  - Specify the SQL function that sets the master encryption key in the -c option.
  - Specify the name of the database to be connected to as the argument.

If the keystore is corrupted or lost, restore the keystore containing the latest master encryption key. If there is no keystore containing the latest master encryption key, restore the keystore to its state at the time of database backup, and recover the database from the database backup. This action recovers the keystore to its latest state.

Example

- Restore the keystore containing the latest master encryption key as of May 5, 2020.

```
> copy C:\keybackup\keystore_20200505.ks C:\key\store\location\keystore.ks
```

- If there is no backup of the keystore containing the latest master encryption key, recover the keystore by restoring the keystore that was backed up along with the database on 1 May 2020.

```
> copy C:\keybackup\keystore_20200501.ks C:\key\store\location\keystore.ks
> pgx_rcvall -B E:\backup\inst1 -D D:\database\inst1 --keystore-passphrase
```

  Specify the following in the pgx_rcvall command:

  - Specify the data storage directory in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
  - Specify the backup data storage directory in the -B option.
  - The --keystore-passphrase option prompts you to enter the passphrase to open the keystore.

If you have restored the keystore, repeat the process of enabling automatic opening of the keystore. This ensures that the contents of the automatically opening keystore (keystore.aks) are identical to the contents of the restored keystore.

It is recommended that you do not back up the automatically opening keystore file, keystore.aks. If the database backup medium and the backup medium storing the automatically opening keystore are both stolen, the attacker will be able to read the data even without knowing the passphrase.

If the automatically opening keystore is corrupted or lost, you must again enable automatic opening. The keystore.aks file will be recreated from keystore.ks at this time.

See

Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall and pgx_dmpall commands.

Refer to "psql" under "Reference" in the PostgreSQL Documentation for information on the psql command.

Refer to "B.2 Transparent Data Encryption Control Functions" for information on the pgx_set_master_key function.

Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for information on how to enable automatic opening of the keystore.

5.7 Backing Up and Restoring/Recovering the Database

FUJITSU Enterprise Postgres enables you to use the five backup and recovery methods described below. Regardless of the method you use, you must back up the keystore at the same time.

Note that you must store the database and the keystore on separate data storage media. Storing both on the same data storage medium risks the danger of the encrypted data being deciphered if the medium is stolen.

Backup and recovery using WebAdmin

- Backup

  WebAdmin backs up encrypted data.

  Back up the key store after backing up the database.

- Recovery

  Restore the keystore to its state at the time of database backup. Refer to "5.6.4 Backing Up and Recovering the Keystore" for details.

  Enable automatic opening of the keystore in accordance with the procedure described in "5.6.3 Enabling Automatic Opening of the Keystore". Then, use WebAdmin to recover the database.

Backup and recovery using the pgx_dmpall and pgx_rcvall commands

- Backup

  The pgx_dmpall command backs up the encrypted data.

  Back up the key store after backing up the database.

- Recovery

  Restore the keystore to its state at the time of the database backup.

  Configure automatic opening of the key store as necessary.

  If automatic opening of the keystore is not enabled, execute the pgx_rcvall command with the --keystore-passphrase option specified. This will display the prompt for the passphrase to be entered.

Example

- Back up the database and the keystore on May 1, 2020.

```
> pgx_dmpall -D D:\database\inst1
> copy C:\key\store\location\keystore.ks C:\keybackup\keystore_20200501.ks
```

  Specify the following in the pgx_dmpall command:

  - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

- Recover the database and the keystore from the backup taken on May 1, 2020.

```
> copy C:\keybackup\keystore_20200501.ks C:\key\store\location\keystore.ks
> pgx_keystore --enable-auto-open C:\key\store\location\keystore.ks (Execute only when enabling
automatic opening)
> pgx_rcvall -B E:\backup\inst1 -D D:\database\inst1 --keystore-passphrase
```

  Specify the following in the pgx_rcvall command:

  - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
  - Specify the backup data storage directory in the -B option.
  - The --keystore-passphrase option prompts you to enter the passphrase to open the keystore.

Dump and restore using SQL

- Backup

  The files output by the pg_dump and pg_dumpall commands are not encrypted. You should, therefore, encrypt the files using OpenSSL commands or other means before saving them, as described in "5.8 Importing and Exporting the Database" below.

  Back up the key store after backing up the database.

- Restore

  If the backup data has been encrypted using, for example Open SSL commands, decrypt that data.

  The data generated by the pg_dumpall command includes a specification to encrypt tablespaces by default. For this reason, the psql command encrypts tablespaces during restoration.

File system level backup and restore

- Backup

  Stop the instance and backup the data directory and the tablespace directory using the file copy command of the operating system. The files of encrypted tablespaces are backed up in the encrypted state.

  Back up the key store after performing the backup.

- Restore

  Restore the keystore to its state at the time of the database backup.

  Stop the instance and restore the data directory and the tablespace directory using the file copy command of the operating system.

Continuous archiving and point-in-time recovery

- Backup

  The pg_basebackup command backs up the encrypted data as is.

  Back up the key store after performing the backup.

- Recovery

  Restore the keystore to its state at the time of the database backup.

  Configure automatic opening of the key store as necessary.

  If automatic opening of the keystore is not enabled, refer to "5.3 Opening the Keystore" for information on starting an instance by specifying pg_ctl --keystore-passphrase start.

See

- Refer to "Reference" in the PostgreSQL Documentation for information on the following commands:
  - psql
  - pg_dump
  - pg_basebackup
- Refer to the Reference for information on the following commands:
  - pgx_rcvall
  - pgx_dmpall
  - pg_dumpall

If you have restored the keystore, repeat the process of enabling automatic opening of the keystore This ensures that the contents of the automatically opening keystore (keystore.aks) are identical to the contents of the restored keystore.

Refer to "5.6.3 Enabling Automatic Opening of the Keystore" for information on how to enable automatic opening of the keystore.

5.8 Importing and Exporting the Database

The files output by the COPY TO command are not encrypted. Therefore, when transferring files to other systems, you should encrypt files using OpenSSL commands, or use file transfer software that performs encrypted communication for Windows, to encrypt the data being transferred.

Use a safe method to delete obsolete plain text files.

You can use the following methods to safely delete files:

- fsutil command

Example

```
# Export the contents of the table my_table to a CSV file.
> psql -c "COPY my_table TO 'C:\WINDOWS\Temp\my_table.csv' (FORMAT CSV)" postgres
# Encrypt the exported file.
> C:\OpenSSL-Win32\bin\openssl enc -e -aes256 -in C:\WINDOWS\Temp\my_table.csv -out my_table.csv.enc
(The user is prompted to enter the passphrase to be used for encryption)

# Check the size of plain text files, and delete them after zero padding
> dir C:\WINDOWS\Temp\my_table.csv
> fsutil file setzerodata offset=0 length=7 C:\WINDOWS\Temp\my_table.csv
> del C:\WINDOWS\Temp\my_table.csv

# Decrypt the encrypted files on other systems.
> C:\OpenSSL-Win32\bin\openssl enc -d -aes256 -in my_table.csv.enc -out my_table.csv
(The user is prompted to enter the passphrase to be used for decryption)
```

If you use COPY FROM to import data to tables and indexes in an encrypted tablespace, the imported data is automatically encrypted before being stored.

5.9 Encrypting Existing Data

You cannot encrypt existing unencrypted tablespaces. In addition, you cannot change encrypted tablespaces so that they do not encrypt.

As an alternative, transfer the tables and indexes to other tablespaces. You can use the following SQL commands for this.

```
ALTER TABLE table_name SET TABLESPACE new_tablespace;
ALTER INDEX index_name SET TABLESPACE new_tablespace;
ALTER DATABASE database_name SET TABLESPACE new_tablespace;
```

See

Refer to "SQL Commands" under "Reference" in the PostgreSQL Documentation for information on SQL commands.

5.10 Operations in Cluster Systems

This section describes how to use transparent data encryption on cluster systems such as high-availability systems, streaming replication, and database multiplexing.

5.10.1 HA Clusters that do not Use Database Multiplexing

Take the following points into account when using transparent data encryption in an HA cluster environment that does not use database multiplexing.

Placement and automatic opening of the keystore file

There are two alternatives for placing the keystore file:

- Sharing the keystore file
- Placing a copy of the keystore file

Sharing the keystore file

This involves using the same keystore file on the primary server and the standby server.

As the standby server is not active while the primary server is running, this file would not be accessed simultaneously, and therefore, it can be shared.

To manage the keystore file in a more secure manner, place it on the key management server or the key management storage isolated in a secure location.

Enable the automatic opening of the keystore on both the primary and standby servers.

Placing a copy of the keystore file

This involves placing a copy of the primary server keystore file on the standby server.

You can do this if you cannot prepare a shared server or disk device that can be accessed from both the primary and standby servers.

However, if you change the master encryption key and the passphrase on the primary server, you must copy the keystore file to the standby server again.

To manage the keystore file in a more secure manner, prepare the key management server or the key management storage isolated in a secure location for both the primary and standby servers, and place the keystore files there.

Enable the automatic opening of the keystore on both the primary and standby servers. Note that copying the automatically opening keystore file (keystore.aks) to the standby server does not enable the automatic opening of the keystore.

5.10.2 Database Multiplexing Mode

Note the following when using transparent data encryption in environments that use streaming replication, or database multiplexing with streaming replication.

Placing the keystore file

Place a copy of the primary server keystore file on the standby server.

This is required as the keystore file cannot be shared, and both servers may need to access it simultaneously.

Point

To manage the keystore file in a more secure manner, place it on the key management server or the key management storage isolated in a secure location. A keystore used by both the primary and standby servers can be managed on the same key management server or key management storage.

However, create different directories for the keystores to be used by the primary server and the standby server. Then copy the keystore for the primary server to the directory used on the standby server.

Automatically opening the keystore

You must enable automatic opening of the keystore.

To do this, enable automatic opening of the keystore in all servers that make up database multiplexing. The settings for automatic opening of the keystore include information unique to each server, so simply copying the file does not enable it.

Changing the passphrase

Changes to the passphrase are reflected in all servers that make up database multiplexing, so no special operation is required.

Building and starting a standby server

Before using the pg_basebackup command or pgx_rcvall command to build a standby server, copy the keystore file from the primary server to the standby server. When using an automatically opening keystore, use the copied keystore file to enable automatic opening on the standby server.

Open the keystore each time you start the standby server. This step is necessary for decrypting and restoring encrypted WAL received from the primary server. To open the keystore, specify the --keystore-passphrase option in the pg_ctl command or pgx_rcvall command and enter the passphrase, or use an automatically opening keystore.

If specifying --keystore-passphrase in the pg_ct command, refer to "5.3 Opening the Keystore" for details.

Changing the master encryption key and the passphrase

Change the master encryption key and the passphrase on the primary server. You need not copy the keystore from the primary server to the standby server. You need not even restart the standby server or reopen the keystore. Changes to the master encryption key and the passphrase are reflected in the keystore on the standby server.

See

Refer to "pgx_rcvall " in the Reference for information on pgx_rcvall command.

Refer to "pg_basebackup" under "Reference" in the PostgreSQL Documentation for information on pg_basebackup command.

Refer to "High Availability, Load Balancing, and Replication" under "Server Administration" in the PostgreSQL Documentation for information on how to set up streaming replication.

5.11 Security-Related Notes

- Decrypted data is cached in the database server memory (shared buffer). As a result, unencrypted data is stored in a minidump, which is the process memory dump. You should, therefore, safely delete the memory dump. You can safely delete files by using the following command:
  - fsutil command
- Unencrypted data may be written from the database server memory to the operating system's swap area. To prevent leakage of information from the swap area, consider either disabling the use of swap area or encrypting the swap area using a full-disk encryption product.
- The content of the server log file is not encrypted. Therefore, in some cases the value of a constant specified in a SQL statement is output to the server log file. To prevent this, consider setting a parameter such as log_min_error_statement.

- When executing an SQL function that opens the keystore and modifies the master encryption key, ensure that the SQL statement containing the passphrase is not output to the server log file. To prevent this, consider setting a parameter such as log_min_error_statement. If you are executing this type of SQL function on a different computer from the database server, encrypt the communication between the client and the database server with SSL.
- Starting with FEP 10, logical replication is available, which allows non-backed up clusters to subscribe to databases where transparent data encryption is enabled. Logical replication does not need to have the same encryption strategy between publisher and subscriber.

  In this scenario, if the user wants to encrypt the subscribed copy of data as well, then it is the user's responsibility to create encryption policies to the subscribed databases. By default, published encrypted tablespace data will not be encrypted in the subscriber side.

5.12 Tips for Installing Built Applications

With transparent data encryption, you can easily encrypt all the data in an application without modifying the application. Database administrators install built applications in the following manner. However, this procedure stores data to the default tablespace, so take necessary action if processing differs from the original design.

1. (Normal procedure) Create an owner and a database for the built application.

```
CREATE USER crm_admin ...;
CREATE DATABASE crm_db ...;
```

2. (Procedure for encryption) Create an encrypted tablespace to store the data for the built application.

```
SET tablespace_encryption_algorithm = 'AES256';
CREATE TABLESPACE crm_tablespace LOCATION 'C:\crm\data';
```

3. (Procedure for encryption) Configure an encrypted tablespace as the default tablespace for the owner of the built application.

```
ALTER USER crm_admin SET default_tablespace = 'crm_tablespace';
ALTER USER crm_admin SET temp_tablespaces = 'crm_tablespace';
```

4. (Normal procedure) Install the built application. The application installer prompts you to enter the host name and the port number of the database server, the user name, and the database name. The installer uses the entered information to connect to the database server and execute the SQL script. For applications that do not have an installer, the database administrator must manually execute the SQL script.

Normally, the application's SQL script includes logic definition SQL statements, such as CREATE TABLE, CREATE INDEX, and GRANT or REVOKE, converted from the entity-relationship diagram. It does not include SQL statements that create databases, users, and tablespaces. Configuring the default tablespace of the users who will execute the SQL script deploys the objects generated by the SQL script to the tablespace.

Chapter 6 Data Masking

Data masking is a feature that can change the returned data for queries generated by applications, so that it can be referenced by users. For example, for a query of employee data, digits except the last four digits of an eight-digit employee number can be changed to "*" so that it can be used for reference.

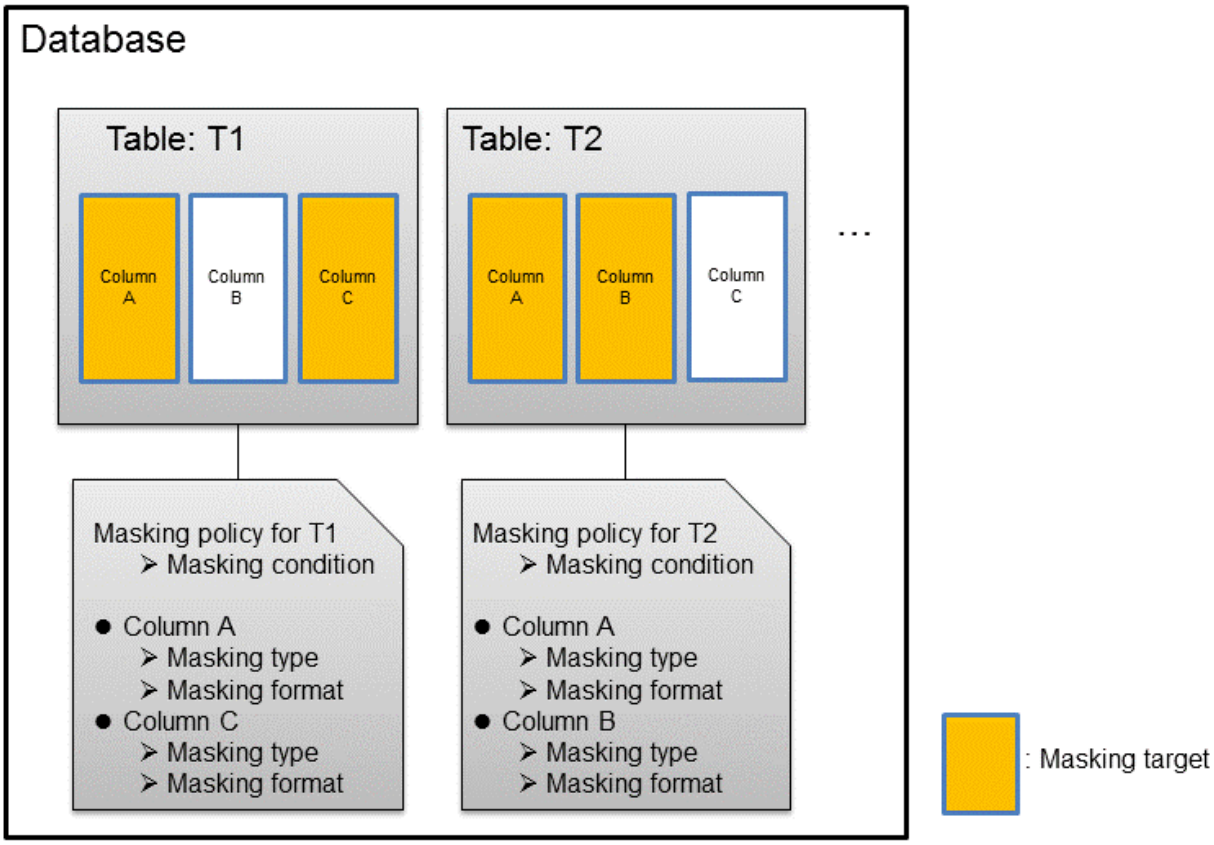
Note

When using this feature, it is recommended that the changed data be transferred to another medium for users to reference. This is because, if users directly access the database to extract the masked data, there is a possibility that they can deduce the original data by analyzing the masking policy or query result to the masking target column.

6.1 Masking Policy

Masking policy is a method of changing data under specific conditions when it is returned for a query from an application. One masking policy can be created per table. You can configure masking target, masking type, masking condition and masking format in a masking policy.

Figure 6.1 Masking policy



Note

When a masking policy is defined, the search performance for the corresponding table may deteriorate.

6.1.1 Masking Target

Masking target refers to a column to which a masking policy will be applied. When referring to a masking target or a function that includes a masking target, the execution result will be changed and obtained.

The following commands can change the execution result:

- SELECT
- COPY
- pg_dump
- pg_dumpall

- If a masking target is specified to INSERT...SELECT target columns, processing will be performed using data before change.
- If a masking target other than SELECT target columns is specified, processing will be performed using data before change.
- If a masking target is specified in a function where the data type will be converted, an error will occur.

6.1.2 Masking Type

Masking type is a method to change column data that is returned from queries. Specify the masking type in the function_type parameter. The following masking types can be specified and selected depending on the masking target data type.

Full masking

All the data in the specified column is changed. The changed value returned to the application that made the query varies depending on the column data type.
For example, 0 is used for a numeric type column and a space is used for a character type column.

Partial masking

The data in the specified column is partially changed.
For example, digits except the last four digits of an employee number can be changed to "*".

Regular expression masking

The data in the specified column is changed via a search that uses a regular expression.
For example, for strings such as email address that can have variable length, "*" can be used to change characters preceding "@" by using a regular expression. Regular expression masking can only be used for character type data.

- If multiple valid masking targets are specified for a function, the masking type for the left-most masking target will be applied.
  For example, if "SELECT GREATEST(c1, c2) FROM t1" is executed for numeric type masking target c1 and c2, the masking type for c1 will be applied.
- When masking the data that includes multibyte characters, do not specify partial masking for masking type. The result may not be as expected.

6.1.3 Masking Condition

Masking condition refers to the conditions configured to perform masking. Specify the masking condition in the expression parameter. Changed or actual data can be displayed for different users by defining masking condition. An expression that returns a boolean type result needs to be specified in masking condition and masking is performed only when TRUE is returned. Refer to "Value Expressions" in the PostgreSQL Documentation for information on the expressions that can be specified. Note that expressions that include a column cannot

be specified.
For example, when masking data only for "postgres" users, specify 'current_user = "postgres"' in the masking condition.

Information

Specify '1=1' so the masking condition is always evaluated to be TRUE and masking is performed all the time.

6.1.4 Masking Format

Masking format is a combination of change method and displayed characters when the masking condition is met. Masking format varies depending on the masking type. The following describes the masking format.

Full masking

With full masking, all characters are changed to values as determined by the database. Changed characters can be referenced in the pgx_confidential_values table. Also, replacement characters can be changed using the pgx_update_confidential_values system management function.

See

Refer to "6.3 Data Types for Masking" for information on the data types for which data masking can be performed.

Partial masking

With partial masking, data is changed according to the content in the function_parameters parameter. The method of specifying function_parameters varies depending on the data type.

Category	Method of specifying function_parameters
Numeric type	'*replacementCharacter*, *startPosition*, *endPosition*' - *replacementCharacter*: Specify the number to display. Specify a value from 0 to 9. - *startPosition*: Specify the start position of masking. Specify a positive integer. - *endPosition*: Specify the end position of masking. Specify a positive integer that is greater than *startPosition*. **Example** Specify as below to change the values from the 1st to 5th digits to 9. function_parameters := '9, 1, 5' In this example, if the original data is "123456789", it will be changed to "999996789".
Character type	*'inputFormat*, *outputFormat*, *replacementCharacter*, *startPosition*, *endPosition'* - *inputFormat*: Specify the current format of the data. Specify "V" for characters that will potentially be masked, and specify "F" for values such as spaces or hyphens that will not be masked. - *outputFormat*: Define the method to format the displayed data. Specify "V" for characters that will potentially be masked. Any character to be output can be specified for each character "F" in *inputFormat*. If you want to output a single quotation mark, specify two of them consecutively. - *replacementCharacter*: Specify any single character. If you want to output a single quotation mark, specify two of them consecutively. - *startPosition*: Specify the position of "V" as the start position of masking. For example, to specify the position of the 4th "V" from the left, specify 4. Specify a positive integer.

Category	Method of specifying function_parameters
	- *endPosition*: Specify the position of "V" as an end position of masking. When working out the end position, do not include positions of "F". For example, to specify the position of the 11th "V" from the left, specify 11. Specify a positive integer that is greater than *startPosition*. **Example** Specify as below to mask a telephone number other than the first three digits using *. function_parameters := 'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11' In this example, if the original data is "012-3156-7890", it will be changed to "012-****-****".
Date/timestamp type	'MDYHMS' - M: Masks month. To mask month, enter the month from 1 to 12 after a lowercase letter m. Specify an uppercase letter M to not mask month. - D: Masks date. To mask date, enter the date from 1 to 31 after a lowercase letter d. If a value bigger than the last day of the month is entered, the last day of the month will be displayed. Specify an uppercase letter D to not mask date. - Y: Masks year. To mask year, enter the year from 1 to 9999 after a lowercase letter y. Specify an uppercase letter Y to not mask year. - H: Masks hour. To mask hour, enter the hour from 0 to 23 after a lowercase letter h. Specify an uppercase letter H to not mask hour. - M: Masks minute. To mask minute, enter the minute from 0 to 59 after a lowercase letter m. Specify an uppercase letter M to not mask minute. - S: Masks second. To mask second, enter the second from 0 to 59 after a lowercase letter s. Specify an uppercase letter S to not mask second. **Example** Specify as below to mask hour, minute, and second and display 00:00:00. function_parameters := 'MDYh0m0s0' In this example, if the original data is "2010-10-10 10:10:10", it will be changed to "2010-10-10 00:00:00".

See

- Refer to "B.3.2 pgx_create_confidential_policy" for information on function_parameters.
- Refer to "6.3 Data Types for Masking" for information on the data types for which masking can be performed.

Regular expression masking

With regular expression masking, data is changed according to the content of the regexp_pattern, regexp_replacement and regexp_flags parameters. For regexp_pattern, specify the search pattern using a regular expression. For regexp_replacement, specify the replacement character to use when data matches the search pattern. For regexp_flags, specify the regular expression flags.

Example

Specify as below to change all three characters starting from b to X.

regexp_pattern := 'b..'

regexp_replacement:= 'X'

regexp_flags := 'g'

In this example, if the original data is "foobarbaz", it will be changed to "fooXX".

See

- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.
- Refer to "6.3 Data Types for Masking" for information on the data types for which masking can be performed.

Note

- When column data type is character(*n*) or char(*n*) and if the string length after change exceeds n, the extra characters will be truncated and only characters up to the nth character will be displayed.
- When column data type is character varying(*n*) or varchar(*n*) and if the string length after change exceeds the length before the change, the extra characters will be truncated and only characters up to the length before change will be displayed.

6.2 Usage Method

Preparation

The following preparation is required to use this feature.

1. Set the postgresql.conf file parameters.

   Prepend "pgx_datamasking" to the shared_preload_libraries parameter.

2. Restart the instance.

3. Execute CREATE EXTENSION for the database that will use this feature.

   The target database is described as "postgres" here.

   Use the psql command to connect to the "postgres" database.

   #### Example

   ```
   postgres=# CREATE EXTENSION pgx_datamasking;
   CREATE EXTENSION
   ```

   #### Note

   You must always prepend "pgx_datamasking" to the "shared_preload_libraries" parameter.

   #### Information

   - Specify "false" for pgx_datamasking.enable to not use this feature. Data will not be masked even if a masking policy is configured. This feature becomes available again once "true" is specified for pgx_datamasking.enable. This setting can be made

by specifying a SET statement or specifying a parameter in the postgresql.conf file.
Example

```
postgres=# SET pgx_datamasking.enable=false;
```

- Hereafter, also perform this preparatory task for the "template1" database, so that this feature can be used by default when creating a new database.

Usage

To perform masking, a masking policy needs to be configured. The masking policy can be created, changed, confirmed, enabled, disabled or deleted during operation.
The procedures to perform these tasks are explained below with examples.

1. Creating a masking policy
2. Changing a masking policy
3. Confirming a masking policy
4. Enabling and disabling a masking policy
5. Deleting a masking policy

Note

Only database superusers can configure masking policies.

6.2.1 Creating a Masking Policy

An example of the operation on the server is shown below.

1. Create a masking policy
   Execute the pgx_create_confidential_policy system management function to create a masking policy.
   The following values are configured in this example.
   - Masking target: Numeric type c1
   - Masking type: FULL
   - Masking condition: '1=1'

```
postgres=# select pgx_create_confidential_policy(table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c1', function_type := 'FULL');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the masking target data (column c1) has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  0 | 012-3456-7890
  0 | 012-3456-7891
  0 | 012-3456-7892
(3 row)
```

See

- Refer to "B.3.2 pgx_create_confidential_policy" for information on the pgx_create_confidential_policy system management function.

Note

- Only one masking policy can be created per table.
- All users can view the masking policy created, so do not grant the login privilege of the database where this feature is set to the users who refer to the changed data. Masking policies are defined in the "pgx_confidential_columns", "pgx_confidential_policies" and "pgx_confidential_values" tables.

6.2.2 Changing a Masking Policy

1. An example of the operation on the server is shown below.
2. Change a masking policy
   Execute the pgx_alter_confidential_policy system management function to change a masking policy.
   The following values are changed in this example.
   - Content of change: Add a masking target
   - Masking target: Character type c2
   - Masking type: PARTIAL
   - Masking condition: 'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11'

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1',
action := 'ADD_COLUMN', column_name := 'c2', function_type := 'PARTIAL', function_parameters :=
'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

3. Confirm the displayed data
   Confirm that the masking target data has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+--------------
  0 | 012-****-****
  0 | 012-****-****
  0 | 012-****-****
(3 row)
```

See

- Refer to "B.3.1 pgx_alter_confidential_policy" for information on the pgx_alter_confidential_policy system management function.

6.2.3 Confirming a Masking Policy

An example of the operation on the server is shown below.

1. Confirm information about a masking target where a masking policy is set
   Refer to the pgx_confidential_columns table to confirm the masking target where the masking policy is set.

```
postgres=# select * from pgx_confidential_columns;
 schema_name | table_name | policy_name | column_name | function_type |
function_parameters           | regexp_pattern | regexp_replacement | regexp_flags |
column_description
-------------+------------+-------------+-------------+---------------
+---------------------------------------+----------------+--------------------+-------------
+--------------------
 public      | t1         | p1          | c1          | FULL
|                                       |                |                    |             |
```

```
 public      | t1         | p1          | c2          | PARTIAL       | VVVFVVVVFVVVV, VVV-VVVV-
VVVV, *, 4, 11 |                |                    |             |
(2 row)
```

2. Confirm information about the masking policy content
   Refer to pgx_confidential_policies to confirm the masking policy content.

```
postgres=# select * from pgx_confidential_policies;
 schema_name | table_name | policy_name | expression | enable | policy_description
-------------+------------+-------------+------------+--------+--------------------
 public      | t1         | p1          | 1=1        | t      |
(1 row)
```

See

- Refer to "D.1 pgx_confidential_columns" for information on the pgx_confidential_columns table.
- Refer to "D.2 pgx_confidential_policies" for information on the pgx_confidential_policies table.

6.2.4 Enabling and Disabling a Masking Policy

An example of the operation on the server is shown below.

1. Disable a masking policy
   Execute the pgx_enable_confidential_policy system management function to disable a masking policy.

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1',
enable := 'f');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the original data is displayed by disabling the masking policy.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  1 | 012-3456-7890
  2 | 012-3456-7891
  3 | 012-3456-7892
(3 row)
```

3. Enable a masking policy
   Execute the pgx_enable_confidential_policy system management function to enable a masking policy.

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1',
enable := 't');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

4. Confirm the displayed data
   Confirm that the masking target data has been correctly changed.

```
postgres=# select * from t1;
 c1 |      c2
----+---------------
  0 | 012-****-****
  0 | 012-****-****
```

```
  0 | 012-****-****
(3 row)
```

See

- Refer to "B.3.4 pgx_enable_confidential_policy" for information on the pgx_enable_confidential_policy system management function.

6.2.5 Deleting a Masking Policy

An example of the operation on the server is shown below.

1. Delete a masking policy
   Execute the pgx_drop_confidential_policy system management function to delete a masking policy.

```
postgres=# select pgx_drop_confidential_policy(table_name := 't1', policy_name := 'p1');
 pgx_drop_confidential_policy
------------------------------
 t
(1 row)
```

2. Confirm the displayed data
   Confirm that the original data is displayed by deleting the masking policy.

```
postgres=# select * from t1;
 c1 |      c2
----+--------------
  1 | 012-3456-7890
  2 | 012-3456-7891
  3 | 012-3456-7892
(3 row)
```

See

- Refer to "B.3.3 pgx_drop_confidential_policy" for information on the gx_drop_confidential_policy function.

6.3 Data Types for Masking

The data types for which data masking can be performed are shown below.

Category	Data type	Masking type		
		Full masking	Partial masking	Regular expression masking
Numeric type	smallint	Y	Y	N
	integer	Y	Y	N
	bigint	Y	Y	N
	decimal	Y	Y	N
	numeric	Y	Y	N
	float	Y	Y	N
	real	Y	Y	N
	double precision	Y	Y	N

Category	Data type	Masking type		
		Full masking	Partial masking	Regular expression masking
Character type	character varying(*n*)	Y	Y	Y
	varchar(*n*)	Y	Y	Y
	character(*n*)	Y	Y	Y
	char(*n*)	Y	Y	Y
Date/timestamp type	date	Y	Y	N
	timestamp	Y	Y	N

6.4 Security Notes

- Starting with FEP 10, logical replication is available, which allows non-backed up clusters to subscribe to databases where data masking policies are enabled. Logical replication allows publisher and subscriber databases to have their own or the same data masking policies.

  In this scenario, the user must disable data masking on the publisher database whenever a subscription is created. This ensures that subscribers are able to obtain the original data (initial copy) instead of the masked version. Then, it is the user's responsibility to set masking policies to each subscribed database.

- Take strong caution in publishing data masking's confidential tables (pgx_confidential_policies, pgx_confidential_columns, etc.) unless the user is publishing all tables of the database and wants to apply the same data masking's policies on the subscribed database for all of them.

  Otherwise, as these confidential tables contain the masking policies for all tables of the database, confidential policies of unpublished tables may be unintentionally published. Additionally, it is not possible to apply different data masking policies on the subscriber database.

Chapter 7 Periodic Operations

This chapter describes the operations that must be performed periodically when running daily database jobs.

7.1 Configuring and Monitoring the Log

FUJITSU Enterprise Postgres enables you to output database errors and warnings to a log file.

This information is useful for identifying if errors have occurred and the causes of those errors.

By default, this information is output to the event log. It is recommended that you configure FUJITSU Enterprise Postgres to collect logs from its log files (for example, log_destination) before operating FUJITSU Enterprise Postgres.

Periodically monitor the log files to check if any errors have occurred.

See

- Refer to "Error Reporting and Logging" under "Server Administration" in the PostgreSQL Documentation for information on logs.
- Refer to "Configuring Parameters" in the Installation and Setup Guide for Server for information on log settings when operating with WebAdmin.

7.2 Monitoring Disk Usage and Securing Free Space

When a database is used for an extended period, free space on the disk is continuously consumed and in some cases the disk space runs out. When this happens, database jobs may stop and no longer run.

You should, therefore, periodically monitor the usage of disk space, and delete obsolete files located in the disk.

Monitor the disk usage of the disk where the following directories are located:

- Data storage destination directory
- Transaction log storage destination (if the transaction log is stored in a different directory from the data storage destination directory)
- Backup data storage destination directory
- Tablespace storage destination directory

7.2.1 Monitoring Disk Usage

To check the disk usage, use the following operating system commands:

- fsutil volume diskfree command

You can even use SQL statements to check tables and indexes individually.

Refer to "Determining Disk Usage" under "Server Administration" in the PostgreSQL Documentation for information on this method.

Information

If you are using WebAdmin for operations, a warning is displayed when disk usage reaches 80%

7.2.2 Securing Free Disk Space

Secure free disk space by using the following operating system commands to delete unnecessary files, other than the database, from the same disk unit.

- del command

You can also secure disk space by performing the following tasks periodically:

- To secure space on the data storage destination disk:

  Execute the REINDEX statement. Refer to "7.5 Reorganizing Indexes" for details.

- To secure space on the backup data storage destination disk:

  Execute backup using WebAdmin or the pgx_dmpall command.

7.3 Automatically Closing Connections

If an application stops responding and abnormally terminates for any reason, the connection from the application may remain active on the database server. If this situation continues for an extended period, other applications attempting to connect to the database server may encounter an error, or an error indicating that the tables are unavailable may occur.

It is, therefore, recommended that idle connections be closed automatically at regular intervals.

Set the following parameters in the postgresql.conf file to indicate the time permitted to elapse before a connection is closed.

Parameter name	Setting	Description
tcp_keepalives_idle	Time until keepalive is sent (seconds) If 0, the default value of the system is used.	Sends keepalive to an idle connection at the specified interval in seconds It is recommended to specify 30 seconds.
tcp_keepalives_interval	keepalive send interval (seconds) If 0, the default value of the system is used.	Sends keepalive at the specified interval It is recommended to specify 6 seconds.

Note

The maximum number of connections allowed is 125, unless the desktop heap setting is changed.

See

Refer to "Connection Settings" under "Server Administration" in the PostgreSQL Documentation for information on the parameters.

7.4 Monitoring the Connection State of an Application

FUJITSU Enterprise Postgres does not immediately delete the updated or deleted data. If the VACUUM determines there are no transactions that reference the database, FUJITSU Enterprise Postgres collects obsolete data.

However, obsolete data is not collected if there are connections that have remained active for an extended period or connections occupying resources. In this case the database may expand, causing performance degradation.

See

Refer to "Routine Vacuuming" under "Server Administration" in the PostgreSQL Documentation for information on the VACUUM command.

In such cases, you can minimize performance degradation of the database by monitoring problematic connections.

The following methods are supported for monitoring connections that have been in the waiting status for an extended period:

- 7.4.1 Using the View (pg_stat_activity)
- 7.4.2 Using pgAdmin

7.4.1 Using the View (pg_stat_activity)

Use the view (pg_stat_activity) to identify and monitor connections where the client has been in the waiting status for an extended period.

Example

The example below shows connections where the client has been in the waiting status for at least 60 minutes.

However, when considering continued compatibility of applications, do not reference system catalogs directly in the following SQL statements.

```
postgres=# select * from pg_stat_activity where state='idle in transaction' and current_timestamp >
cast(query_start + interval '60 minutes' as timestamp);
-[ RECORD 1 ]----+------------------------------
datid            | 13003
datname          | db01
pid              | 4638
leader_pid       |
usesysid         | 10
usename          | fsep
application_name | apl01
client_addr      | 192.33.44.15
client_hostname  |
client_port      | 27500
backend_start    | 2020-02-24 09:09:21.730641+09
xact_start       | 2020-02-24 09:09:23.858727+09
query_start      | 2020-02-24 09:09:23.858727+09
state_change     | 2020-02-24 09:09:23.858834+09
wait_event_type  | Client
wait_event       | ClientRead
state            | idle in transaction
backend_xid      |
backend_xmin     |
query            | begin;
backend_type     | client backend
```

See

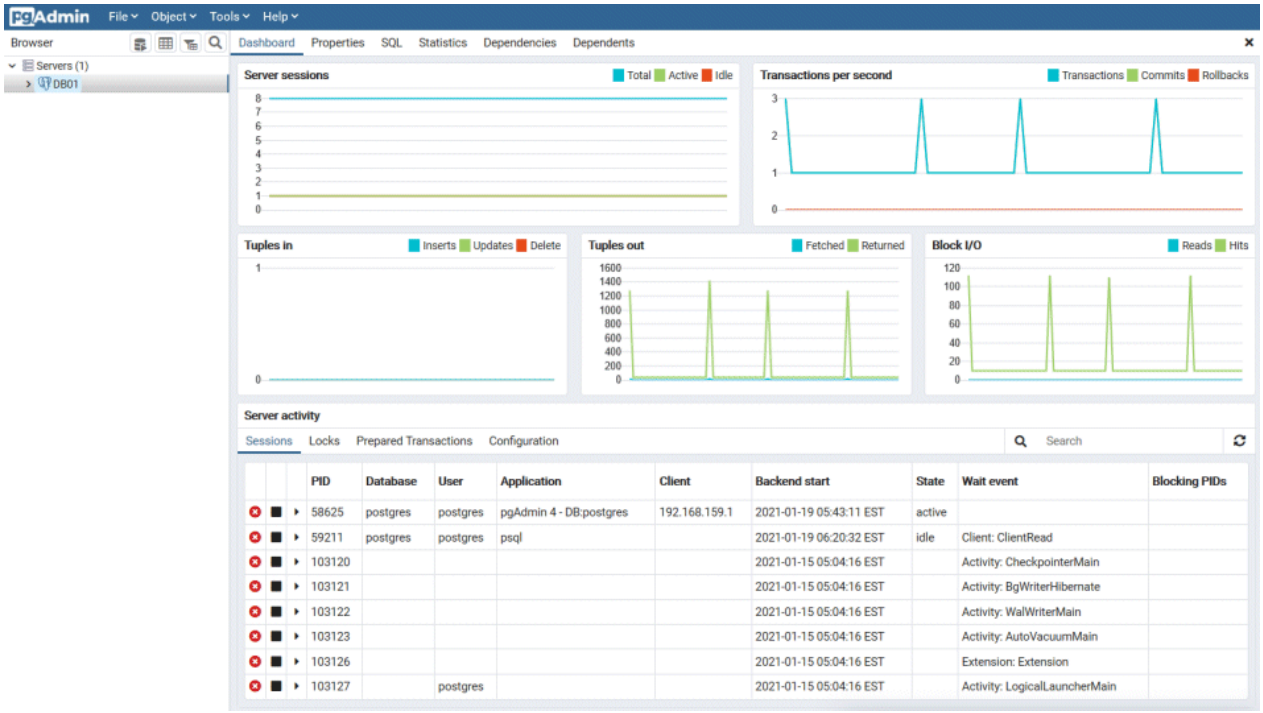
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on maintaining application compatibility.
- Refer to "The Statistics Collector" under "Server Administration" in the PostgreSQL Documentation for information on pg_stat_activity.

7.4.2 Using pgAdmin

This section describes the procedure for monitoring connections using [Server Status] in pgAdmin.

1. In the [Browser] pane, click the database server for monitoring.

2. In the [Dashboard] tab, identify client connections that have been in the waiting state for an extended period.



7.5 Reorganizing Indexes

Normally, a database defines indexes in tables, but if data is frequently updated, indexes can no longer use free space in the disk efficiently. This situation can also cause a gradual decline in database access performance.

To rearrange used space on the disk and prevent the database access performance from declining, it is recommended that you periodically execute the REINDEX command to reorganize indexes.

Check the disk usage of the data storage destination using the method described in "7.2 Monitoring Disk Usage and Securing Free Space".

Note

Because the REINDEX command retrieves the exclusive lock for an index being processed and locks writing of tables that are the source of the index, other processes that access these may stop while waiting to be locked.

Therefore, it is necessary to consider measures such as executing the command after the task is completed.

See

Refer to "Routine Reindexing" under "Server Administration" in the PostgreSQL Documentation for information on reorganizing indexes by periodically executing the REINDEX command.

Point

Typically, reorganize indexes once a month at a suitable time such as when conducting database maintenance. Use SQL statements to check index usage. If this usage is increasing on a daily basis, adjust the frequency of recreating the index as compared to the free disk space.

The following example shows the SQL statements and the output.

However, when considering continued compatibility of applications, do not reference system catalogs and functions directly in the following SQL statements. Refer to "Notes on Application Compatibility" in the Application Development Guide for details.

[SQL statements]

```
SELECT
  nspname AS schema_name,
  relname AS index_name,
  round(100 * pg_relation_size(indexrelid) / pg_relation_size(indrelid)) / 100 AS index_ratio,
  pg_size_pretty(pg_relation_size(indexrelid)) AS index_size,
  pg_size_pretty(pg_relation_size(indrelid)) AS table_size
FROM pg_index I
  LEFT JOIN pg_class C ON (C.oid = I.indexrelid)
  LEFT JOIN pg_namespace N ON (N.oid = C.relnamespace)
WHERE
  C.relkind = 'i' AND
  pg_relation_size(indrelid) > 0
ORDER BY pg_relation_size(indexrelid) DESC, index_ratio DESC;
```

[Output]

```
 schema_name |            index_name            | index_ratio | index_size | table_size
-------------+----------------------------------+-------------+------------+------------
 public      | pgbench_accounts_pkey            |        0.16 | 2208 KB    | 13 MB
 pg_catalog  | pg_depend_depender_index         |         0.6 | 224 KB     | 368 KB
 pg_catalog  | pg_depend_reference_index        |        0.58 | 216 KB     | 368 KB
...
```

See

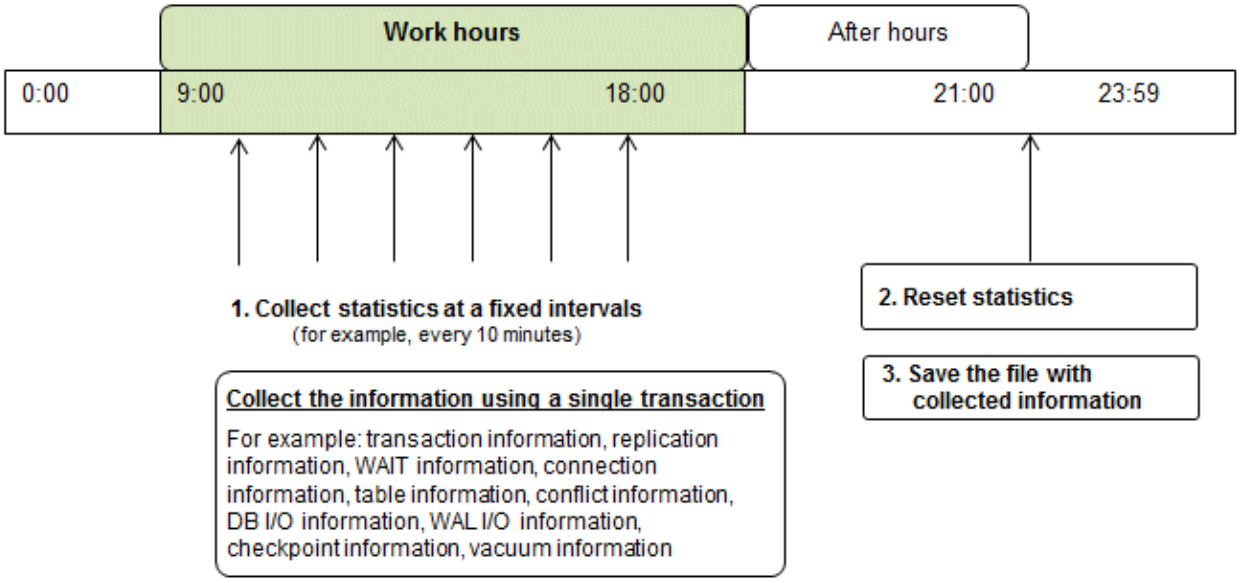
Refer to "Notes on Application Compatibility" in the Application Development Guide for information on maintaining application compatibility.

7.6 Monitoring Database Activity

FUJITSU Enterprise Postgres enables you to collect information related to database activity. By monitoring this information, you can check changes in the database status.

This information includes wait information for resources such as internal locks, and is useful for detecting performance bottlenecks. Furthermore, you should collect this information in case you need to request Fujitsu technical support for an investigation.

Figure 7.1 Overview of information collection



1. Collect statistics at fixed intervals during work hours.

   Accumulate the collected information into a file.

   Wherever possible, collect data from the various statistics views using a single transaction, because it enables you to take a snapshot of system performance at a given moment.

   Refer to "7.6.1 Information that can be Collected" for information on the system views that can be collected.

2. Reset statistics after work hours, that is, after jobs have finished.

   Refer to "7.6.3 Information Reset" for information on how to reset statistics.

3. Save the file with collected information.

   Keep the file with collected information for at least two days, in order to check daily changes in performance and to ensure that the information is not deleted until you have sent a query to Fujitsu technical support.

Where jobs run 24 hours a day, reset statistics and save the file with collected information when the workload is low, for example, at night.

Note

Statistics cumulatively add the daily database value, so if you do not reset them, the values will exceed the upper limit, and therefore will not provide accurate information.

The subsections below explain the following:

- Information that can be collected
- Collection configuration
- Information reset

7.6.1 Information that can be Collected

Information that can be collected is categorized into the following types:

- Information common to PostgreSQL
- Information added by FUJITSU Enterprise Postgres

Information common to PostgreSQL

See

Refer to "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on information common to PostgreSQL.

Information added by FUJITSU Enterprise Postgres

You can collect the following information added by FUJITSU Enterprise Postgres.

Table 7.1 Information added by FUJITSU Enterprise Postgres

View name	Description
pgx_stat_lwlock	Displays statistic related to lightweight lock, with each type of content displayed on a separate line. This information helps to detect bottlenecks. Refer to "C.2 pgx_stat_lwlock" for details.
pgx_stat_latch	Displays statistics related latches, with each type of wait information within FUJITSU Enterprise Postgres displayed on a separate line. This information helps to detect bottlenecks. Refer to "C.3 pgx_stat_latch" for details.

View name	Description
pgx_stat_walwriter	Displays statistics related to WAL writing, in a single line. Refer to "C.4 pgx_stat_walwriter" for details.
pgx_stat_sql	Displays statistics related to SQL statement executions, with each type of SQL statement displayed on a separate line. Refer to "C.5 pgx_stat_sql" for details.
pgx_stat_gmc	Displays statistics related to Global Meta Cache hit ration and used memory size. Refer to "C.6 pgx_stat_gmc" for detail. Also refer to Chapter 12 Global Meta Cache" for information on the Global Meta Cache.

7.6.2 Collection Configuration

The procedure for configuring collection depends on the information content.

- Information common to PostgreSQL
- Information added by FUJITSU Enterprise Postgres

Information common to PostgreSQL

See

Refer to "The Statistics Collector" in "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on information common to PostgreSQL.

Information added by FUJITSU Enterprise Postgres

Information added by FUJITSU Enterprise Postgres is collected by default.

To enable or disable information collection, change the configuration parameters in postgresql.conf. The following table lists the views for which you can enable or disable information collection, and the configuration parameters.

View name	Parameter
pgx_stat_lwlock pgx_stat_latch	track_waits (*1)
pgx_stat_sql	track_sql
pgx_stat_gmc	track_gmc

Remarks: You cannot change the collection status for pgx_stat_walwriter.

*1: When executing the SQL statement with EXPLAIN ANALYZE, processing time may increase because of this information collection. It is recommended to set this parameter to "off" when executing EXPLAIN ANALYZE to check the processing time.

Refer to "Appendix A Parameters" for information on the parameters.

7.6.3 Information Reset

This section describes how to reset information.

Information added by FUJITSU Enterprise Postgres

You can reset information added by FUJITSU Enterprise Postgres by using the pg_stat_reset_shared function in the same way as for information common to PostgreSQL.

Configure the following parameters in the pg_stat_reset_shared function:

Function	Type of return value	Description
pg_stat_reset_shared(text)	void	Reset some cluster-wide statistics counters to zero, depending on the argument (requires superuser privileges). Calling pg_stat_reset_shared('lwlock') will zero all counters shown in pgx_stat_lwlock. Similarly, in the following cases, all values of the pertinent statistics counter are reset: - If pg_stat_reset_shared('latch') is called: All values displayed in pgx_stat_latch - If pg_stat_reset_shared('walwriter') is called: All values displayed in pgx_stat_walwriter - If pg_stat_reset_shared('sql') is called: All values displayed in pgx_stat_sql - If pg_stat_reset_shared('gmc') is called: All values except size column in pgx_stat_gmc

See

Refer to "Statistics Functions" in "Monitoring Database Activity" under "Server Administration" in the PostgreSQL Documentation for information on other parameters of the pg_stat_reset_shared function.

Chapter 8 Streaming Replication Using WebAdmin

This chapter describes how to create a streaming replication cluster using WebAdmin.

Streaming replication allows the creation of one or more standby instances, which connect to the master instances and replicate the data using WAL records. The standby instance can be used for read-only operations.

WebAdmin can be used to create a streaming replication cluster. WebAdmin allows the creation of a cluster in the following configurations:

- Master-Standby Configuration: This configuration creates a master and standby instance together.
- Standby Only Configuration: This configuration creates a standby instance from an already existing instance.

Point

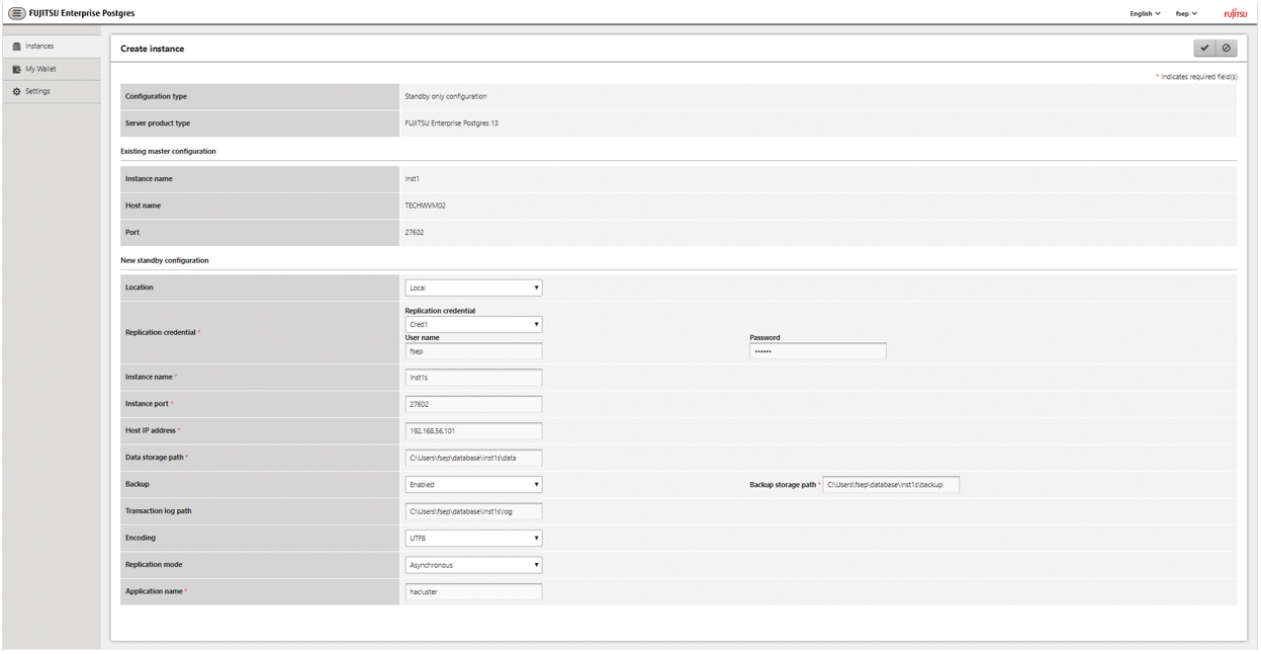
- A standby instance can be created from a standalone instance, a master instance, or even from another standby instance.
- If a streaming replication cluster is created using WebAdmin, the network with the host name (or IP address) specified in [Host name] will be used across sessions of WebAdmin, and also used as the log transfer network.
- To use a network other than the job network as the log transfer network, specify the host name other than the job network one in [Host name].

8.1 Creating a Standby Instance

Follow the procedure below to create a standby instance.

1. In the [Instances] tab, select the instance from which a standby instance is to be created.
2. Click .
3. Enter the information for the standby instance to be created. In the example below, a standby instance is created from instance "inst1".

   The instance name, host address and port of the selected instance are already displayed for easy reference.



   Enter the following items:

   - [Location]: Whether to create the instance in the server that the current user is logged in to, or in a remote server. The default is "Local", which will create the instance in the server machine where WebAdmin is currently running.

- [Replication credential]: The user name and password required for the standby instance to connect to the master instance. The user name and password can be entered or selected from the Wallet. Refer to "Appendix G WebAdmin Wallet" for information on creating wallet entries.
- [Instance name]: Name of the standby database instance to create.

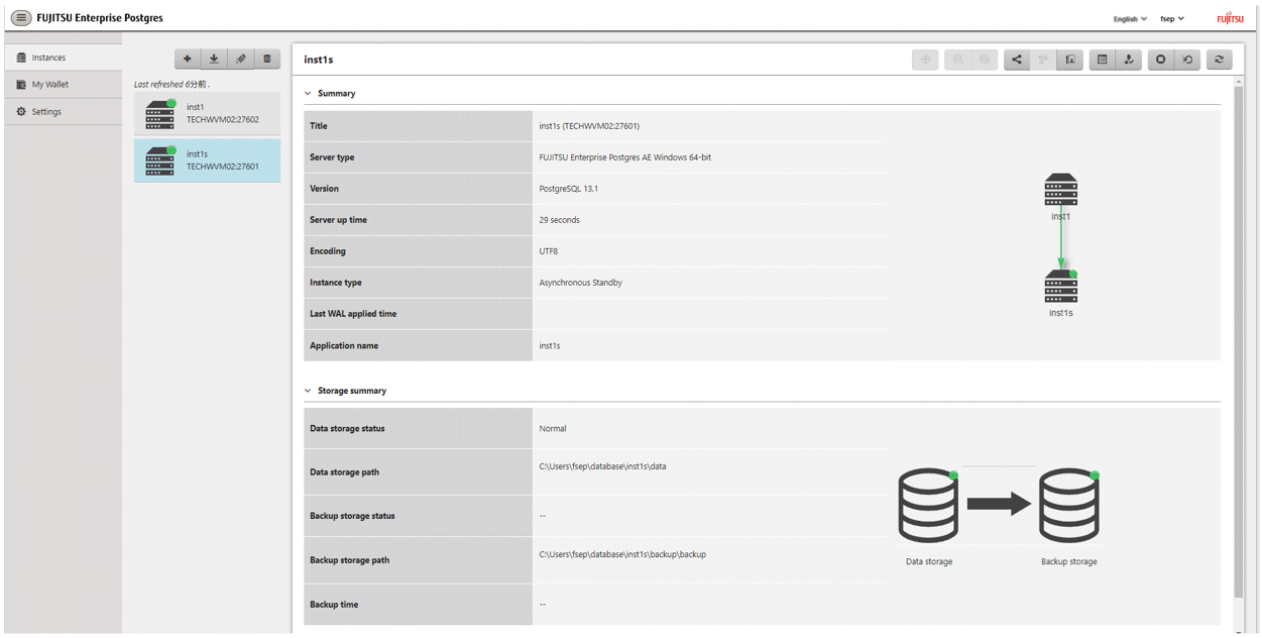
  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters
- [Instance port]: Port number of the standby database instance.
- [Host IP address]: The IP address of the server machine where the standby instance is to be created. This information is needed to configure the standby instance to be connected to the master.
- [Data storage path]: Directory where the database data will be stored
- [Backup storage path]: Directory where the database backup will be stored
- [Transaction log path]: Directory where the transaction log will be stored
- [Encoding]: Database encoding system
- [Replication mode]: Replication mode of the standby instance to be created ("Asynchronous" or "Synchronous")
- [Application name]: The reference name of the standby instance used to identify it to the master instance.

  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters

4. Click ✔ to create the standby instance.
5. Once the standby instance is created successfully, select standby instance in the [Instances] tab. The following page will be displayed:



Note

- Backups are not possible for standby instances in WebAdmin. As a result, and are disabled and no value is shown for [Backup storage status] and [Backup time].
- If using WebAdmin to manage Mirroring Controller, the message below may be output to the server log or system log in the standby instance. No action is required, as the instance is running normally.

```
ERROR:  pgx_rcvall failed (16491)
ERROR:  pgx_rcvall: backup of the database has not yet been performed, or an incorrect backup
storage directory was specified
```

- Replication credential (user name and password) should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".

8.2 Promoting a Standby Instance

Streaming replication between a master and standby instance can be discontinued using WebAdmin.

Follow the procedure below to promote a standby instance to a standalone instance, thereby discontinuing the streaming replication.

1. In the [Instances] tab, select the standby instance that needs to be promoted.
2. Click .
3. Click [Yes] from the confirmation dialog box.

The standby instance will be promoted and will become a standalone instance, which is not part of a streaming replication cluster.

Once the standby instance is promoted to become a standalone instance, the backup storage status will be "Error". This is because no backups are available when the instance is newly promoted to a standalone instance. The status will be reset if a new backup is performed by clicking [Solution] or .

8.3 Converting an Asynchronous Replication to Synchronous

Streaming replication between a master and standby instance can be configured to be in Asynchronous or Synchronous mode. This mode can be changed even after the standby instance was successfully created.

Follow the procedure below to convert an Asynchronous standby instance to Synchronous.

1. In the [Instances] tab, select the master instance of the relevant cluster.
2. Click .
3. In the [Streaming replication] section, edit the value for [Synchronous standby names].
   - Add the "Application name" of the standby instance you want to be in Synchronous mode.
4. Click .
5. Select the master instance and click .
6. Select the standby instance. [Instance type] will now show the updated status.

Note

- Converting an Asynchronous standby instance to Synchronous can cause the master instance to queue the incoming transactions until the standby instance is ready. For this reason, it is recommended that this operation be performed during a scheduled maintenance period.
- When adding a synchronous standby instance, FUJITSU Enterprise Postgres will only keep the first entry in [Synchronous standby names] in synchronous state.

- To learn more about the differences between synchronous and asynchronous standby modes and their behavior, refer to "Streaming Replication" in "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation.

8.4 Converting a Synchronous Replication to Asynchronous

Streaming replication between a master and standby instance can be configured to be in Asynchronous or Synchronous Mode. This mode can be changed even after the standby instance was successfully created.

Follow the procedure below to convert a Synchronous standby instance to Asynchronous.

1. In the [Instances] tab, select the master instance of the relevant cluster.
2. Click .
3. In the [Streaming replication] section, edit the value for [Synchronous standby names].
   - Remove the "Application name" of the standby instance you want to be in Asynchronous mode.
4. Click .
5. Select the master instance and click .
6. Select the standby instance. [Instance type] will now show the updated status.

Note

To learn more about the differences between synchronous and asynchronous standby modes and their behavior, refer to "Streaming Replication" in "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation.

8.5 Joining a Replication Cluster

WebAdmin facilitates the joining of an old master of the cluster as a standby node.

1. In the [Instances] tab, select the remote instance (from where the new cluster node will stream WAL entries), and then click .
2. Configure the node to accept streaming requests from the new node.
3. In the [Instances] tab, select the new standby instance (which needs to be connected to the cluster), and then click .
4. Set [Replication host name] to the remote instance.
5. Enter [Replication credential].

   Specify the user name and password required for the standby instance to connect to the remote instance. The user name and password can be entered or selected from the Wallet. Refer to "Appendix G WebAdmin Wallet" for information on creating wallet entries. Replication credential (user name and password) should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".
6. Enter [Host IP address].

   Specify the IP address of the node where the standby instance was created.
7. Click to open the [Join replication cluster] dialog box.
   For FUJITSU Enterprise Postgres 12 and earlier instances, select [Restart later] or [Restart now], and then click [Yes] to set up the standby instance.
   For FUJITSU Enterprise Postgres 13, click [Yes] or [Restart now], and then click [Yes] to set up the standby instance.
8. Upon successful completion, the confirmation dialog box will be displayed.
9. Click [Close] to return to the instance details window.

The instance will become a standby instance, and will be part of the streaming replication cluster. The replication diagram will display the relationship between the standby instance and the remote instance. The user can change the replication relationship of the remote instance from asynchronous to synchronous (and vice versa) using the [Configuration] window.

Chapter 9 Installing and Operating the In-memory Feature

The in-memory feature enables fast aggregation using Vertical Clustered Index (VCI) and memory-resident feature.

VCI has a data structure suitable for aggregation, and features parallel scan and disk compression, which enable faster aggregation through reduced disk I/O.

The memory-resident feature reduces disk I/O that occurs during aggregation. It consists of the preload feature that reads VCI data to memory in advance, and the stable buffer feature that suppresses VCI data eviction from memory. The stable buffer feature secures the proportion specified by parameter in the shared memory for VCI.

This chapter describes how to install and operate the in-memory feature.

Note

This feature can only be used in Advanced Edition.

9.1 Installing Vertical Clustered Index (VCI)

This section describes the installation of VCI.

1. Evaluating whether to Install VCI
2. Estimating Resources
3. Setting up

9.1.1 Evaluating whether to Install VCI

VCI uses available resources within the server to increase scan performance.

It speeds up processing in many situations, and can be more effective in the following situations:

- Single table processing
- Processing that handles many rows in the table
- Processing that handles some columns in the table
- Processing that performs very heavy aggregation such as simultaneous sum and average aggregation

VCI will not be used in the following cases, so it is necessary to determine its effectiveness in advance:

- The data type of the target table or column contains VCI restrictions.
- The SQL statement does not meet the VCI operating conditions
- VCI is determined to be slower based on cost estimation

Note

If performing operations that use VCI, the full_page_writes parameter setting in postgresql.conf must be enabled (on). For this reason, if this parameter is disabled (off), operations that use VCI return an error. In addition, to perform operations for tables that do not create a VCI when the full_page_writes parameter setting is temporarily disabled (off), do not create a VCI or perform operations to tables that created a VCI during that time.

See

- Refer to "9.1.4 Data that can Use VCI" for information on VCI restrictions.

- Refer to "Scan Using a Vertical Clustered Index (VCI)" - "Operating Conditions" in the Application Development Guide for information on VCI operating conditions.

9.1.2 Estimating Resources

Estimate resources before setting up VCI.

Select the aggregation that you want to speed up and identify the required column data. The additional resources below are required according to the number of columns.

- Memory

  Secure additional capacity required for the disk space for the column for which VCI is to be created.

- Disk

  Secure additional disks based on the disk space required for the column for which VCI is to be created, as VCI stores column data as well as existing table data on the disk. It is recommended to provide a separate disk in addition to the existing one, and specify it as the tablespace to avoid impact on any other jobs caused by I/O.

Information

The operations on VCI can continue even if the memory configured for VCI is insufficient by using VCI data on the disk.

See

Refer to "Estimating Memory Requirements" and "Estimating Database Disk Space Requirements" in the Installation and Setup Guide for Server for information on how to estimate required memory and disk space.

9.1.3 Setting up

This section describes how to set up VCI.

Setup flow

1. Setting Parameters
2. Installing the Extensions
3. Creating VCI
4. Confirming that VCI has been Created

9.1.3.1 Setting Parameters

Edit postgresql.conf to set the required parameters for VCI. After that, start or restart the instance.

The following table lists the parameters that need or are recommended to be configured in advance:

Parameter name	Setting value	Description	Required
shared_preload_libraries	Literal 'vci, pg_prewarm'	VCI and shared library to be preloaded at server start.	Y
session_preload_libraries	Literal 'vci, pg_prewarm'	VCI and shared library to be preloaded at connection start.	Y
reserve_buffer_ratio	Percentage of shared memory to be used for stable buffer table	Proportion of shared memory to be used for a stable buffer table.	N

Parameter name	Setting value	Description	Required
vci.control_max_workers	Number of background workers that manage VCI	Number of background workers that manage VCI. Add this value to max_worker_processes.	N
vci.max_parallel_degree	Maximum number of background workers used for parallel scan	Maximum number of background workers used for parallel scan. Add this value to max_worker_processes.	N
vci.smc_directory	Directory name in which a temporary file is created as the dynamic shared memory	Directory name in which a temporary file is created as the dynamic shared memory during a scan using a VCI.	N

Example

```
shared_preload_libraries =  'vci, pg_prewarm'
session_preload_libraries =  'vci, pg_prewarm'
reserve_buffer_ratio = 20
vci.control_max_workers = 8
vci.max_parallel_degree = 4
max_worker_processes = 18 # Example: If the initial value was 6, 6 + 8 + 4 = 18
vci.smc_directory = 'E:\\vci\\work'
```

Note

If performing operations that use VCI, do not delete the shared library names specified to "shared_preload_libraries" and "session_preload_libraries". If operations that access VCI are performed after the VCI was defined, unexpected behavior may occur.

See

- Refer to "Appendix A Parameters" for information on all parameters for VCI. Refer also to default value for each parameter and details such as specification range in the same chapter. Refer to "Server Configuration" under "Server Administration" in the PostgreSQL documentation for information on shared_preload_libraries, session_preload_libraries, and max_worker_processes.

9.1.3.2 Installing the Extensions

Execute CREATE EXTENSION to install the VCI and pg_prewarm extensions. Both extensions need to be installed for each database.

- Installing VCI

```
db01=# CREATE EXTENSION vci;
```

- Installing pg_prewarm

```
db01=# CREATE EXTENSION pg_prewarm;
```

Note

- Only superusers can install VCI extensions.
- VCI extensions can only be installed in public schema.
- Some operations cannot be performed for VCI extensions. Refer to "9.2.1 Commands that cannot be Used for VCI" for details.

9.1.3.3 Creating a VCI

Execute the CREATE INDEX statement with the "USING vci" clause to create a VCI for the desired columns and the "WITH (stable_buffer=true)" clause to enable the stable buffer feature.

To use a separate disk for the VCI, specify the TABLESPACE clause.

```
db01=# CREATE INDEX idx_vci ON table01 USING vci (col01, col02) WITH (stable_buffer=true);
```

Note

- Some table types cannot be specified on the ON clause of CREATE INDEX. Refer to "9.1.4.1 Relation Types" for details.
- Some data types cannot be specified on the column specification of CREATE INDEX. Refer to "9.1.4.2 Data Types" for details.
- Some operations cannot be performed for VCI. Refer to "9.2.1 Commands that cannot be Used for VCI" for details.
- The same column cannot be specified more than once on the column specification of CREATE INDEX.
- VCI cannot be created for table columns that belong to the template database.
- CREATE INDEX creates multiple views named vci_*10digitRelOid_5digitRelAttr_1charRelType* alongside VCI itself. These are called VCI internal relations. Do not update or delete them as they are used for VCI aggregation.
- All data for the specified column will be replaced in columnar format when VCI is created, so executing CREATE INDEX on an existing table with data inserted takes more time compared with a general index (B-tree). Jobs can continue while CREATE INDEX is running.
- When CREATE INDEX USING VCI is invoked on a partitioned table, the default behavior is to recurse to all partitions to ensure they all have matching indexes. Each partition is first checked to determine whether an equivalent index already exists, and if so, that index will become attached as a partition index to the index being created, which will become its parent index. If no matching index exists, a new index will be created and automatically attached; the name of the new index in each partition will be determined as if no index name had been specified in the command. If the ONLY option is specified, no recursion is done, and the index is marked invalid. (ALTER INDEX ... ATTACH PARTITION marks the index valid, once all partitions acquire matching indexes.) Note, however, that any partition that is created in the future using CREATE TABLE ... PARTITION OF will automatically have a matching index, regardless of whether ONLY is specified.
- Parallel index build is not supported on VCI indexes.

9.1.3.4 Confirming that the VCI has been Created

Execute the SELECT statement to reference the pg_indexes catalog, and confirm that the VCI was created for the target columns.

Example

```
db01=# SELECT indexdef FROM pg_indexes WHERE indexdef LIKE '%vci%';
                          indexdef
-----------------------------------------------------
CREATE INDEX idx_vci ON table01 USING vci (col01, col02)
(1 row)
```

9.1.4 Data that can Use VCI

This section describes on which relation types and for which data types VCIs can be created.

9.1.4.1 Relation Types

VCIs cannot be created on some relation types.

The ON clause of CREATE INDEX described in "9.1.3.3 Creating a VCI" cannot specify relations on which VCIs cannot be created.

- Relations on which VCIs can be created
  - Normal tables
  - UNLOGGED TABLEs
- Relations on which VCIs cannot be created
  - Materialized views
  - Temporary tables
  - Views
  - Temporary views
  - Foreign tables

9.1.4.2 Data Types

VCIs cannot be created for some data types.

The column specification of CREATE INDEX described in "9.1.3.3 Creating a VCI" cannot specify a column with data type on which VCIs cannot be created.

Category	Data type	Supported by VCI?
Numeric	smallint	Y
	integer	Y
	bigint	Y
	decimal	Y
	numeric	Y
	real	Y
	double precision	Y
	serial	Y
	bigserial	Y
Monetary	money	Y
Character	varchar(*n*)	Y
	char(*n*)	Y
	nchar	Y
	nvarchar(*n*)	Y
	text	Y
Binary	bytea	Y
Date/time	timestamp	Y
	timestamp with time zone	Y
	date	Y
	time	Y
	time with time zone	Y
	interval	Y
Boolean	boolean	Y
Geometric	point	N

Category	Data type	Supported by VCI?
	line	N
	lseg	N
	box	N
	path	N
	polygon	N
	circle	N
Network address	cidr	N
	inet	N
	macaddr	N
	macaddr8	N
Bit string	bit(*n*)	Y
	bit varying(*n*)	Y
Text search	tsvector	N
	tsquery	N
UUID	uuid	Y
XML	xml	N
JSON	json	N
	jsonb	N
Range	int4range	N
	int8range	N
	numrange	N
	tsrange	N
	tstzrange	N
	daterange	N
Object identifier	oid	N
	regproc	N
	regprocedure	N
	regoper	N
	regoperator	N
	regclass	N
	regtype	N
	regconfig	N
	regdictionary	N
pg_lsn type	pg_lsn	N
Array type	-	N
User-defined type (Basic type, enumerated type, composite type, and range type)	-	N

9.2 Operating VCI

This section describes how to operate VCI.

9.2.1 Commands that cannot be Used for VCI

Some operations cannot be performed for VCI extensions and VCI itself.

This section describes SQL commands that cannot be executed for the VCI extensions and VCI itself, and client application commands.

SQL commands

- Operations that cannot be performed for the VCI extension

Command	Subcommand	Description
ALTER EXTENSION	UPDATE	The VCI extension cannot be specified. This operation is not required for VCI.
	SET SCHEMA	
	ADD	
	DROP	
CREATE EXTENSION	SCHEMA	The subcommands on the left cannot be performed if the VCI extension is specified. This operation is not required for VCI.

- Operations that cannot be performed on relations containing a VCI

Command	Subcommand	Description
ALTER INDEX	SET	The subcommands on the left cannot be performed if a VCI is specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	SET TABLESPACE	
	ALL IN TABLESPACE	
ALTER OPERATOR CLASS	RENAME TO	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
	OWNER TO	
	SET SCHEMA	
ALTER OPERATOR FAMILY	ADD	
	DROP	
	RENAME TO	
	OWNER TO	
	SET SCHEMA	
ALTER TABLE	ALL IN TABLESPACE *name* [OWNED BY *roleName*] SET TABLESPACE *newTablespace*	A tablespace that contains a VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	DROP [COLUMN] [IF EXISTS] *colName* [RESTRICT | CASCADE]	A column that contains a VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
	ALTER [COLUMN] *colName* [SET DATA] TYPE *dataType* [COLLATE *collation*] [USING *expr*]	

Command	Subcommand	Description
	CLUSTER ON *indexName*	A VCI cannot be specified. This operation is not supported in VCI.
	REPLICA IDENTITY {DEFAULT | USING INDEX *indexName* | FULL | NOTHING}	
CLUSTER	-	A table that contains a VCI and VCI cannot be specified. If the operation is required, delete the VCI using DROP INDEX, and re-create it using CREATE INDEX after completing the operation.
CREATE INDEX	UNIQUE	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
	CONCURRENTLY	
	[ASC | DESC]	
	[NULLS { FIRST | LAST }]	
	WITH	
	WHERE	
	INCLUDE	
CREATE OPERATOR CLASS	-	A VCI cannot be specified. This operation is not supported in VCI.
CREATE OPERATOR FAMILY	-	
CREATE TABLE	EXCLUDE	
DROP INDEX	CONCURRENTLY	The subcommands on the left cannot be performed if a VCI is specified. This operation is not supported in VCI.
REINDEX	-	A VCI cannot be specified. This command is not required as VCI uses daemon's automatic maintenance to prevent disk space from increasing.

Client application command

- Operations that cannot be performed on relations containing a VCI

Command	Description
clusterdb	Clustering cannot be performed for tables that contain a VCI.
reindexdb	VCIs cannot be specified on the --index option.

9.2.2 Data Preload Feature

The first aggregation using VCI immediately after an instance is started may take time, because the VCI data has not been loaded to buffer.

Therefore, use the preload feature to load the VCI data to buffer in advance when performing VCI aggregation after an instance is started.

When using the preload feature, execute the function pgx_prewarm_vci to each VCI created with CREATE INDEX.

```
db01=# SELECT pgx_prewarm_vci('idx_vci');
```

See

Refer to "B.4 VCI Data Load Control Function" for information on pgx_prewarm_vci.

Chapter 10 Parallel Query

FUJITSU Enterprise Postgres enhances parallel queries, by taking into consideration the aspects below:

- CPU load calculation
- Increase of workers during runtime

10.1 CPU Load Calculation

There may be a case when the user tries to execute a parallel query but there is not enough CPU available.

Adding dynamic workers at this stage will provide no benefits - instead, it may add overhead due to context switching.

FUJITSU Enterprise Postgres takes into consideration the current CPU load when deciding on the number of workers for parallel query.

10.2 Increase of Workers during Runtime

This FUJITSU Enterprise Postgres enhancement allows systems to allocate additional workers during query execution (if there are workers available at the time). This improves query performance, which could otherwise starve of CPU if there were fewer or no workers when the query started.

Note

The ability to increase workers during runtime is available only with parallel sequence scan.

Chapter 11 High-Speed Data Load

High-speed data load uses the pgx_loader command to load data from files at high speed into FUJITSU Enterprise Postgres.

Note

- This feature is available only in the Advanced Edition.
- This feature is not available in single-user mode. This is because in single-user mode instances run in a single process, and it cannot start parallel workers.

11.1 Installing High-Speed Data Load

This section describes how to install high-speed data load.

Installation flow

1. Deciding whether to Install
2. Estimating Resources
3. Setup

11.1.1 Deciding whether to Install

The feature achieves high speed data load by executing the COPY FROM command in parallel. If the database system is unable to use sufficient resources due to the feature using more resources than the COPY FROM command of PostgreSQL, load performance may be inferior to that of the COPY FROM command of PostgreSQL. Therefore, determine if the feature will be effective by considering the factors below before deciding to install.

Database server memory

If the value of shared_buffers in postgresql.conf is small, fewer data pages are cached to the shared memory of the database server. This will result in multiple parallel workers more often having to wait for write exclusive locks to the same data page. Moreover, the smaller the number of data pages, the more often the table expands. During table expansion, access to the table is exclusive (standby event name: extend), so write time increases. To cater for that, increase the value of shared_buffers.

See

The standby event name is stored in the wait_event column of the pg_stat_activity view. Refer to "wait_event Description" in "The Statistics Collector" in the PostgreSQL Documentation for details.

Frequency of checkpoints

If checkpoints are issued at short intervals, write performance is reduced. If the messages below are output to the server log during data writes, increase the values of max_wal_size and checkpoint_timeout in postgresql.conf to reduce the frequency of checkpoints.

Example

```
LOG:  checkpoints are occurring too frequently (19 seconds apart)
HINT:  Consider increasing the configuration parameter "max_wal_size".
```

11.1.2 Estimating Resources

Estimate the memory requirements for high-speed data load.

Up to 128 parallel workers to perform data load can be specified for this feature. The additional resources below are required depending on the number of parallel workers.

- Dynamic shared memory created during data load

  The feature creates shared memory and shared memory message queues during data load. These are used to send external data from the back end to the parallel workers, and for error notifications.

Note

If the value of shared_buffers in postgresql.conf is small, the system will often have to wait for write exclusive locks to the same data page (as described in "Database server memory" in "11.1.1 Deciding whether to Install"). Since input data cannot be loaded from the shared memory message queues during such waits, they will often be full. In these cases, it will not be possible to write to the shared memory message queues, resulting in degraded data load performance.

See

Refer to "High-Speed Data Load Memory Requirements" in the Installation and Setup Guide for Server for information on the formula for estimating memory requirements.

11.1.3 Setup

This section describes how to set up high-speed data load.

Setup flow

1. Setting Parameters
2. Installing the Extension

11.1.3.1 Setting Parameters

Set the parameters required for high-speed data load in postgresql.conf. After that, start or restart the instance.

The table below lists the postgresql.conf parameters that must be changed, and the values that must be added to their current values. After editing postgresql.conf, start or restart the instance.

Parameter	Setting	Required
max_prepared_transactions	Add the number of transactions that can be prepared by parallel workers during data load to the parameter's current value. The resulting value must be equal to or greater than the maximum number of parallel workers used with this feature.	Mandatory
max_worker_processes	Number of parallel workers to perform data load.	Mandatory
max_parallel_workers	Add the maximum number of parallel workers to be used in a parallel query by this feature to the parameter's current value. The resulting value must be equal to or greater than the number of parallel workers used with this feature.	Mandatory

Example

The example below shows how to configure 2 instances of high-speed data load being executed simultaneously using a degree of parallelism of 4.

```
max_prepared_transactions = 13  #Example if the initial value was 5: 5 + 2 x 4 = 13
max_worker_processes = 16        #Example if the initial value was 8: 8 + 2 x 4 = 16
max_parallel_workers = 12        #Example if the initial value was 4: 4 + 2 x 4 = 12
```

Note

As shown in the example above, set the value of max_prepared_transactions, max_worker_processes and max_parallel_workers multiplied by the number of instances of this feature executed simultaneously.

The table below lists the postgresql.conf parameters that must also be checked.

Parameter	Setting	Required
dynamic_shared_memory_type	Implementation of dynamic shared memory to be used by the instance. The default value is recommended.	Mandatory

See

Refer to "Resource Consumption" in the PostgreSQL Documentation for information on the parameters.

11.1.3.2 Installing the Extension

Execute CREATE EXTENSION to install the high-speed data load extension. The extension needs to be installed on each database.

Example

The example below installs the extension on the "postgres" database.

```
postgres=# CREATE EXTENSION pgx_loader;
CREATE EXTENSION
```

Note

- Only superusers can install the high-speed data load extension.
- The high-speed data load extension can only be installed on the public schema.

11.2 Using High-Speed Data Load

This section describes how to use high-speed data load.

11.2.1 Loading Data

To load data from a file into a FUJITSU Enterprise Postgres table, execute the pgx_loader command in load mode.

Example

The example below loads the file E:\path\to\data.csv (2000 records) into table tbl using a degree of parallelism of 3.

```
> pgx_loader load -j 3 -c "COPY tbl FROM 'E:\path\to\data.csv' WITH CSV"
LOAD 2000
```

Point

If an external file contains data that violates the format or constraints, the data load may fail partway through, resulting in delays for routine tasks such as nightly batch processing. Therefore, it is recommended to remove the invalid data before executing the data load.

Note

The data inserted using this feature is dumped as a COPY command by the pg_dump command and the pg_dumpall command.

See

- Refer to "pgx_loader" in the Reference for information on the command.
- Refer to "COPY" in the PostgreSQL Documentation for information on the deployment destination and access privileges for external files.

11.2.2 Recovering from a Data Load that Ended Abnormally

If a system interruption such as a server failure occurs while high-speed data load is being performed, transactions prepared using this feature may be changed to the in-doubt state. At that point, resources occupied by the transaction will be locked, and access to the relevant resources from other transactions will be blocked, rendering them unusable.

In such cases, check transactions that are in an in-doubt state, and resolve them.

Checking for in-doubt transactions

This section describes how to check for in-doubt transactions.

1. Refer to the pgx_loader_state table in the pgx_loader schema.

   Retrieve the global transaction identifier (gid column) of in-doubt transactions. In-doubt transactions will contain "rollback" in the column "state".

   #### Example

   The example below retrieves the global transaction identifier (gid) of in-doubt transactions performed by the database role myrole and that used table tbl. The retrieved global transaction identifiers pgx_loader:9589 and pgx_loader:9590 identify in-doubt transactions.

   ```
   postgres=# SELECT gid, state FROM pgx_loader.pgx_loader_state WHERE
   postgres-# role_oid IN (SELECT oid FROM pg_roles WHERE rolname = 'myrole') AND
   postgres-# relation_oid IN (SELECT relid FROM pg_stat_all_tables WHERE
   postgres-# relname = 'tbl');
          gid       | state
   -----------------+-------------
    pgx_loader:9590 | rollback
    pgx_loader:9591 | commit
    pgx_loader:9589 | rollback
   (3 rows)
   ```

2. Refer to the pg_prepared_xacts system view.

   Check if the in-doubt transactions retrieved above exist.

Example

The example below checks if in-doubt transactions with the global transaction identifiers pgx_loader:9589 and pgx_loader:9590 exist.

```
postgres=# SELECT gid FROM pg_prepared_xacts WHERE gid IN ('pgx_loader:9589','pgx_loader:9590');
       gid
------------------
 pgx_loader:9590
 pgx_loader:9589
(2 rows)
```

See

Refer to "E.1 pgx_loader_state" for information on the pgx_loader_state table.

Resolving in-doubt transactions

Execute the pgx_loader command in recovery mode to resolve in-doubt transactions.

After executing the pgx_loader command in recovery mode, perform the procedure described in "Checking for in-doubt transactions" to check if the in-doubt transactions have been resolved.

Example

The example below completes the in-doubt transactions prepared for table tbl.

```
$ pgx_loader recovery -t tbl
```

Point

The recovery mode of the pgx_loader command only resolves transactions prepared by high-speed data load. For transactions prepared by an application using distributed transactions other than this feature, follow the procedure described in "15.13 Actions in Response to Error in a Distributed Transaction".

11.3 Removing High-Speed Data Load

This section describes how to remove high-speed data load.

11.3.1 Removing the Extension

Execute DROP EXTENSION to remove the high-speed data load extension. The extension needs to be removed on each database.

Example

The example below removes the extension on the "postgres" database.

```
postgres=# DROP EXTENSION pgx_loader;
DROP EXTENSION
```

Note

- The information required for operation of high-speed data load is stored in the pgx_loader_state table of the pgx_loader schema. Do not remove the high-speed data load extension if the pgx_loader_state table is not empty.
- Only superusers can remove the high-speed data load extension.
- The high-speed data load extension can only be removed on the public schema.

Chapter 12 Global Meta Cache

The Global Meta Cache (GMC) feature loads a meta cache into shared memory using the pgx_global_metacache parameter. This reduces the amount of memory required throughout the system.

Note

This feature can only be used in Advanced Edition.

12.1 Usage

Describes how to use the Global Meta Cache feature.

12.1.1 Deciding Whether to Enable the Global Meta Cache Feature

Global Meta Cache is a mechanism for sharing meta caches between processes, so it works well on systems with a high number of resources accessed and SQL connections. The number of resources is primarily the number of tables accessed by a process, the number of indexes, or the total number of all columns in all tables accessed.

In particular, consider using Global Meta Cache if the total size of the meta cache for each process exceeds the amount of installed memory, or takes up a large portion of that memory, thereby squeezing memory allocations to the database cache or the Operating system file cache. Using Global Meta Cache may slightly increase the time it takes to execute a single SQL to reference a meta cache on shared memory (For example, it will not exceed 5% of the execution time in a situation where all the data is located in the database cache), but you can expect a greater benefit from being able to allocate more memory, such as for the database cache.

If performance degradation using Global Meta Cache is not acceptable, you may want to limit the number of tables accessed by a process.

12.1.2 Estimating Memory for Global Meta Cache

To enable the Global Meta Cache feature, the pgx_global_metacache parameter must specify an upper limit on the size of the shared memory (Hereinafter, the GMC area) dedicated to Global Meta Cahche. Ideally, this upper limit should be the size estimated in “Appendix A Parameters”. Values lower than this can still work, but refer to "12.1.3 How the GMC Memory Area Is Used" on using the GMC area to understand the disadvantages.

12.1.3 How the GMC Memory Area Is Used

At startup, the memory for the GMC area is not used much, but the GMC area grows as new meta caches are placed in the GMC area. If it does, it discards any meta caches that the system determines are not heavily used and places a new one in the GMC area.

Therefore, the GMC area will work even if it is smaller than the estimate, but the meta cache will be regenerated if the discarded meta cache needs to be reused. Note that if this happens frequently, it will degrade overall performance.

With this in mind, it may not be a problem if, for example, the tables to be accessed are different depending on the time zone, and the degradation of the time zone immediately after the change is acceptable.

In any case, be sure to test and tune the system thoroughly before running it.

12.1.4 Enabling the Global Meta Cache Feature

To Enable the Global Meta Cache feature edit the postgresql.conf file and set the pgx_global_metacahe parameter. Restarting the instance after editing the postgresql.conf file is required. Refer to "Appendix A Parameters" for information on the parameters.

Parameter Name	Description
pgx_global_metacache	Specify the maximum amount of memory for the GMC area on shared memory. When it’s set to 0 (default value), the Global Meta Cache feature is disabled. When enabled, the minimum value allowed is 10MB.

When the cache is created, if the total amount of meta caches on shared memory exceeds the value specified by pgx_global_metacache, the inactive, unreferenced meta caches are removed from the GMC area. Note that if all GMC are in use and the cache cannot be created in the GMC area, the cache is temporarily created in the local memory of the backend process.

Example

Here is an example postgresql.conf configuration:

```
pgx_global_metacache = 800 MB
```

Wait Events

The Global Meta Cache feature may cause wait events. Wait events are identified in the wait_event column of the pg_stat_activity view. GMC specific wait events are described below.

[GMC Feature Wait Events]

Wait Event Type	Wait Event Name	Description
LWLock	GlobalCatcache	Waiting to find, add, and remove meta caches in the GMC area.
IPC	GMCSweep	Waiting to select a meta cache that can be deleted when GMC space is low. If the GMC is fully referencing and there is no deletable meta cache, it is waiting for the reference to be removed and a deletable meta cache to be selected.

Note

If GMCSweep is happened frequently, increase the pgx_global_metacache setting.

See

Refer to "Viewing Statistics" in the PostgreSQL Documentation for information on the pg_stat_activity view.

12.1.5 Estimating Resources

Refer to "Global Meta Cache Memory Requirements" in the Installation and Setup Guide for Server for formulas to estimate the amount of memory used by the Global Meta Cache feature.

12.2 Statistics

Describes the statistics for the Global Meta Cache feature.

12.2.1 System View

You can check the cache hit ratio and size of the GMC area in the system view pgx_stat_gmc. Refer to "C.6 pgx_stat_gmc" for information on the columns.

If the cache hit ratio is low and the current memory usage is close to pgx_global_metacache, increase the pgx_global_metacache setting because performance may be degraded.

Refer to "7.6 Monitoring Database Activity" in the Operations Guide for information on the statistics.

Chapter 13 Local Meta Cache Limit

Local Meta Cache Limit feature limits the size of a Local Meta Cache by removing it if it has not been accessed for a long time.

Note

This feature is available only in the Advanced Edition.

13.1 Usage

Describes how to use the Local Meta Cache Limit feature.

13.1.1 Deciding Whether to Enable the Local Meta Cache Limit Feature

Refer to "Appendix A Parameters", after estimating the total amount of memory to be used as the catalog cache and relation cache, when the total amount of memory exceeds the amount of installed memory or occupies a large amount of installed memory, consider using this feature.

This feature adds the action of discarding the meta cache that has been held permanently. If you attempt to refer to a destroyed meta cache again, the meta cache is recreated, so using this feature will result in poor performance compared to not using it.

Therefore, read the following to understand how to discard a meta cache.

- 13.1.3 Cache Removal when Local Meta Cache Limit is Enabled
- 13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature
- Parameters for the Local Meta Cache Limit feature

How to set the upper limit with these considerations is described in detail in the estimation formula in "Appendix A Parameters".

13.1.2 How to Set Parameters for the Local Meta Cache Limit Feature

To enable the Local Meta Cache Limit feature, set the pgx_catalog_cache_max_size and pgx_relation_cache_max_size parameters.

Parameter Name	Description
pgx_catalog_cache_max_size	Specify the maximum amount of memory that the backend process should use as the catalog cache. You can enable catalog cache removal by setting it to 8 KB or more. When it is set to 0 (default value), the catalog cache removal is disabled.
pgx_relation_cache_max_size	Specify the maximum amount of memory that the backend process should use as the relation cache. You can enable relation cache removal by setting it to 8 KB or more. When it is set to 0 (default value), the relation cache removal is disabled.

Example

Here is an example postgresql.conf configuration:

```
pgx_catalog_cache_max_size = 1MB
pgx_relation_cache_max_size = 1MB
```

13.1.3 Cache Removal when Local Meta Cache Limit is Enabled

When this feature is enabled, the caching strategy is to keep the cache as long as possible within the specified upper limit. If holding a new cache exceeds the limit, consider locality of reference and remove the cache from the one with the longest unreferenced time.

However, because the cache used by active transactions cannot be removed, if a transaction uses a large number of caches, the cache may be held above the limit. In this case, remove the all caches at the end of the transaction. This is necessary to free up memory.

In PostgreSQL, in order to acquire memory at high speed, a memory block of a certain size is acquired from the OS, and a small memory is cut out from the block and used. The memory for the metacache is cut out in the same way. Therefore, it is possible to return the memory block to the OS by destroying all the meta caches scattered throughout the memory block. When this happens, the next SQL execution will be slowed down due to the re-creation of the meta cache. Therefore, upper limit of feature should be set to a value larger than the size of the meta cache used by at least one transaction.

When the size of the meta cache exceeds the upper limit, the following message is output:

```
WARNING: could not reduce Cat/RelCacheMemoryContext size to AA kilobytes, reduced to BB kilobytes
HINT: consider increasing the configuration parameter pgx_catalog/relation_cache_max_size
```

(***AA***: Upper limit, ***BB***: Amount of memory actually used)

CatCacheMemoryContext and RelCacheMemoryContext are memory areas for storing the catalog cache and relation cache, respectively. If this message is output, consider increasing the upper limit.

If the memory consumption by the backend process exceeds the allowable value by increasing the upper limit, reconsider the SQL to be executed, such as reducing the number of tables accessed in one transaction, or add memory adjust to the amount of memory used.

13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature

By observing how much meta cache regeneration is taking place, you can determine if the low upper limit is the cause of the failure to achieve the desired performance.

From the message below, calculate the cache hit ratio as follows:

```
Cache hit ratio = Number of cache hits ÷ Number of times the cache was searched
```

If the cache hit ratio is 80% or higher, this feature will not be the main factor that impedes performance. If not, raise the upper limit and see if performance can reach the goal. In doing so, first try to shift the focus of allocation to the relations cache. This is because when executing SQL, the relation cache generated based on the catalog cache is mainly referenced, so it is advantageous to leave a large amount of relation cache.

```
Catalog cache:catalog cache hit stats: search XX, hits YY
Relation cache:relation cache hit stats: search XX, hits YY
```

(***XX***: Number of times the cache was searched, ***YY***: Number of cache hits)

This message is printed when the transaction ends. However, if you output the message frequently, the performance will be degraded by itself, so you can adjust the output interval with the following parameters.

Parameter Name	Description
pgx_cache_hit_log_interval	When the transaction ends, if the time set in this parameter has elapsed since the previous message was output, the message is output. If set to 0, a message will be output each time the transaction ends. Setting -1 disables the output. The default value is 10min. Even if pgx_catalog_cache_max_size and pgx_relation_cache_max_size are disabled, the message output of the corresponding cache will be invalid. Immediately after connecting to the server, a small transaction occurs before the request from the user application, such as for user authentication. Since it is meaningless to know the hit ratio for these, a message is output at the end of the transaction that started after the time set in this parameter has elapsed after connecting to the server. For the same reason, setting a small value such as 0 may result in a message being printed at the end of such a small transaction. You can check which transaction the message corresponds to from the information output at the beginning. This information depends on the setting of the parameter log_line_prefix.

Example

Here is an example postgresql.conf configuration:

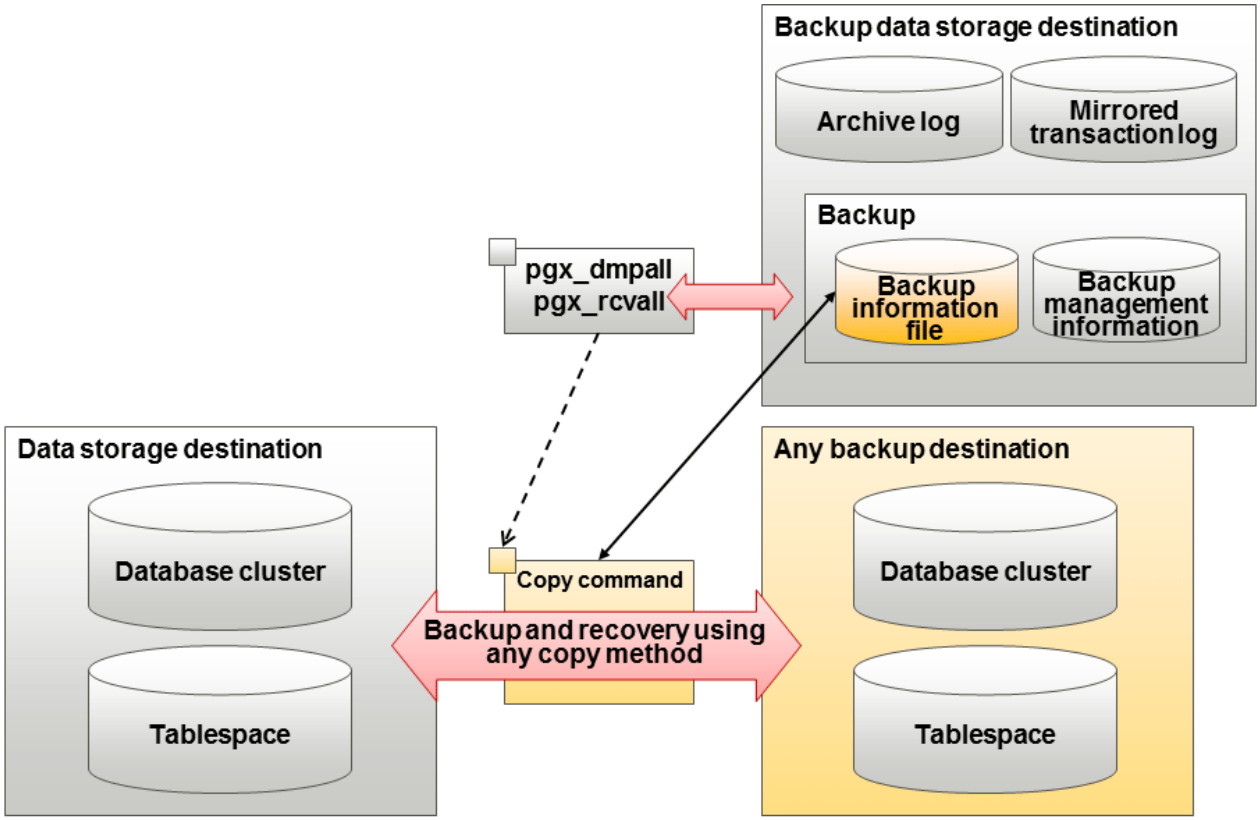
```
pgx_cache_hit_log_interval= 30min
```

Chapter 14 Backup/Recovery Using the Copy Command

By using a copy command created by the user, the pgx_dmpall command and the pgx_rcvall command can perform backup to any destination and can perform recovery from any destination using any copy method.

Copy commands must be created in advance as executable scripts for the user to implement the copy process on database clusters and tablespaces, and are called when executing the pgx_dmpall and pgx_rcvall commands.

This appendix describes backup/recovery using the copy command.



Point

It is also possible to back up only some tablespaces using the copy command. However, database resources not backed up using the copy command are still backed up to the backup data storage destination.

Note

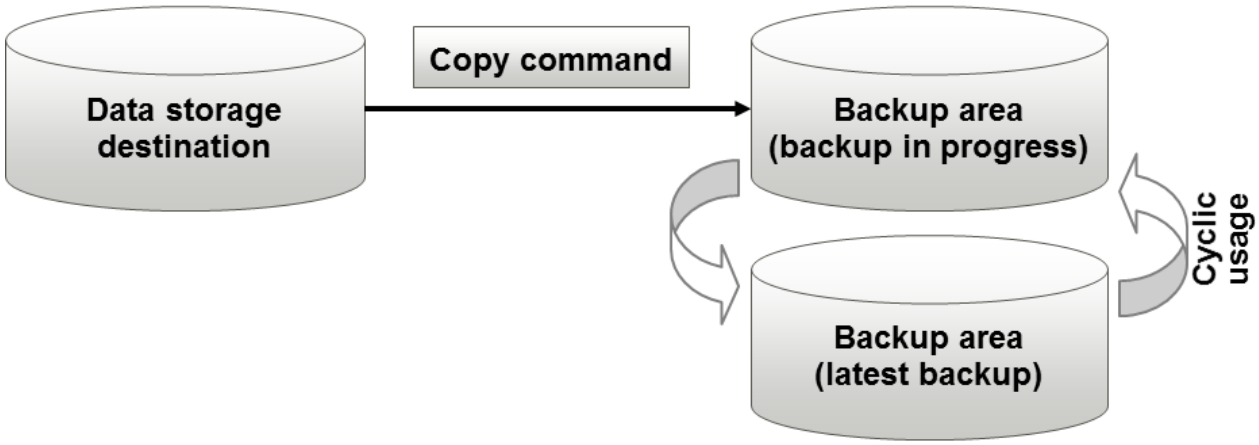
Both the backup data storage destination and the optional backup destination are necessary for recovery - if they are located in secondary media, combined management of these is necessary.

14.1 Configuration of the Copy Command

This section describes the configuration of the copy command for backup and recovery.

Cyclic usage of the backup area

Prepare two backup areas for the copy command in case an issue affects the data storage destination during backup. The copy command performs backup while cyclically using these backup areas.

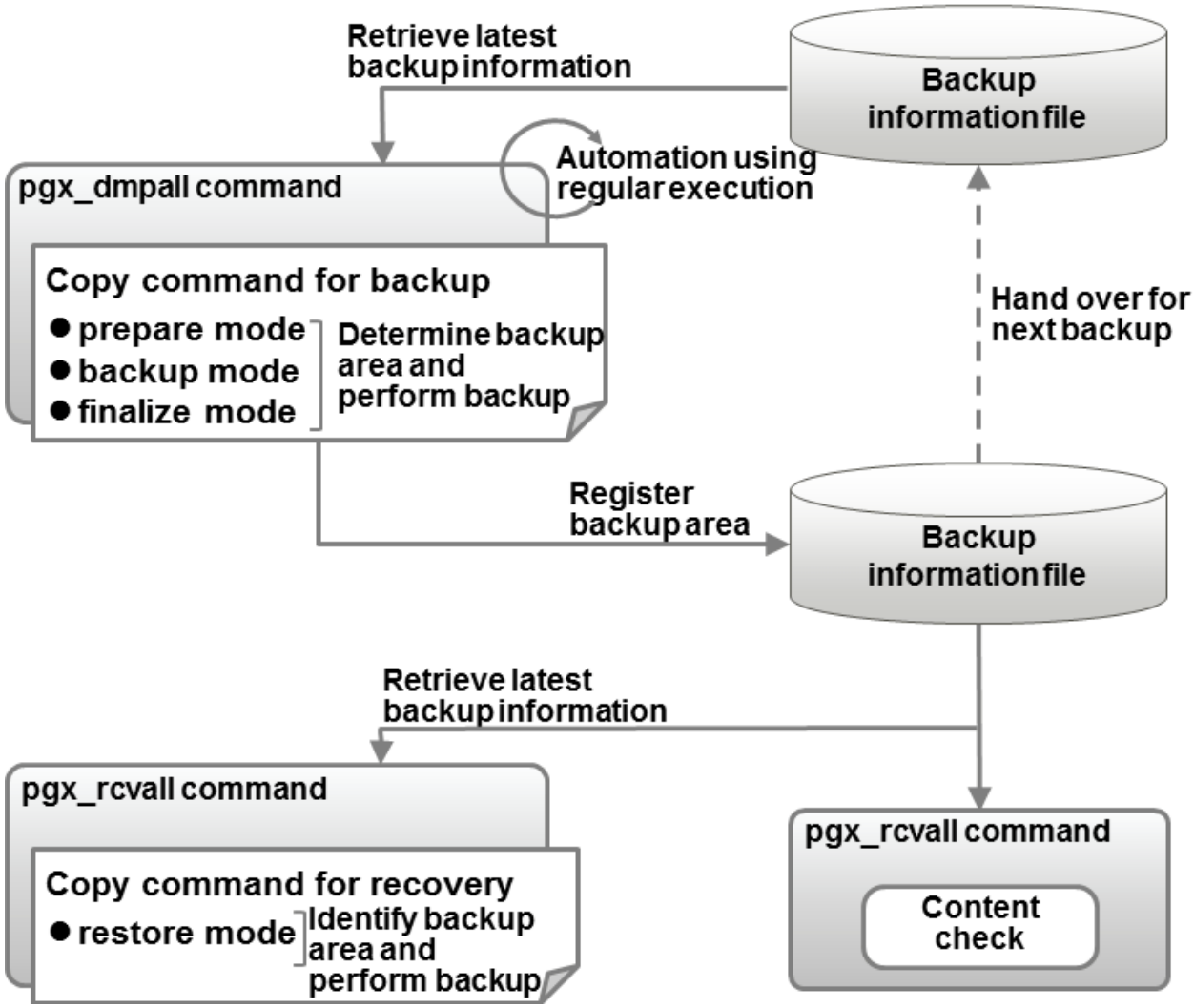


Note

The backup data storage destination cannot be used as these backup areas used by the copy command.

Backup using the backup information file

The copy command must determine the backup destination on each backup, as it is necessary to cycle through the backup areas. Backup can be automated by using the backup information file, which contains information about the backup destination.



Information

The backup information file is prepared in the backup data storage destination by the pgx_dmpall command, and contains information that can be read or updated by the copy command. This file is managed by associating it with the latest backup successfully completed by the pgx_dmpall command, so the latest backup information relating to the copy command registered by the user can be retrieved. Additionally, the content of the backup information file can be displayed using the pgx_rcvall command.

Configuration of the copy command for backup

The pgx_dmpall command calls the copy command for backup after execution for the three modes below. It is therefore necessary for the copy command for backup to implement the required processing for each of the modes.

- prepare mode

  Determines which of the two backup areas will be used for the current backup.

  The backup area to be used for the current backup is determined by reading the information relating to the latest backup destination where the backup information file was written to during the previous backup.

- backup mode

  Performs backup on the backup area determined by prepare mode, using any copy method.

- finalize mode

  Writes information relating to the destination of the current backup to the backup information file.

  This enables the prepare mode to check the destination of the previous backup during the next backup.

Note

The user can use any method to hand over backup information between modes within the copy command, such as creating temporary files.

Configuration of the copy command for recovery

The pgx_rcvall command calls the copy command for recovery for the mode below. It is therefore necessary for the copy command for recovery to implement the required processing for the mode.

- restore mode

  Any copy method can be used to implement restore from the backup destination retrieved using the copy command for backup.

Point

By referring to the mode assigned to the copy command as an argument, backup and recovery can be implemented using a single copy command.

Example

Using a batch file

```
if "%1" == "prepare"  goto prepare
if "%1" == "backup"   goto backup
if "%1" == "finalize" goto finalize
if "%1" == "restore"  goto restore
:prepare
    processingRequiredForPrepareMode
    exit /b
:backup
    processingRequiredForBackupMode
```

```
    exit /b
:finalize
    processingRequiredForFinalizeMode
    exit /b
:restore
    processingRequiredForRestoreMode
    exit /b
```

Point

A sample batch file that backs up the database cluster and tablespace directory to a specific directory is supplied to demonstrate how to write a copy command.

The sample is stored in the directory below:

```
installDir\share\copy_command.bat.sample
```

14.2 Backup Using the Copy Command

To perform backup using the copy command, in addition to performing the standard backup procedure, it is also necessary to create a copy command, and then execute the pgx_dmpall command specifying it. This section describes the procedure specific to using the copy command.

Preparing for backup

You must prepare for backup before actually starting the backup process.

Perform the following procedure:

1. Determine the database resources to be backed up

   Determine the database resources to be backed up using the copy command. The copy command can back up the following resources:

   - Database cluster
   - Tablespace

   To back up only some tablespaces, create a file listing them. This file is not necessary to back up all tablespaces.

   Example

   To back up only tablespaces tblspc1 and tblspc2

   ```
   tblspc1
   tblspc2
   ```

2. Prepare a backup area

   Prepare a backup area to save the database resources to be backed up, as determined in step 1.

3. Create the copy command

   Create the copy commands for backup and recovery. Refer to "14.4 Copy Command Interface" for details.

Performing backup

Execute the pgx_dmpall command with the -Y option specifying the full path of the copy command for backup created in step 3 of preparation for backup.

The example below backs up only some tablespaces, but not the database cluster, using the copy command.

Example

```
> pgx_dmpall -D D:\database\inst1 -Y D:\database\command\backup.bat
  --exclude-copy-cluster -P D:\database\command\tablespace_list.txt
```

Point

- To exclude up the database cluster from backup using the copy command, specify the --exclude-copy-cluster option.
- To back up only some tablespaces using the copy command, use the -P option specifying the full path of the file created in step 1 of preparation for backup.

See

- Refer to "pgx_dmpall" in the Reference for information on the command.

Checking backup status

Use the pgx_rcvall command to check the backup status.

Execute the pgx_rcvall command with the -l option specified to output backup data information. If backup was performed using the copy command, the resources backed up using the copy command will also be output.

Example

```
> pgx_rcvall -l -D D:\database\inst1
Date                Status   Dir                                 Resources backed up by the copy command
2020-05-01 13:30:40 COMPLETE E:/backup/inst1/2020-05-01_13-30-40 pg_data,dbspace,indexspace
```

14.3 Recovery Using the Copy Command

To perform recovery using the copy command, in addition to performing the standard recovery procedure, it is also necessary to create a copy command, and then execute the pgx_rcvall command specifying it. This section describes the procedure specific to using the copy command.

Determining the backup area of the latest backup

Check the backup information file to determine the backup area used for the latest backup, and confirm that it is in a recoverable state.

Execute the pgx_rcvall command with the --view-results-of-copying option to output the content of the backup information file.

Example

```
> pgx_rcvall -D D:\database\inst1 --view-results-of-copying
```

Perform recovery

Execute the pgx_rcvall command with the -Y option specifying the full path of the copy command for recovery created in step 3 of the preparation for backup described in "14.2 Backup Using the Copy Command".

The example below recover only some tablespaces, but not the database cluster, using the copy command.

Example

```
> pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1 -Y D:\database\command\recovery.bat
```

Point

If the latest backup was performed using the copy command, the pgx_rcvall command automatically recognizes which database resources were backed up using the copy command, or whether resources were backed up to the backup data storage destination. Therefore, recovery can be performed by simply executing the pgx_rcvall command specifying the copy command for recovery.

See

Refer to "pgx_rcvall" in the Reference for information on the command.

14.4 Copy Command Interface

The following types of copy command are available:

- Copy command for backup
- Copy command for recovery

This appendix describes the interface of each copy command.

14.4.1 Copy Command for Backup

Feature

User exit (for the copy command) called from the pgx_dmpall command.

Format

The syntax for calling the copy command from the pgx_dmpall command is described below.

If the operation mode is "prepare"

```
copyCommandName prepare "pathOfBackupInfoFile" "pathOfBackupTargetListFile"
```

If the operation mode is "backup"

```
copyCommandName backup
```

If the operation mode is "finalize"

```
copyCommandName finalize "pathOfBackupInfoFile"
```

Argument

- Operation mode

Mode	Description
prepare	Implements the preparation process for backing up using the copy command. Called before the PostgreSQL online backup mode is started.
backup	Implements the backup process. Called during the PostgreSQL online backup mode.

Mode	Description
finalize	Implements the backup completion process. Called after the PostgreSQL online backup mode is completed.

- Full path of the backup information file

  Full path of the backup information file of the latest backup, enclosed in double quotation marks. If a backup has not been performed, specify '-'.

- Full path of the backup target list file

  Full path of the file containing the resources to be backed up using the copy command, enclosed in double quotation marks. One of the following is described in each resource name.

Resource	Description
Database cluster	pg_data
Tablespace	Tablespace name

Example

To back up the database cluster and the tablespaces dbspace and indexspace using the copy command, the file should contain the following:

```
pg_data
dbspace
indexspace
```

Information

The encoding of resource names output to the backup target list file by the pgx_dmpall command is the encoding used when this command connects to the database with auto specified for the client_encoding parameter, and is dependent on the locale at the time of command execution.

The number of arguments vary depending on operation mode. The argument of each operation mode is as follows.

Operation mode	First argument	Second argument	Third argument
prepare	Operation mode	Backup information file path name	Backup target list file path name
backup		None	None
finalize		Backup information file path name	

Additionally, the access permissions for the backup information file and backup target list file are different depending on the operation mode. The access permissions of each operation mode are as follows:

Operation mode	Backup information file	Backup target list file
prepare	Can be viewed	Can be viewed
backup	-	-
finalize	Can be viewed and updated	-

Return value

Return value	Description
0	Normal end

Return value	Description
	The pgx_dmpall command continues processing.
Other than 0	Abnormal end The pgx_dmpall command terminates in error.

Description

- The copy command operates with the privileges of the operating system user who executed the pgx_dmpall command. Therefore, grant copy command execution privileges to users who will execute the pgx_dmpall command. Additionally, have the copy command change users as necessary.
- To write to the backup information file, use a method such as redirection from the copy command.
- Because the copy command is called for each mode, implement all processing for each one.
- To copy multiple resources simultaneously, have the copy command copy them in parallel.

- The backup information file and backup target list file cannot be deleted. Additionally, the privileges cannot be changed.
- Standard output and standard error output of the copy command are output to the terminal where the pgx_dmpall command was executed.
- If the copy command becomes unresponsive, the pgx_dmpall command will also become unresponsive. If the copy command is deemed to be unresponsive by the operating system, use an operating system command to forcibly stop it.
- Output the copy command execution trace and the result to a temporary file, so that if it terminates in error, the cause can be investigated at a later time.
- For prepare mode only, it is possible to use the PostgreSQL client application to access the database using the copy command. For all other modes, do not execute FUJITSU Enterprise Postgres commands or PostgreSQL applications.
- Enable the fsync parameter in postgresql.conf, because data on the shared memory buffer needs to have been already written to disk when backup starts.

14.4.2 Copy Command for Recovery

Feature

User exit (for the copy command) called from the pgx_rcvall command.

Format

The syntax for calling the copy command from the pgx_rcvall command is described below.

```
copyCommandName restore "pathOfBackupInfoFile" "pathOfBackupTargetListFile"
```

Argument

- Operation mode

Mode	Description
restore	Performs restore.

- Full path of the backup information file

  Full path of the backup information file, enclosed in double quotation marks.

- Full path of the backup target list file

  Full path of the file containing the resources to be restored using the copy command, enclosed in double quotation marks.

The access permissions for the backup information file and backup target list file are as below.

Backup information file	Backup target list file
Can be viewed	Can be viewed

Return value

Return value	Description
0	Normal end The pgx_rcvall command continues processing.
Other than 0	Abnormal end The pgx_rcvall command terminates in error.

Description

- The copy command operates with the privileges of the operating system user who executed the pgx_rcvall command. Therefore, grant copy command execution privileges to users who will execute the pgx_rcvall command. Additionally, have the copy command change users as necessary.
- The copy command is called once only in restore mode.
- To copy multiple resources simultaneously, have the copy command copy them in parallel.

Note

- The backup information file and backup target list file cannot be deleted. Additionally, the privileges cannot be changed.
- Standard output and standard error output of the copy command are output to the terminal where the pgx_rcvall command was executed.
- If the copy command becomes unresponsive, the pgx_rcvall command will also become unresponsive. If the status of the copy command is deemed to be unresponsive by the operating system, use an operating system command to forcibly stop it.
- Output the copy command execution trace and the result to a temporary file, so that if it terminates in error, the cause can be investigated at a later time.
- Do not execute FUJITSU Enterprise Postgres commands or PostgreSQL applications in the copy command.
- There may be files and directories not required for recovery using the archive log included in the backup, such as postmaster.pid, pg_wal/*subdirectory* and pg_replslot in the database cluster. If such unnecessary files and directories exist, have the copy command delete them after the restore.

Chapter 15 Actions when an Error Occurs

This chapter describes the actions to take when an error occurs in the database or an application, while FUJITSU Enterprise Postgres is operating.

Depending on the type of error, it may be necessary to recover the database cluster. The recovery process recovers the following resources:

- Data storage destination
- Transaction log storage destination (if the transaction log is stored in a separate disk from the data storage destination)
- Backup data storage destination

Note

Even if a disk is not defective, the same input-output error messages, as those generated when the disk is defective, may be output. The recovery actions differ for these error messages.

Check the status of the disk, and select one of the following actions:

- If the disk is defective

  Refer to "15.1 Recovering from Disk Failure (Hardware)", and take actions accordingly.

- If the disk is not defective

  Refer to "15.14 I/O Errors Other than Disk Failure", and take actions accordingly.

  A few examples of errors generated even if the disk is not defective include:

  - Network error with an external disk
  - Errors caused by power failure or mounting issues

Determining the cause of an error

If an error occurs, refer to the WebAdmin message and the event log, and determine the cause of the error.

See

Refer to "Configuring Parameters" in the Installation and Setup Guide for Server for information on server logs.

Approximate recovery time

The formulas for deriving the approximate recovery time of resources in each directory are given below.

If using the copy command with the pgx_rcvall command, the recovery time will depend on the implementation of the copy command.

- Data storage destination or transaction log storage destination

```
Recovery time = (usageByTheDataStorageDestination + usageByTheTransactionLogStorageDestination) /
diskWritePerformance x 1.5
```

  - *usageByTheDataStorageDestination*: Disk space used by the database cluster
  - *usageByTheTransactionLogStorageDestination*: Disk space used by the transaction log stored outside the database cluster
  - *diskWritePerformance*: Measured maximum data volume (bytes/second) that can be written per second in the system environment where the operation is performed
  - 1.5: Coefficient assuming the time excluding disk write, which is the most time-consuming step

- Backup data storage destination

```
Recovery time = usageByTheBackupDataStorageDestination / diskWritePerformance x 1.5
```

- *usageByTheBackupDataStorageDestination*: Disk space used by the backup data
- *diskWritePerformance*: Measured maximum data volume (bytes/second) that can be written per second in the system environment where the operation is performed
- 1.5: Coefficient assuming the time excluding disk write, which is the most time-consuming step

15.1 Recovering from Disk Failure (Hardware)

This section describes how to recover database clusters to a point immediately before failure, if a hardware failure occurs in the data storage disk or the backup data storage disk.

There are two methods of recovery:

- 15.1.1 Using WebAdmin
- 15.1.2 Using Server Command

Point

Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.1.1 Using WebAdmin

Recover the database cluster by following the appropriate recovery procedure below for the disk where the failure occurred.

Note

Recovery operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.

If disk failure occurs on a standby instance, it may be necessary to delete and re-create the instance.

Recovery operation can be performed on an instance that is part of a streaming replication cluster in "Master" mode. If a recovery operation is performed on a master instance, it will break the replication cluster and streaming replication will stop between the master instance and all its standby instances. In such an event, the standby instances can be promoted to standalone instances or can be deleted and re-created.

If failure occurred in the data storage disk or the transaction log storage disk

Follow the procedure below to recover the data storage disk or the transaction log storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance. WebAdmin automatically stops instances if recovery of the database cluster is performed without stopping the instance.

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a tablespace directory

   If a tablespace was defined after backup, create a directory for it.

5. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

6. Recover the database cluster

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message in the lower-right corner.

7. Run recovery

   In the [Restore Instance] dialog box, click [Yes].

   Instance restore is performed. An instance is automatically started when recovery is successful.

   Note

   WebAdmin does not support recovery of hash index. If you are using a hash index, then after recovery, execute the REINDEX command to rebuild it. Use of hash indexes is not recommended.

8. Resume applications

   Resume applications that are using the database.

Point

WebAdmin may be unable to detect disk errors, depending on how the error occurred.

If this happens, refer to "15.10.3 Other Errors" to perform recovery.

If failure occurred on the backup data storage disk

Follow the procedure below to recover the backup data storage disk.

1. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

2. Recover the backup data

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message.

3. Run backup

   Perform backup to enable recovery of the backup data. In the [Backup] dialog box, click [Yes]. The backup is performed. An instance is automatically started when backup is performed.

Point

If you click [Recheck the status], the resources in the data storage destination and the backup data storage destination are reconfirmed. As a result, the following occurs:

- If an error is not detected

  The status of the data storage destination and the backup data storage destination returns to normal, and it is possible to perform operations as usual.

- If an error is detected

  An error message is displayed in the message list again. Click [Solution], and resolve the problem by following the resolution for the cause of the error displayed in the dialog box.

15.1.2 Using Server Command

Recover the database cluster by following the appropriate recovery procedure below for the disk where the failure occurred.

If failure occurred on the data storage disk or the transaction log storage directory

Follow the procedure below to recover the data storage disk or the transaction log storage directory.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance, refer to "2.1.2 Using Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a storage destination directory

   - If failure occurred on the data storage disk
     Create a data storage destination directory. If a tablespace was defined, also create a directory for it.
   - If failure occurred on the translation log storage disk
     Create a transaction log storage destination directory.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

See

Refer to "Preparing Directories to Deploy Resources" under "Setup" in the Installation and Setup Guide for Server for information on how to create a storage directory.

5. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

6. Recover the database cluster

   Recover the database cluster using the backup data.

   Specify the following in the pgx_rcvall command:

   - Specify the data storage location in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup data storage location in the -B option.

   Example

```
> pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

```
FATAL: the database system is starting up
```

7. Start the instance

   Refer to "2.1.2 Using Commands" for information on how to start an instance.

8. Resume applications

   Resume applications that are using the database.

If failure occurred on the backup data storage disk

The procedure for recovering the backup data storage disk is described below.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Confirm that transaction log mirroring has stopped	Y	N
2	Stop output of archive logs	Y	N
3	Stop applications	N	Y
4	Stop the instance	N	Y
5	Recover the failed disk	Y	Y
6	Create a backup data storage destination directory	Y	Y
7	Resume output of archive logs	Y	N
8	Resume transaction log mirroring	Y	N
9	Start the instance	N	Y
10	Run backup	Y	Y
11	Resume applications	N	Y

Y: Required
N: Not required

The procedure is as follows:

If an instance has not been stopped

1. Confirm that transaction log mirroring has stopped

   Use the following SQL function to confirm that transaction log mirroring has stopped.

```
 postgres=# SELECT pgx_is_wal_multiplexing_paused();
 pgx_is_wal_multiplexing_paused
-------------------
 t
(1 row)
```

   If transaction log mirroring has not stopped, then stop it using the following SQL function.

```
postgres=# SELECT pgx_pause_wal_multiplexing();
LOG:  multiplexing of transaction log files has been stopped
pgx_pause_wal_multiplexing
---------------------------

(1 row)
```

2. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage disk or the transaction log storage disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing archive_command

     Specify a command that will surely complete normally, so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reload the configuration file

     Execute the pg_ctl reload command or the pg_reload_conf SQL function to reload the configuration file.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a backup data storage destination

   Create a backup data storage destination.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the backup data storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

   Refer to "3.2.2 Using Server Commands" for information on how to create a backup data storage destination.

5. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

6. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

7. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D D:\database\inst1
   ```

If an instance has been stopped

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Recover the failed disk

   Replace the disk, and then recover the volume configuration information.

4. Create a backup data storage destination

   Create a backup data storage destination.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the backup data storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

   Refer to "3.2.2 Using Server Commands" for details.

5. Start the instance

   Start the instance. Refer to "2.1.2 Using Commands" for information on how to start an instance.

6. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

```
> pgx_dmpall -D D:\database\inst1
```

7. Resume applications

   Resume applications that are using the database.

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on pgx_resume_wal_multiplexing.

15.2 Recovering from Data Corruption

If data in a disk is logically corrupted and the database does not operate properly, you can recover the database cluster to its state at the time of backup.

There are two methods of recovery:

- 15.2.1 Using WebAdmin
- 15.2.2 Using the pgx_rcvall Command

Note

- Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.
- If you recover data to a point in the past, a new time series (database update history) will start from that recovery point. When recovery is complete, the recovery point is the latest point in the new time series. When you subsequently recover data to the latest state, the database update is re-executed on the new time series.

15.2.1 Using WebAdmin

If using WebAdmin, recover the data to the point immediately prior to data corruption by using the backup data.

Refer to "15.1.1 Using WebAdmin" for details.

15.2.2 Using the pgx_rcvall Command

Recover the database cluster by specifying in the pgx_rcvall command the date and time of the backup you want to read from. Then re-execute the transaction as required to recover the data.

Follow the procedure below to recover the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Confirm the backup date and time

   Pinpoint a date and time prior to the data corruption based on the content of the job log or event log.

4. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

5. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.
   - Specify the recovery date and time in the -e option.

   Example

   In the following examples, "May 20, 2020 10:00:00" is specified as the recovery time.

   ```
   > pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1 -e "2020-05-20 10:00:00"
   ```

   Note

   If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

   If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

   The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

   ```
   FATAL:  the database system is starting up
   ```

6. Start the instance

   Start the instance. Refer to "2.1.2 Using Commands" for information on how to start an instance.

   If necessary, re-execute transaction processing from the specified recovery time, and then resume database operations.

Note

The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

7. Resume applications

   Resume applications that are using the database.

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

15.3 Recovering from an Incorrect User Operation

This section describes how to recover database clusters when data has been corrupted due to erroneous user operations.

There are two methods of recovery:

- 15.3.1 Using WebAdmin
- 15.3.2 Using the pgx_rcvall Command

Note

- Back up the database cluster after recovering it. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.
- If you recover data to a point in the past, a new time series (database update history) will start from that recovery point. When recovery is complete, the recovery point is the latest point in the new time series. When you subsequently recover data to the latest state, the database update is re-executed on the new time series.
- An effective restore point is one created on a time series for which you have made a backup. That is, if you recover data to a point in the past, you cannot use any restore points set after that recovery point. Therefore, once you manage to recover your target past data, make a backup.

15.3.1 Using WebAdmin

You can use WebAdmin to recover data to a backup point.

Note

Recovery operation cannot be performed on an instance that is part of a streaming replication cluster in standby mode.

If disk failure occurs on a standby instance, it may be necessary to delete and re-create the instance.

Recovery operation can be performed on an instance that is part of a streaming replication cluster in "Master" mode. If a recovery operation is performed on a master instance, it will break the replication cluster and streaming replication will stop between the master instance and all its standby instances. In such an event, the standby instances can be promoted to standalone instances or can be deleted and re-created.

Follow the procedure below to recover the data in the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance.

3. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

4. Recover the database cluster

   Log in to WebAdmin, and in the [Instances] tab, select the instance to be recovered and click .

5. Recover to the backup point

   In the [Restore Instance] dialog box, click [Yes].

   Recovery is performed. An instance is automatically started when recovery is successful.

   Note

   WebAdmin cannot accurately recover a hash index. If you are using a hash index, then after recovery, execute the REINDEX command for the appropriate index.

6. Resume database operations

   If necessary, re-execute transaction processing from the backup point to when an erroneous operation was performed, and then resume database operations.

15.3.2 Using the pgx_rcvall Command

The pgx_rcvall command recovers database clusters to the restore point created with the server command. Refer to "Setting a restore point" in "3.2.2 Using Server Commands" for information on how to create a restore point.

Follow the procedure below to recover the data in the data storage disk.

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Confirm the restore point

   Use a restore point recorded in an arbitrary file, as explained in ""3.2.2 Using Server Commands", to determine a restore point prior to the erroneous operation.

4. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

5. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   Specify the following values in the pgx_rcvall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup data storage destination in the -B option.
   - The -n option recovers the data to the specified restore point.

   Example

The following example executes the pgx_rcvall command with the restore point "batch_20200503_1".

```
> pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1 -n batch_20200503_1
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall (therefore the user does not need not be concerned).

```
FATAL:  the database system is starting up
```

6. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Commands" for information on how to start an instance.

   Note

   The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

7. Restart operation of the database

   If necessary, re-execute transaction processing from the specified recovery time to the point when an erroneous operation was performed, and then resume database operations.

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

15.4 Actions in Response to an Application Error

If there is a connection from a client that has been in the waiting state for an extended period, you can minimize performance degradation of the database by closing the problematic connection.

The following methods are available for identifying a connection to be closed:

- view(pg_stat_activity) (refer to "15.4.1 When using the view (pg_stat_activity)")
- pgAdmin (refer to "15.4.2 Using pgAdmin")

Use the system management function (pg_terminate_backend) to disconnect connections.

15.4.1 When using the view (pg_stat_activity)

When using the view (pg_stat_activity), follow the procedure below to close a connection.

1. Use psql command to connect to the postgres database.

   ```
   > psql postgres
   psql (13.3)
   Type "help" for help.
   ```

2. Close connections from clients that have been in the waiting state for an extended period.

   Use pg_terminate_backend() to close connections that have been trying to connect for an extended period.

   However, when considering continued compatibility of applications, do not reference or use system catalogs and functions directly in SQL statements. Refer to " Notes on Application Compatibility" in the Application Development Guide for details.

   Example

   The following example closes connections where the client has been in the waiting state for at least 60 minutes.

```
select pid,usename,application_name,client_hostname,pg_terminate_backend(pid) from
pg_stat_activity where state='idle in transaction' and current_timestamp > cast(query_start +
interval '60 minutes' as timestamp);
-[ RECORD 1 ]--------+--------------
pid                  | 4684
username             | fsepuser
application_name     | apl1
client_addr          | 192.11.11.1
pg_terminate_backend | t
```

See

- Refer to "System Administration Functions" under "The SQL Language" in the PostgreSQL Documentation for information on pg_terminate_backend.
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on how to maintain application compatibility.

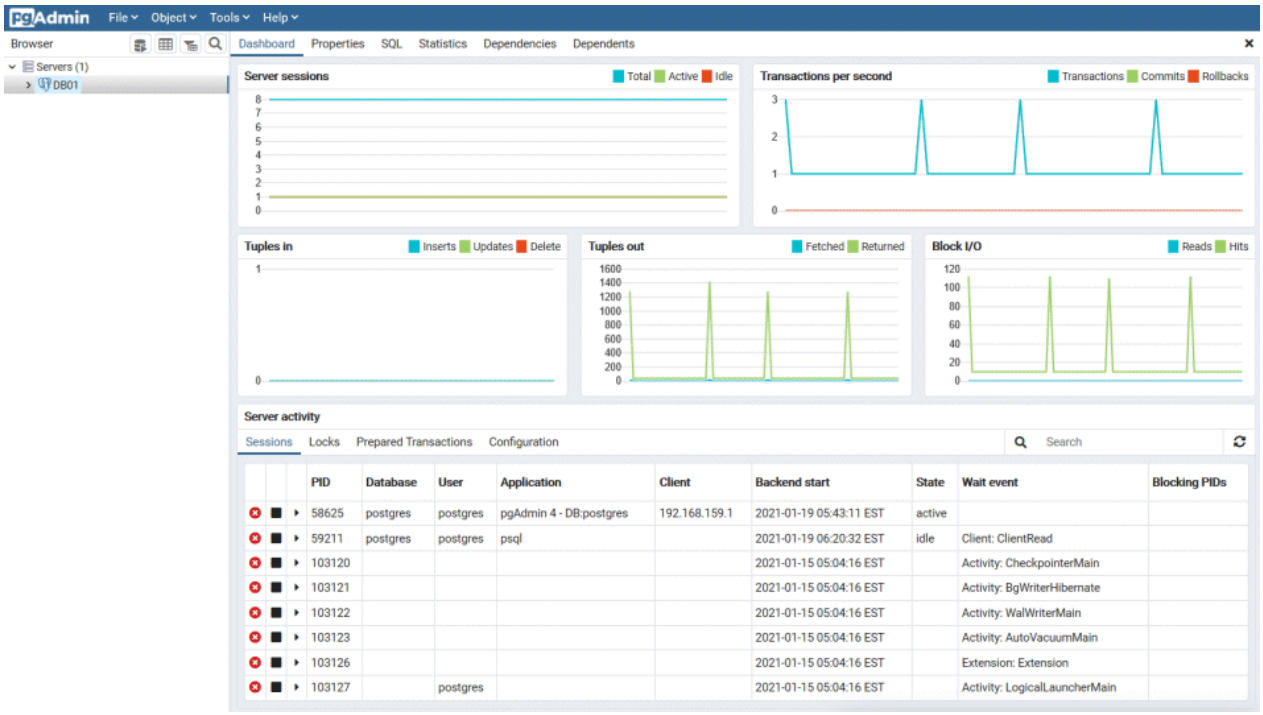
15.4.2 Using pgAdmin

If using pgAdmin, follow the procedure below to close connections.

1. In the [Browser] pane, click the relevant database server.

2. Close the client connections that have been in a wait state for an extended period.

   Click the [Dashboard] tab. In the [Server activity] section, select the connections that have been in an "idle" or "idle in transaction" state for an extended period. For each of these connections, click to close the session.



15.5 Actions in Response to an Access Error

If access is denied, grant privileges allowing the instance administrator to operate the following directories, and then re-execute the operation. Also, refer to the event log and the server log, and confirm that the file system has not been mounted as read-only due to a disk error. If the file system has been mounted as read-only, mount it properly and then re-execute the operation.

- Data storage destination
- Tablespace storage destination
- Transaction log storage destination
- Backup data storage destination

See

Refer to "Preparing Directories to Deploy Resources" under "Setup" in the Installation and Setup Guide for Server for information on the privileges required for the directory.

15.6 Actions in Response to Insufficient Space on the Data Storage Destination

If the data storage destination runs out of space, check if the disk contains any unnecessary files and delete them so that operations can continue.

If deleting unnecessary files does not solve the problem, you must migrate data to a disk with larger capacity.

There are two methods of migrating data:

- 15.6.1 Using a Tablespace

- 15.6.2 Replacing the Disk with a Larger Capacity Disk

15.6.1 Using a Tablespace

FUJITSU Enterprise Postgres enables you to use a tablespace to change the storage destination of database objects, such as tables and indexes, to a different disk.

The procedure is as follows:

1. Create a tablespace

   Use the CREATE TABLESPACE command to create a new tablespace in the prepared disk.

2. Modify the tablespace

   Use the ALTER TABLE command to modify tables for the newly defined tablespace.

See

Refer to "SQL Commands" under "Reference" in the PostgreSQL Documentation for information on the CREATE TABLESPACE command and ALTER TABLE command.

15.6.2 Replacing the Disk with a Larger Capacity Disk

Before replacing the disk with a larger capacity disk, migrate resources at the data storage destination using the backup and recovery features.

There are two methods of performing backup and recovery:

- 15.6.2.1 Using WebAdmin
- 15.6.2.2 Using Server Commands

The following sections describe procedures that use each of these methods to replace the disk and migrate resources at the data storage destination.

Note

- Before replacing the disk, stop applications and instances that are using the database.
- It is recommended that you back up the database cluster following recovery. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.6.2.1 Using WebAdmin

Follow the procedure below to replace the disk and migrate resources at the data storage destination by using WebAdmin.

1. Back up files

   If the disk at the data storage destination contains any required files, back up the files. It is not necessary to back up the data storage destination.

2. Stop applications

   Stop applications that are using the database.

3. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.1 Using WebAdmin" for details.

4. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Recover the database cluster

   Log in to WebAdmin, and perform recovery operations. Refer to steps 4 ("Create a tablespace directory ") to 7 ("Run recovery") under "If failure occurred in the data storage disk or the transaction log storage disk" in "15.1.1 Using WebAdmin" for information on the procedure. An instance is automatically started when recovery is successful.

7. Resume applications

   Resume applications that are using the database.

8. Restore the files

   Restore the files backed up in step 1.

15.6.2.2 Using Server Commands

Follow the procedure below to replace the disk and migrate resources at the data storage destination by using server commands.

1. Back up files

   If the disk at the data storage destination contains any required files, back up the files. It is not necessary to back up the data storage destination.

2. Stop applications

   Stop applications that are using the database.

3. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.2 Using Server Commands" for details.

4. Stop the instance

   After backup is complete, stop the instance. Refer to "2.1.2 Using Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a data storage destination

   Create a data storage destination. If a tablespace was defined, also create a directory for it.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the data storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

7. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

8. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.

   Example

```
> pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1
```

Note

If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

The following message displayed during recovery is output as part of normal operation of pgx_rcvall (therefore the user does not need not be concerned).

```
FATAL:  the database system is starting up
```

See

Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

9. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Commands" for information on how to start an instance.

Note

The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the pgx_rcvall command to end and then execute the REINDEX command for the appropriate index.

10. Resume applications

    Resume applications that are using the database.

11. Restore files

    Restore the files backed up in step 1.

15.7 Actions in Response to Insufficient Space on the Backup Data Storage Destination

If space runs out on the backup data storage destination, check if the disk contains any unnecessary files and delete them, and then make a backup as required.

If deleting unnecessary files does not solve the problem, take the following action:

- 15.7.1 Temporarily Saving Backup Data
- 15.7.2 Replacing the Disk with a Larger Capacity Disk

15.7.1 Temporarily Saving Backup Data

This method involves temporarily moving backup data to a different directory, saving it there, and securing disk space on the backup data storage destination so that a backup can be made normally.

Use this method if you need time to prepare a larger capacity disk.

If space runs out on the backup data storage destination, archive logs can no longer be stored in the backup data storage destination. As a result, transaction logs continue to accumulate in the data storage destination or the transaction log storage destination.

If action is not taken soon, the transaction log storage destination will become full, and operations may not be able to continue.

To prevent this, secure space in the backup data storage destination, so that archive logs can be stored.

There are two methods of taking action:

- 15.7.1.1 Using WebAdmin
- 15.7.1.2 Using Server Commands

15.7.1.1 Using WebAdmin

Follow the procedure below to recover the backup data storage disk.

1. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform recovery. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb \backup.

   Example

   ```
   > mkdir F:\mnt\usb\backup
   > move E:\backup\inst1\* F:\mnt\usb\backup
   ```

   Note: Place the temporary backup destination directory in a location where it will not impact on operating system resources or FUJITSU Enterprise Postgres resources.

2. Back up the database cluster

   Back up the latest resources at the data storage destination. Refer to "3.2.1 Using WebAdmin" for details.

3. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in F:\mnt\usb.

   Example

   ```
   > rmdir /S /Q F:\mnt\usb\backup
   ```

15.7.1.2 Using Server Commands

The following describes the procedure for recovering the backup storage disk.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Stop transaction log mirroring	Y	N
2	Stop output of archive logs	Y	N
3	Stop applications	N	Y
4	Stop the instance	N	Y
5	Temporarily save backup data	Y	Y
6	Resume output of archive logs	Y	N

No	Step	Instance stopped	
		No	Yes
7	Resume transaction log mirroring	Y	N
8	Start an instance	N	Y
9	Run backup	Y	Y
10	Resume applications	N	Y
11	Delete temporarily saved backup data	Y	Y

Y: Required
N: Not required

The procedure is as follows:

Performing recovery while the instance is active

1. Stop transaction log mirroring

   Stop transaction log mirroring.

```
postgres=# SELECT pgx_pause_wal_multiplexing();
LOG:  multiplexing of transaction log files has been stopped
pgx_pause_wal_multiplexing
---------------------------

(1 row)
```

2. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage disk or the transaction log storage disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing the archive_command parameter

     Specify a command that will surely complete normally, so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reloading the configuration file

     Run the pg_ctl reload command or the pg_reload_conf SQL function.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

3. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb\backup.

   Example

```
> mkdir F:\mnt\usb\backup
> move E:\backup\inst1\* F:\mnt\usb\backup
```

Note: Place the temporary backup destination directory in a location where it will not impact on operating system resources or FUJITSU Enterprise Postgres resources.

4. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

5. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

6. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following option in the pgx_dmpall command:

   - Specify the directory of the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

     Example

     ```
     > pgx_dmpall -D D:\database\inst1
     ```

7. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in F:\mnt\usb.

   Example

   ```
   > rmdir /S /Q F:\mnt\usb\backup
   ```

If an instance has been stopped

1. Stop applications

   Stop applications that are using the database.

2. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Commands" for details.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

3. Temporarily save backup data

   Move backup data to a different directory and temporarily save it, and secure space in the backup data storage destination directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform recovery. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb \backup.

   Example

   ```
   > mkdir F:\mnt\usb\backup
   > move E:\backup\inst1\* F:\mnt\usb\backup
   ```

   Note: Place the temporary backup destination directory in a location where it will not impact on operating system resources or FUJITSU Enterprise Postgres resources.

4. Start the instance

   Start the instance. Refer to "2.1.2 Using Commands" for information on how to start an instance.

5. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

     Example

     ```
     > pgx_dmpall -D D:\database\inst1
     ```

6. Resume applications

   Resume applications that are using the database.

7. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in F:\mnt\usb.

   Example

   ```
   > rmdir /S /Q F:\mnt\usb\backup
   ```

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on the pgx_is_wal_multiplexing_paused and pgx_resume_wal_multiplexing.

15.7.2 Replacing the Disk with a Larger Capacity Disk

This method involves replacing the disk at the backup data storage destination with a larger capacity disk, so that it does not run out of free space again. After replacing the disk, back up data to obtain a proper backup.

There are two methods of performing backup:

- 15.7.2.1 Using WebAdmin
- 15.7.2.2 Using Server Commands

Note

Before replacing the disk, stop applications that are using the database.

15.7.2.1 Using WebAdmin

Follow the procedure below to recover the backup storage disk.

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb\backup.

   Example

   ```
   > mkdir F:\mnt\usb\backup
   > move E:\backup\inst1\* F:\mnt\usb\backup
   ```

   Note: Place the temporary backup destination directory in a location where it will not impact on operating system resources or FUJITSU Enterprise Postgres resources.

3. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

4. Run backup

   Log in to WebAdmin, and perform recovery operations. Refer to steps 2 ("Recover the backup data") and 3 ("Run backup") under "If failure occurred on the backup storage disk" in "15.1.1 Using WebAdmin".

5. Restore files

   Restore the files backed up in step 1.

6. Delete temporarily saved backup data

   If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

   The following example deletes backup data that was temporarily saved in F:\mnt\usb.

   Example

   ```
   > rmdir /S /Q F:\mnt\usb\backup
   ```

15.7.2.2 Using Server Commands

The procedure for recovering the backup data storage disk is described below.

There are two methods of taking action:

- Performing recovery while the instance is active
- Stopping the instance before performing recovery

The following table shows the different steps to be performed depending on whether you stop the instance.

No	Step	Instance stopped	
		No	Yes
1	Back up files	Y	Y
2	Temporarily save backup data	Y	Y
3	Confirm that transaction log mirroring has stopped	Y	N
4	Stop output of archive logs	Y	N
5	Stop applications	N	Y
6	Stop the instance	N	Y
7	Replace with a larger capacity disk	Y	Y

No	Step	Instance stopped	
		No	Yes
8	Create a backup storage directory	Y	Y
9	Resume output of archive logs	Y	N
10	Resume transaction log mirroring	Y	N
11	Start the instance	N	Y
12	Run backup	Y	Y
13	Resume applications	N	Y
14	Restore files	Y	Y
15	Delete temporarily saved backup data	Y	Y

Y: Required
N: Not required

The procedure is as follows:

If an instance has not been stopped

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb\backup.

   Example

   ```
   > mkdir F:\mnt\usb\backup
   > move E:\backup\inst1\* F:\mnt\usb\backup
   ```

3. Confirm that transaction log mirroring has stopped

   Use the following SQL function to confirm that transaction log mirroring has stopped.

   ```
    postgres=# SELECT pgx_is_wal_multiplexing_paused();
    pgx_is_wal_multiplexing_paused
   -------------------
    t
   (1 row)
   ```

   If transaction log mirroring has not stopped, then stop it using the following SQL function.

   ```
   postgres=# SELECT pgx_pause_wal_multiplexing();
   LOG:  multiplexing of transaction log files has been stopped
   pgx_pause_wal_multiplexing
   ----------------------------

   (1 row)
   ```

4. Stop output of archive logs

   Transaction logs may accumulate during replacement of backup storage disk, and if the data storage destination disk or the transaction log storage destination disk becomes full, there is a risk that operations may not be able to continue.

   To prevent this, use the following methods to stop output of archive logs.

   - Changing the archive_command parameter

     Specify a command that will surely complete normally, so that archive logs will be regarded as having been output.

     If you specify echo, a message is output to the server log, so it may be used as a reference when you conduct investigations.

   - Reloading the configuration file

     Run the pg_ctl reload command or the pg_reload_conf SQL function.

   If you simply want to stop output of errors without the risk that operations will not be able to continue, specify an empty string ('') in archive_command and reload the configuration file.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a backup data storage destination

   Create a backup data storage destination.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the backup data storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

   Refer to "3.2.2 Using Server Commands" for details.

7. Resume output of archive logs

   Return the archive_command setting to its original value, and reload the configuration file.

8. Resume transaction log mirroring

   Execute the pgx_resume_wal_multiplexing SQL function.

   Example

   ```
   SELECT pgx_resume_wal_multiplexing()
   ```

9. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D D:\database\inst1
   ```

10. Restore files

    Restore the files backed up in step 1.

11. Delete temporarily saved backup data

    If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

    The following example deletes backup data that was temporarily saved in F:\mnt\usb.

    Example

    ```
    > rmdir /S /Q F:\mnt\usb\backup
    ```

If an instance has been stopped

1. Back up files

   If the disk at the backup data storage destination contains any required files, back up the files. It is not necessary to back up the backup data storage destination.

2. Temporarily save backup data

   Save the backup data to a different directory.

   The reason for saving the backup data is so that the data in the data storage destination can be recovered even if it is corrupted before you perform the next step. If there is no disk at the save destination and you consider that there is no risk of corruption at the data storage destination, delete the backup data.

   The following example saves backup data from the backup data storage destination directory (E:\backup\inst1) under F:\mnt\usb\backup.

   Example

   ```
   > mkdir F:\mnt\usb\backup
   > move E:\backup\inst1\* F:\mnt\usb\backup
   ```

   Note: Place the temporary backup destination directory in a location where it will not impact on operating system resources or FUJITSU Enterprise Postgres resources.

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   Stop the instance. Refer to "2.1.2 Using Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a backup data storage destination

   Create a backup data storage destination.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the backup data storage destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

   Refer to "3.2.2 Using Server Commands" for details.

7. Start the instance

   Start the instance. Refer to "2.1.2 Using Commands" for information on how to start an instance.

8. Run backup

   Use the pgx_dmpall command to back up the database cluster.

   Specify the following value in the pgx_dmpall command:

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.

   Example

   ```
   > pgx_dmpall -D D:\database\inst1
   ```

9. Resume applications

   Resume applications that are using the database.

10. Restore files

    Restore the files backed up in step 1.

11. Delete temporarily saved backup data

    If backup completes normally, the temporarily saved backup data becomes unnecessary and is deleted.

    The following example deletes backup data that was temporarily saved in F:\mnt\usb.

    Example

    ```
    > rmdir /S /Q F:\mnt\usb\backup
    ```

See

- Refer to "pgx_rcvall" and "pgx_dmpall" in the Reference for information on the pgx_rcvall command and pgx_dmpall command.
- Refer to "Write Ahead Log" under "Server Administration" in the PostgreSQL Documentation for information on archive_command.
- Refer to "B.1 WAL Mirroring Control Functions" for information on the pgx_is_wal_multiplexing_paused and pgx_resume_wal_multiplexing.

15.8 Actions in Response to Insufficient Space on the Transaction Log Storage Destination

If the transaction log storage destination runs out of space, check if the disk contains any unnecessary files and delete them so that operations can continue.

If deleting unnecessary files does not solve the problem, you must migrate data to a disk with larger capacity.

15.8.1 Replacing the Disk with a Larger Capacity Disk

Before replacing the disk with a larger capacity disk, migrate resources at the transaction log storage destination using the backup and recovery features.

There are two methods of performing backup and recovery:

- 15.8.1.1 Using WebAdmin
- 15.8.1.2 Using Server Commands

The following sections describe procedures that use each of these methods to replace the disk and migrate resources at the transaction log storage destination.

Note

- Before replacing the disk, stop applications that are using the database.
- It is recommended that you back up the database cluster following recovery. Backup deletes obsolete archive logs (transaction logs copied to the backup data storage destination), freeing up disk space and reducing the recovery time.

15.8.1.1 Using WebAdmin

Follow the procedure below to replace the disk and migrate resources at the transaction log storage destination by using WebAdmin.

1. Back up files

   If the disk at the transaction log storage destination contains any required files, back up the files. It is not necessary to back up the transaction log storage destination.

2. Back up the database cluster

   Back up the latest data storage destination resources and transaction log storage destination resources (refer to "3.2.1 Using WebAdmin" for details).

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   Stop the instance. Refer to "2.1.1 Using WebAdmin" for information on how to stop an instance. WebAdmin automatically stops instances if recovery of the database cluster is performed without stopping the instance.

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a tablespace directory

   If a tablespace was defined after backing up, create a directory for it.

7. Recover the keystore, and enable automatic opening of the keystore

   Do the following if the data in the database has been encrypted:

   - Restore the keystore to its state at the time of the database backup.
   - Enable automatic opening of the keystore.

8. Recover the database cluster

   Log in to WebAdmin, and perform recovery operations. Refer to steps 4 ("Create a tablespace directory ") to 7 ("Run Recovery") under " If failure occurred in the data storage disk or the transaction log storage disk " in "15.1.1 Using WebAdmin" for information on the procedure. An instance is automatically started when recovery is successful.

9. Resume applications

   Resume applications that are using the database.

10. Restore files

    Restore the files backed up in step 1.

15.8.1.2 Using Server Commands

Follow the procedure below to replace the disk and migrate resources at the transaction log storage destination by using server commands.

1. Back up files

   If the disk at the transaction log storage destination contains any required files, back up the files. It is not necessary to back up the transaction log storage destination.

2. Back up the database cluster

   Use server commands to back up the latest data storage destination resources and transaction log storage destination resources. Refer to "3.2.2 Using Server Commands" for information on how to perform backup.

3. Stop applications

   Stop applications that are using the database.

4. Stop the instance

   After backup is complete, stop the instance. Refer to "2.1.2 Using Commands" for information on how to stop an instance.

   If the instance fails to stop, refer to "15.11 Actions in Response to Failure to Stop an Instance".

5. Replace with a larger capacity disk

   Replace the disk. Then, recover the volume configuration information.

6. Create a transaction log storage destination

   Create a transaction log storage destination. If a tablespace was defined, also create a directory for it.

   In [Properties] in Windows(R) Explorer, set appropriate permissions so that only the instance administrator can access the transaction log destination directory. (Refer to [Help and Support] in Windows(R) for information on [Properties].)

7. Recover the keystore, and enable automatic opening of the keystore

   When the data in the database has been encrypted, restore the keystore to its state at the time of the database backup. Configure automatic opening of the keystore as necessary.

8. Recover the database cluster

   Use the pgx_rcvall command to recover the database cluster.

   - Specify the data storage destination in the -D option. If the -D option is omitted, the value of the PGDATA environment variable is used by default.
   - Specify the backup storage directory in the -B option.

   Example

```
> pgx_rcvall -D D:\database\inst1 -B E:\backup\inst1
```

   Note

   If recovery fails, remove the cause of the error in accordance with the displayed error message and then re-execute the pgx_rcvall command.

   If the message "pgx_rcvall: an error occurred during recovery" is displayed, then the log recorded when recovery was executed is output after this message. The cause of the error is output in around the last fifteen lines of the log, so remove the cause of the error in accordance with the message and then re-execute the pgx_rcvall command.

   The following message displayed during recovery is output as part of normal operation of pgx_rcvall command (therefore the user does not need not be concerned).

```
FATAL: the database system is starting up
```

   See

   Refer to "pgx_rcvall" in the Reference for information on the pgx_rcvall command.

9. Start the instance

   Start the instance.

   Refer to "2.1.2 Using Commands" for information on how to start an instance.

   Note

   The pgx_rcvall command cannot accurately recover a hash index. If you are using a hash index, wait for the instance to start and then execute the REINDEX command for the appropriate index.

10. Resume applications

    Resume applications that are using the database.

11. Restore files

    Restore the files backed up in step 1.

15.9 Errors in More Than One Storage Disk

If an error occurs in the storage destination disks or resources are corrupted, determine the cause of the error from event logs and server logs and remove the cause.

If errors occur in either of the following combinations, you cannot recover the database.

Recreate the instance, and rebuild the runtime environment.

Data storage disk	Transaction log storage disk	Backup data storage disk
Error	-	Error
-	Error	Error

See

Refer to "Setup" in the Installation and Setup Guide for Server for information on how to create an instance and build the runtime environment.

15.10 Actions in Response to Instance Startup Failure

If an instance fails to start, refer to the event log and the server log, and determine the cause of the failure.

If using WebAdmin, remove the cause of the error. Then, click [Solution] and [Recheck the status] and confirm that the instance is in the normal state.

The following sections describe common causes of errors and the actions to take.

15.10.1 Errors in the Configuration File

If you have directly edited the configuration file using a text editor or changed the settings using WebAdmin, refer to the event log and the server log, confirm that no messages relating to the files below have been output.

- postgresql.conf
- pg_hba.conf

See

Refer to the following for information on the parameters in the configuration file:

- "Configuring Parameters" in the Installation and Setup Guide for Server
- "Appendix A Parameters"
- "Server Configuration" and "Client Authentication" under "Server Administration" in the PostgreSQL Documentation

15.10.2 Errors Caused by Power Failure or Mounting Issues

If mounting is cancelled after restarting the server, for example, because the disk device for each storage destination disk was not turned on, or because automatic mounting has not been set, then starting an instance will fail.

Refer to "15.14.2 Errors Caused by Power Failure or Mounting Issues", and take actions accordingly.

15.10.3 Other Errors

This section describes the recovery procedure to be used if you cannot take any action or the instance cannot start even after you have referred to the event log and the server log.

There are two methods of recovery:

- 15.10.3.1 Using WebAdmin
- 15.10.3.2 Using Server Commands

Note that recovery will not be possible if there is an error at the backup data storage destination. If the problem cannot be resolved, contact Fujitsu technical support.

15.10.3.1 Using WebAdmin

Follow the procedure below to perform recovery.

1. Delete the data storage destination directory and the transaction log storage destination directory

   Back up the data storage destination directory and the transaction log storage destination directory before deleting them.

2. Reconfirm the status

   Log in to WebAdmin, and in the [Instances] tab, click [Solution] for the error message.

   Click [Recheck the status] to reconfirm the storage destination resources.

3. Run recovery

   Restore the database cluster after WebAdmin detects an error.

   Refer to "15.2.1 Using WebAdmin" for details.

15.10.3.2 Using Server Commands

Follow the procedure below to recover the database.

1. Delete the data storage destination directory and the transaction log storage destination directory

   Save the data storage destination directory and the transaction log storage destination directory, and then delete them.

2. Execute recovery

   Use the pgx_rcvall command to recover the database cluster.

   Refer to "15.2.2 Using the pgx_rcvall Command" for details.

15.11 Actions in Response to Failure to Stop an Instance

If an instance fails to stop, refer to the event log and the server log, and determine the cause of the failure.

If the instance cannot stop despite taking action, perform the following operation to stop the instance.

There are two methods of recovery:

- 15.11.1 Using WebAdmin
- 15.11.2 Using Server Commands

15.11.1 Using WebAdmin

In the [Instances] tab, click and select the Fast stop mode or the Immediate stop mode to stop the instance. Forcibly terminate the server process from WebAdmin if the instance cannot be stopped.

Refer to "2.1.1 Using WebAdmin" for information on the stop modes.

15.11.2 Using Server Commands

There are three methods:

- Stopping the Instance Using the Fast Mode

  If backup is in progress, then terminate it, roll back all executing transactions, forcibly close client connections, and then stop the instance.

- Stopping the Instance Using the Immediate Mode

  Forcibly terminate the instance immediately. A crash recovery is run when the instance is restarted.

- Forcibly Stopping the Server Process

  Reliably stops the server process when the other methods are unsuccessful.

15.11.2.1 Stopping the Instance Using the Fast Mode

Specify "-m fast" in the pg_ctl command to stop the instance.

If the instance fails to stop when you use this method, stop the instance as described in "15.11.2.2 Stopping the Instance Using the Immediate Mode" or "15.11.2.3 Forcibly Stopping the Server Process".

Example

```
> pg_ctl stop -D D:\database\inst1 -m fast
```

15.11.2.2 Stopping the Instance Using the Immediate Mode

Specify "-m immediate " in the pg_ctl command to stop the instance.

If the instance fails to stop when you use this method, stop the instance as described in "15.11.2.3 Forcibly Stopping the Server Process".

Example

```
> pg_ctl stop -D D:\database\inst1 -m immediate
```

15.11.2.3 Forcibly Stopping the Server Process

If both the Fast mode and the Immediate mode fail to stop the instance, use the kill parameter of the pg_ctl command to forcibly stop the server process.

The procedure is as follows:

1. Execute the wmic command to identify the process ID of the server process.

   ```
   c:\>wmic
   wmic:root\cli>process where "name = \"postgres.exe\"" get CommandLine,Name,ProcessId
   CommandLine                                                                    Name
   ProcessId
   :
   "C:\Program Files\Fujitsu\fsepv<x>server64\bin\postgres.exe" -D "D:\database\inst1"
   postgres.exe  896
   :
   ```

   The postgres.exe process ID(896) that indicates the data storage destination directory of the applicable instance in the -D option becomes the server process.

2. Forcibly stop the server process

   As instance manager, forcibly stop the server process using the pg_ctl command.

   ```
   c:\>pg_ctl kill QUIT 896
   ```

15.12 Actions in Response to Failure to Create a Streaming Replication Standby Instance

When creating a streaming replication standby instance using WebAdmin, if the instance creation fails, refer to the event log and the server log, and determine the cause of the failure.

When an error occurs in the creation of the standby instance using WebAdmin, it is unlikely that the partially created standby instance can be resumed to complete the operation.

In such a scenario, fix the cause of the error, delete the partially created standby instance, and then create a new standby instance. This recommendation is based on the following assumptions:

- As the instance is yet to be created completely, there are no applications connecting to the database.
- The standby instance is in error state and is not running.
- There are no backups for the standby instance and as a result, it cannot be recovered.

See

Refer to "Deleting Instances" in the Installation and Setup Guide for details on how to delete an instance.

15.13 Actions in Response to Error in a Distributed Transaction

If a system failure (such as server failure) occurs in an application that uses distributed transactions (such as .NET TransactionScope), then transactions may be changed to the in-doubt state.

At that point, resources accessed by the transaction will be locked, and rendered unusable by other transactions.

The following describes how to check for in-doubt transactions, and how to resolve them.

How to check for in-doubt transactions

The following shows how to check for them:

If the server fails

1. An in-doubt transaction will have occurred if a message similar to the one below is output to the log when the server is restarted.

   Example

   ```
   LOG: Restoring prepared transaction 2103.
   ```

2. Refer to system view pg_prepared_xacts to obtain information about the prepared transaction.

   If the transaction identifier of the prepared transaction in the list (in the transaction column of pg_prepared_xacts) is the same as the identifier of the in-doubt transaction obtained from the log output when the server was restarted, then that row is the information about the in-doubt transaction.

   Example

   ```
   postgres=# select * from pg_prepared_xacts;
    transaction |   gid     |   prepared |  owner   | database
   -------------+-----------+------------+----------+----------
   2103 | 374cc221-f6dc-4b73-9d62-d4fec9b430cd | 2020-05-06 16:28:48.471+08 | postgres |
   postgres (1 row)
   ```

   Information about the in-doubt transaction is output to the row with the transaction ID 2103 in the transaction column.

If the client fails

If there are no clients connected and there is a prepared transaction in pg_prepared_xacts, then you can determine that the transaction is in the in-doubt state.

If at least one client is connected and there is a prepared transaction in pg_prepared_xacts, you cannot determine whether there is a transaction in the in-doubt state. In this case, use the following query to determine the in-doubt transaction from the acquired database name, user name, the time PREPARE TRANSACTION was executed, and the information about the table name accessed.

```
select gid,x.database,owner,prepared,l.relation::regclass as relation from pg_prepared_xacts x
left join pg_locks l on l.virtualtransaction = '-1/'||x.transaction and l.locktype='relation';
```

If it still cannot be determined from this information, wait a few moments and then check pg_prepared_xacts again.

If there is a transaction that has continued since the last time you checked, then it is likely that it is the one in the in-doubt state.

Point

As you can see from the explanations in this section, there is no one way to definitively determine in-doubt transactions.

Consider collecting other supplementary information (for example, logging on the client) or performing other operations (for example, allocating database users per job).

How to resolve in-doubt transactions

From the system view pg_prepared_xacts mentioned above, obtain the global transaction identifier (in the gid column of pg_prepared_xacts) for the in-doubt transaction, and issue either a ROLLBACK PREPARED statement or COMMIT PREPARED statement to resolve the in-doubt transaction.

Example

- Rolling back in-doubt transactions

```
postgres=# rollback prepared '374cc221-f6dc-4b73-9d62-d4fec9b430cd';
ROLLBACK PREPARED
```

- Committing in-doubt transactions

```
postgres=# commit prepared '374cc221-f6dc-4b73-9d62-d4fec9b430cd';
COMMIT PREPARED
```

15.14 I/O Errors Other than Disk Failure

Even if a disk is not defective, the same input-output error messages, as those generated when the disk is defective, may be output.

A few examples of such errors are given below. The appropriate action for each error is explained respectively.

- 15.14.1 Network Error with an External Disk
- 15.14.2 Errors Caused by Power Failure or Mounting Issues

15.14.1 Network Error with an External Disk

This is an error that occurs in the network path to/from an external disk.

Determine the cause of the error by checking the information in the event log and the server log, the disk access LED, network wiring, and network card status. Take appropriate action to remove the cause of the error, for example, replace problematic devices.

15.14.2 Errors Caused by Power Failure or Mounting Issues

These are errors that occur when the disk device is not turned on, automatic mounting of the disk was not set, or mounting was accidentally cancelled.

In this case, check the information in the event log and the server log, the disk access LED, and whether the disk is mounted correctly. If problems are detected, take appropriate action.

If mounting has been cancelled, it is possible that mounting was accidentally cancelled, or the existing setting (automatic mounting at the time of starting the operating system) has been changed so that mounting is not performed automatically. In this case, set the mounting to be performed automatically.

15.15 Anomaly Detection and Resolution

The following operations performed via the command line interface will result in an anomaly in WebAdmin:

- Changes to the port and backup_destination parameters in postgresql.conf
- Changes to Mirroring Controller configuration of cluster replication added via WebAdmin

This section describes when WebAdmin checks for such anomalies, and what takes place when an anomaly is detected.

15.15.1 Port Number and Backup Storage Path Anomalies

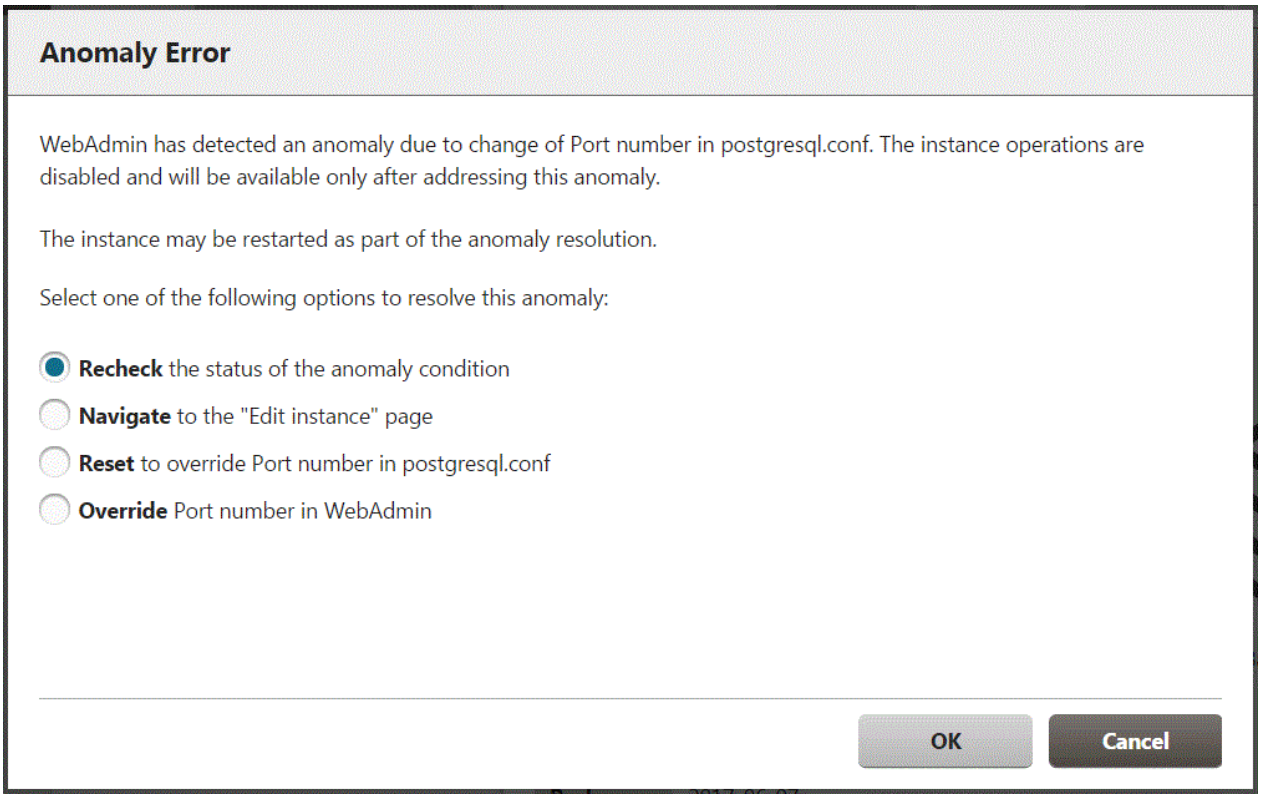
An anomaly occurs when the value of [Port number] and/or [Backup storage path] in WebAdmin is different from the value of its corresponding parameter in postgresql.conf - port and backup_destination, respectively.

WebAdmin checks for anomalies when an instance is selected for viewing or any instance operation is performed. Anomalies will be identified for the selected instance only.

The following occurs when an anomaly is detected in port number and/or backup storage path:

- All instance operation buttons are disabled, except for "Edit instance", "Refresh instance", and "Delete Mirroring Controller"
- A red error status indicator is displayed on the instance icon
- For an anomaly specific to backup storage path, a red error status indicator is displayed on the [Backup storage] disk icon, and [Backup storage status] is set to "Error"
- The message, "WebAdmin has detected an anomaly with...", is displayed in the [Message] section along with an associated [Solution] button

Click [Solution]. The [Anomaly Error] dialog box is displayed.



Select the required option, click [OK], and then resolve the anomaly error.

Refer to "Editing instance information" in the Installation and Setup Guide for Server for information on the [Edit instance] page.

Note

Critical errors encountered during anomaly resolution will be displayed, however, rollback of the instance to its previous state is not supported.

15.15.2 Mirroring Controller Anomalies

The following conditions will cause a Mirroring Controller anomaly:

- The Mirroring Controller management folder or configuration files have been deleted
- The permissions to the Mirroring Controller management folder or configuration files have been changed such that:
  - The instance administrator's access to Mirroring Controller configuration is denied
  - Users other than an instance administrator have access privileges to Mirroring Controller configuration files

WebAdmin checks for anomalies when Mirroring Controller status check is performed.

The following occurs when a Mirroring Controller anomaly is detected:

- All Mirroring Controller functionality is disabled for the replication cluster, except for "Delete Mirroring Controller"
- [Mirroring Controller status] is set to "Error"
- Either of the following messages is displayed in the [Message] section

  "Failed to access the Mirroring Controller management folder or configuration files '*path*'. Mirroring Controller functionality has been disabled. Consider deleting Mirroring Controller and adding it again."

  "Failed to find the Mirroring Controller management folder or configuration files '*path*'. Mirroring Controller functionality has been disabled. Consider deleting Mirroring Controller and adding it again."

Appendix A Parameters

This appendix describes the parameters to be set in the postgresql.conf file of FUJITSU Enterprise Postgres.

The postgresql.conf file is located in the data storage destination.

Information

The maximum value that can be expressed as a 4-byte signed integer changes according to the operating system. Follow the definition of the operating system in use.

Note

Note the following when specifying the path:

- Specify \\ as the path delimiter.
- Enclose the path in double quotes (") if it contains spaces.

- core_directory (string)

  This parameter specifies the directory where the corefile is to be output. If this parameter is omitted, the data storage destination is used by default. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- core_contents (string)

  This parameter specifies the contents to be included in the corefile.

  - full: Outputs all contents of the server process memory to the corefile.
  - none: Does not output a corefile.
  - minimum: Outputs only non-shared memory server processes to the corefile. This reduces the size of the corefile. However, in some cases, this file may not contain sufficient information for examining the factor that caused the corefile to be output.

  If this parameter is omitted, "minimum" is used by default. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- keystore_location (string)

  This parameter specifies the directory that stores the keystore file. Specify a different location from other database clusters. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

- tablespace_encryption_algorithm (string)

  This parameter specifies the encryption algorithm for tablespaces that will be created. Valid values are "AES128", "AES256", and "none". If you specify "none", encryption is not performed. The default value is "none". To perform encryption, it is recommended that you specify "AES256". Only superusers can change this setting.

- backup_destination (string)

  This parameter specifies the absolute path of the directory where pgx_dmpall will store the backup data. Specify a different location from other database clusters. This parameter can only be set when specified on starting an instance. It cannot be changed dynamically, while an instance is active.

  Place this directory on a different disk from the data directory to be backed up and the tablespace directory. Ensure that users do not store arbitrary files in this directory, because the contents of this directory are managed by the database system.

- search_path (string)

  When using the SUBSTR function compatible with Oracle databases, set "oracle" and "pg_catalog" in the search_path parameter. You must specify "oracle" before "pg_catalog".

Example

```
search_path = '"$user", public, oracle, pg_catalog'
```

Information

- The search_path feature specifies the priority of the schema search path. The SUBSTR function in Oracle database is defined in the oracle schema.
- Refer to "Statement Behavior" under "Server Administration" in the PostgreSQL Documentation for information on search_path.

- track_waits (string)

  This parameter enables collection of statistics for pgx_stat_lwlock and pgx_stat_latch.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is assumed.

  Only superusers can change this setting.

- track_sql (string)

  This parameter enables collection of statistics for pgx_stat_sql.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is assumed.

  Only superusers can change this setting.

Parameters for the in-memory feature

- reserve_buffer_ratio (numerical value)

  This parameter specifies the proportion of shared memory to be used for a stable buffer table.

  - Minimum value: 0
  - Maximum value: 80

  If this parameter is omitted, 0 will be used.

- vci.cost_threshold (numerical value)

  This parameter specifies the lowest cost that selects an execution plan that uses a VCI. If the cost of the best execution plan that does not use a VCI is lower than this value, that execution plan will be selected.

  - Minimum value: 0
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 18000 will be used.

- vci.control_max_workers (numerical value)

  This parameter specifies the number of background workers that manage VCI. The number of workers for the entire instance is limited by max_worker_processes, so add the value specified here to max_worker_processes.

  - Minimum value: 1
  - Maximum value: 8388607

  If this parameter is omitted or a value outside this range is specified, 8 will be used.

- vci.enable (string)

  This parameter enables or disables VCI.

  - on: Enables VCI.
  - off: Disables VCI.

  If this parameter is omitted, "on" will be used.

- vci.log_query (string)

  This parameter enables or disables log output when VCI is not used due to insufficient memory specified by vci.max_local_ros.

  - on: Enables log output.
  - off: Disables log output.

  If this parameter is omitted, "off" will be used.

- vci.maintenance_work_mem (numerical value)

  This parameter specifies the maximum memory size used for maintenance of VCI (when executing CREATE INDEX, for example).

  - Minimum value: 1 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer / 1024

  If this parameter is omitted or a value outside this range is specified, 256 MB will be used.

- vci.max_local_ros (numerical value)

  This parameter specifies the maximum memory size used for VCI scan.

  - Minimum value: 64 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 64 MB will be used.

- vci.max_parallel_degree (numerical value)

  This parameter specifies the maximum number of background workers used for parallel scan. The number of workers for the entire instance is limited by max_worker_processes, so add the value specified here to max_worker_processes.

  A value from -8388607 to 8388607 can be specified.

  - Integer (1 or greater): Parallel scan is performed using the specified degree of parallelism.
  - 0: Stops the parallel scan process.
  - Negative number: The specified value minus the maximum number of CPUs obtained from the environment is used as the degree of parallelism and parallel scan is performed.

  If this parameter is omitted or a value outside this range is specified, 0 will be used.

- vci.shared_work_mem (numerical value)

  This parameter specifies the maximum memory size used for VCI parallel scan.

  - Minimum value: 32 MB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  If this parameter is omitted or a value outside this range is specified, 1 GB will be used.

- vci.smc_directory (string)

  This parameter specifies a directory name in which a temporary file is created as the dynamic shared memory during a scan using a VCI.

  If this parameter is omitted, a directory (*dataStorageDir*\\base\\pgsql_tmp) under the data storage directory will be used.

Parameters for the Global Meta Cache feature

- pgx_global_metacache (numerical value)

  Specifies the memory size of the GMC area.

  Specify a value calculated by the formula below.

  A value lower than the calculated value will still work, but the meta cache may not be able to fit into the GMC area.

  In this case, the system will discard the meta cache it thinks it is no longer needed, but if it is needed again, the meta cache will need to be expanded and will not perform well.

  If the value is less than 10 MB and is set to a nonzero value that disables the feature, the database startup fails because the Global Meta Cache feature cannot operate.

  A setting of 0 disables the Global Meta Cache feature. The default is 0.

  Changing this setting requires restarting the database.

```
Size of GMC area
 = Max(10MB,
     (All user table x 0.4 KB
      + All user Indexes x 0.3 KB
      + All user columns x 0.8 KB) x 1.5 (*1) )

*1) Safety Factor (1.5)
This value takes into account the case where both GMC before and after the change temporarily exist
at the same time in shared memory when the table definition is changed or the row of the system
catalog is changed.
```

- track_gmc (string)

  This parameter enables collection of statistics for pgx_stat_gmc.

  - on: Enables collection of statistics.
  - off: Disables collection of statistics.

  If this parameter is omitted, "on" is used.

  Only superusers can change this setting.

Parameters for the Local Meta Cache Limit feature

- pgx_catalog_cache_max_size(numerical value)

  Specifies the maximum amount of memory that the backend process should use as the catalog cache.

  You can enable catalog cache deletion by setting it to 8 KB or more.

  A setting of 0 disables the catalog cache removal. The default is 0.

  If no units are specified, they are treated as KB.

  - Minimum value: 8KB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  When calculating the parameter settings, the factors that determine the cache size are calculated as the number of tables, the number of indexes, and the number of columns. What is kept as a catalog cache or relation cache also includes objects such as databases, roles, or procedures, but these are small compared to the above factors and do not need to be factored into them. It also includes a calculation method for pgx_relacion_cache_max_size because the given memory is distributed between the catalog cache and the relation cache.

Note

The calculation method here assumes that all backends have similar access and that the transaction also has access to a similar number of resources. If you have a small number of singular backends or transactions, consider excluding them as errors.

1. Determine how much memory a backend process can use. Decide by subtracting the memory size required by the entire system such as the database cache from the installed memory and dividing the rest by the number of connections.

2. For best performance, use the following formula to calculate the total memory size of the catalog cache when the backend holds the catalog cache for all resources accessed during its lifetime.
   The amount of memory varies depending on whether Global Meta Cache is enabled or disabled. Enabling Global Meta Cache reduces the amount of memory required because most of the cache is located on shared memory.

   ```
   When Global Meta Cache is enabled:
     (Number of tables to access + Number of indexes to access + Number of columns to access)
         × 0.1KB × 1.5 (*1)
   When Global Meta Cache is disabled:
     { Number of tables to access × 0.5KB(pg_class tuple size)
         + Number of indexes to access × 0.5KB(pg_index tuple size)
         + Number of columns to access × 1.0KB(pg_statistic tuple size)} × 1.5 (*1)

   *1) Safety Factor (1.5)
   The system catalog contains columns with variable-length types. For example, the tuple size in
   pg_class is a constant value multiplied by the number of tables, while relname in pg_class is
   variable length data.
   It is not practical to calculate every definition in detail, so we added 50% to the above
   formula.
   ```

3. In the same way as in 2., calculate the relation cache using the following formula.

   ```
     (1.4KB × Number of tables to access + 2.4KB × Number of indexes to access) × 1.5 (*1)

   *1) Safety Factor (1.5)
   The relation cache is structured to facilitate the use of table and index definitions, holds
   pointers to various objects, and is sized to include them. It is variable length because the
   type of object allocated by the table definition and its size change. Since it is not
   realistic to calculate for all definitions, 50% is added.
   ```

4. If the value of 1. ≥ the value of 2. + the value of 3., the backend process can keep all caches to the extent allowed, so there is no need to limit the caches. If you want to cap for safety, set the value of 2. to pgx_catalog_cache_max_size and the value of 3. to pgx_relation_cache_max_size.

5. If the value of 1. < the value of 2. + the value of 3. then you need to limit the cache. However, this parameter does not limit the size of the cache used by a transaction. Therefore, take the following steps.

6. Calculate the catalog cache used by a transaction using the formula in 2.

7. Calculate the relation cache used by a transaction using the formula in 3.

8. If the value of 1. < the value of 6. + the value of 7., then the value of 1. needs to be increased. In other words, in some cases, it may be necessary to increase the installed memory or reduce the number of connections.

9. If the value of 1. ≥ the value of 6. + the value of 7., the condition of 1. can be satisfied by limiting the cache with this parameter. Divide the value of 1. by the ratio of 2. and 3. and set it as a parameter. Set the value distributed to 2. to pgx_catalog_cache_max_size and the value distributed to 3. to pgx_relation_cache_max_size.

10. The value calculated in 9. is a provisional value. If you cannot meet your target performance, first try to shift the focus of allocation to the relation cache. This is because when executing SQL, the relation cache generated based on the catalog cache is mainly referenced, so it is advantageous to leave a large amount of relation cache. If the performance is still not satisfied, adjust the parameters by referring to "13.1.4 Performance Impact and Parameter Tuning of the Local Meta Cache Limit Feature".

Note

Be careful when partitioning the table.

The cached definition changes depending on whether the parent table is specified in the SQL statement or the child table is specified. In particular, note that if you specify a parent table, the definitions of all child tables are cached. This is because when you specify a parent table in an SQL statement, you need to know the definitions of all the child tables in order to determine which child table will contain the desired data. Note that the column information of the parent table is not cached.

When specifying the parent table:

```
Number of tables to access = Number of parent tables to access + Number of defined child tables
Number of columns = Number of defined columns x number of defined child tables
```

When specifying the child table directly:

```
Number of tables to access = Number of child tables actually accessed
Number of columns = Number of defined columns x number of child tables actually accessed
```

Example)

Suppose the parent table T (1 index, 3 columns) is split from child tables T1 to T5 (1 index, 3 columns, respectively). If the parent table T is specified in SQL, when the child tables that contain the data to be queried are limited to T1 and T2, and when accessing the data using the indexes defined by T1 and T2, calculate as follows.

```
Number of tables = 1(parent table) + 5(child table) = 6
Number of indexes = 2 (index to access)
Number of columns = 3 (number of columns) x 5 (child table) = 15
```

If you specify child tables T1 and T2 in SQL and use the indexes defined on T1 and T2 when accessing data, the calculation is as follows.

```
Number of tables = 2(child table)
Number of indexes = 2 (index to access)
Number of columns = 3 (number of columns) x 2 (child table) = 6
```

- pgx_relation_cache_max_size(numerical value)

  Specifies the maximum amount of memory that the backend process should use as the relation cache.

  You can enable catalog cache deletion by setting it to 8 KB or more.

  A setting of 0 disables the relation cache removal. The default is 0.

  If no units are specified, they are treated as KB.

  - Minimum value: 8KB
  - Maximum value: Maximum value that can be expressed as a 4-byte signed integer

  For the calculation method for parameter setting, refer to the calculation method of pgx_catalog_cache_max_size.

- pgx_cache_hit_log_interval(numerical value)

  Specifies the time interval to output a message indicating the cache reference status for each backend process.

  When the transaction ends, if the time set in this parameter has elapsed since the previous message was output, the message is output.

  If set to 0, a message will be output each time the transaction ends.

  Setting -1 disables the output. The default value is 10min.

  If no units are specified, they are treated as ms.

  Even if pgx_catalog_cache_max_size and pgx_relation_cache_max_size are disabled, the message output of the corresponding cache will be invalid.

  Immediately after connecting to the server, a small transaction occurs before the request from the user application, such as for user authentication. Since it is meaningless to know the hit rate for these, a message will be output at the end of the transaction that started after the time set in this parameter has elapsed after connecting to the server.

  For the same reason, setting a small value such as 0 may result in a message being printed at the end of such a small transaction.

  You can check which transaction the message corresponds to from the information output at the beginning.

  This information depends on the setting of the parameter log_line_prefix.

  - Minimum value: 0
  - Maximum value: 2147483647ms

See

Refer to "Server Configuration" under "Server Administration" in the PostgreSQL Documentation for information on other postgresql.conf parameters.

Appendix B System Administration Functions

This appendix describes the system administration functions of FUJITSU Enterprise Postgres.

See

Refer to "System Administration Functions" under "The SQL Language" in the PostgreSQL Documentation for information on other system administration functions.

B.1 WAL Mirroring Control Functions

The following table lists the functions that can be used for backup and recovery based on WAL mirroring.

Table B.1 WAL mirroring control functions

Name	Return type	Description
pgx_pause_wal_multiplexing()	void	Stops WAL multiplexing
pgx_resume_wal_multiplexing()	void	Resumes WAL multiplexing
pgx_is_wal_multiplexing_paused()	boolean	Returns true if WAL multiplexing has stopped

If WAL multiplexing has not been configured, these functions return an error. Setting the backup_destination parameter in postgresql.conf configures WAL multiplexing.

Only superusers can execute these functions.

B.2 Transparent Data Encryption Control Functions

The following table lists the functions that can be used for transparent data encryption.

Table B.2 Transparent data encryption control functions

Name	Return type	Description
pgx_open_keystore(*passphrase*)	void	Opens the keystore
pgx_set_master_key(*passphrase*)	void	Sets the master encryption key
pgx_set_keystore_passphrase(*oldPassphrase*, *newPassphrase*)	void	Changes the keystore passphrase

The pgx_open_keystore function uses the specified passphrase to open the keystore. When the keystore is opened, the master encryption key is loaded into the database server memory. In this way, you can access the encrypted data and create encrypted tablespaces. If the keystore is already open, this function returns an error.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block.

The pgx_set_master_key function generates a master encryption key and stores it in the keystore. If the keystore does not exist, this function creates a keystore. If the keystore already exists, this function modifies the master encryption key. If the keystore has not been opened, this function opens it.

The passphrase is a string of 8 to 200 bytes.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block. Processing is not affected by whether the keystore is open.

The pgx_set_keystore_passphrase function changes the keystore passphrase. Specify the current passphrase in *oldPassphrase*, and a new passphrase in *newPassphrase*.

The passphrase is a string of 8 to 200 bytes.

Only superusers can execute this function. Also, this function cannot be executed within a transaction block. Processing is not affected by whether the keystore is open.

B.3 Data Masking Control Functions

The table below lists the functions that can be used for data masking.

Table B.3 Data masking control functions

Name	Return type	Description
pgx_alter_confidential_policy	boolean	Changes masking policies
pgx_create_confidential_policy	boolean	Creates masking policies
pgx_drop_confidential_policy	boolean	Deletes masking policies
pgx_enable_confidential_policy	boolean	Enables or disables masking policies
pgx_update_confidential_values	boolean	Changes replacement characters when full masking is specified for masking type

B.3.1 pgx_alter_confidential_policy

Description

Changes masking policies

Format

The format varies depending on the content to be changed. The format is shown below.

- Common format

```
common_arg:
[schema_name    := 'schemaName',]
table_name    := 'tableName',
policy_name     := 'policyName'
```

- Add a masking target to a masking policy

```
pgx_alter_confidential_policy(
commonArg,
[action        := 'ADD_COLUMN', ]
column_name    := 'colName'
[, function_type    := 'FULL'] |
[, function_type    := 'PARTIAL', partialOpt] |
[, function_type    := 'REGEXP', regexpOpt]
)


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement    := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

- Delete a masking target from a masking policy

```
pgx_alter_confidential_policy(
commonArg,
action        := 'DROP_COLUMN',
column_name    := 'colName'
)
```

- Change the masking condition

```
pgx_alter_confidential_policy(
commonArg,
action        := 'MODIFY_EXPRESSION',
expression    := 'expr'
)
```

- Change the content of a masking policy set for a masking target

```
pgx_alter_confidential_policy(
commonArg,
action        := 'MODIFY_COLUMN',
column_name    := 'colName'
[, function_type    := 'FULL'] |
[, function_type    := 'PARTIAL', partialOpt] |
[, function_type    := 'REGEXP', regexpOpt]
)


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement        := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

- Change the masking policy description

```
pgx_alter_confidential_policy(
commonArg,
action        := 'SET_POLICY_DESCRIPTION',
policy_description    := 'policyDesc'
)
```

- Change the masking target description

```
pgx_alter_confidential_policy(
commonArg,
action        := 'SET_COLUMN_DESCRIPTION',
column_name    := 'colName',
column_description    := 'colDesc'
)
```

Argument

The argument varies depending on the content to be changed. Details are as follows.

- Common arguments

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	schema_name	varchar(63)	Schema name of table for which a masking policy is applied	'public'
	table_name	varchar(63)	Name of table for which a masking policy is applied	Mandatory
	policy_name	varchar(63)	Masking policy name	Mandatory

- Add a masking target to a masking policy

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'ADD_COLUMN'	'ADD_COLUMN'
	column_name	varchar(63)	Masking target name	Mandatory
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

- Delete a masking target from a masking policy

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'DROP_COLUMN'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory

- Change the masking condition

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'MODIFY_EXPRESSION'	Mandatory
	expression	varchar(1024)	Masking condition to be changed	Mandatory

- Change the content of a masking policy set for a masking target

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'MODIFY_COLUMN'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

- Change the masking policy description

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'SET_POLICY_DESCRIPTION'	Mandatory
	policy_description	varchar(1024)	Masking policy description	Mandatory

- Change the masking target description

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	action	varchar(63)	'SET_COLUMN_DESCRIPTION'	Mandatory
	column_name	varchar(63)	Masking target name	Mandatory
	column_description	varchar(1024)	Masking target description	Mandatory

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional									
	ADD_COLUMN			DROP_COLUMN	MODIFY_EXPRESSION	MODIFY_COLUMN			SET_POLICY_DESCRIPTION	SET_COLUMN_DESCRIPTION
	Full masking	Partial masking	Regular expression masking			Full masking	Partial masking	Regular expression masking		
schema_name	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
table_name	N	N	N	N	N	N	N	N	N	N

Argument	Mandatory or optional									
	ADD_COLUMN			DROP_COLUMN	MODIFY_EXPRESSION	MODIFY_COLUMN			SET_POLICY_DESCRIPTION	SET_COLUMN_DESCRIPTION
	Full masking	Partial masking	Regular expression masking			Full masking	Partial masking	Regular expression masking		
policy_name	N	N	N	N	N	N	N	N	N	N
action	Y	Y	Y	N	N	N	N	N	N	N
column_name	N	N	N	N	-	N	N	N	-	N
function_type	Y	N	N	-	-	Y	N	N	-	-
expression	-	-	-	-	N	-	-	-	-	-
policy_description	-	-	-	-	-	-	-	-	N	-
column_description	-	-	-	-	-	-	-	-	-	N
function_parameters	-	N	-	-	-	-	N	-	-	-
regexp_pattern	-	-	N	-	-	-	-	N	-	-
regexp_replacement	-	-	N	-	-	-	-	N	-	-
regexp_flags	-	-	Y	-	-	-	-	Y	-	-

Y: Can be omitted; N: Cannot be omitted; -: Ignored when specified

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example 1

Adding masking policy p1 to masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'ADD_COLUMN', column_name := 'c2', function_type := 'PARTIAL', function_parameters := 'VVVFVVVVFVVVV,
VVV-VVVV-VVVV, *, 4, 11');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 2

Deleting masking target c1 from masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'DROP_COLUMN', column_name := 'c1');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 3

Changing the masking condition for masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'MODIFY_EXPRESSION', expression := 'false');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 4

Changing the content of masking policy p1 set for masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'MODIFY_COLUMN', column_name := 'c2', function_type := 'FULL');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 5

Changing the description of masking policy p1

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'SET_POLICY_DESCRIPTION', policy_description := 'this policy is an example.');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Execution example 6

Changing the description of masking target c2

```
postgres=# select pgx_alter_confidential_policy(table_name := 't1', policy_name := 'p1', action :=
'SET_COLUMN_DESCRIPTION', column_name := 'c2', column_description := 'c2 column is FULL.');
 pgx_alter_confidential_policy
-------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_alter_confidential_policy system management function can be specified in any order.
- The action parameters below can be specified. When action parameters are omitted, ADD_COLUMN is applied.

Parameter	Description
ADD_COLUMN	Adds a masking target to a masking policy.
DROP_COLUMN	Deletes a masking target from a masking policy.
MODIFY_EXPRESSION	Changes expression.
MODIFY_COLUMN	Changes the content of a masking policy set for a masking target.
SET_POLICY_DESCRIPTION	Changes policy_description.
SET_COLUMN_DESCRIPTION	Changes column_description.

- The function_parameters argument is enabled when the function_type is PARTIAL. If the function_type is other than PARTIAL, it will be ignored.

- The arguments below are enabled when the function_type is REGEXP. If the function_type is other than REGEXP, these arguments will be ignored.
  - regexp_pattern
  - regexp_replacement
  - regexp_flags

- Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.
- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.

B.3.2 pgx_create_confidential_policy

Description

Creates masking policies

Format

The format varies depending on the masking type. The format is shown below.

```
pgx_create_confidential_policy(
[schema_name        := 'schemaName',]
table_name        := 'tableName',
policy_name         := 'policyName',
expression        := 'expr'
[, enable           := 'policyStatus']
[, policy_description    := 'policyDesc']
[, column_name        := 'colName'
     [, function_type    := 'FULL'] |
     [, function_type    := 'PARTIAL', partialOpt] |
     [, function_type    := 'REGEXP', regexpOpt]
     [, column_description    := 'colDesc']
])


partialOpt:
function_parameters    := 'maskingFmt'


regexpOpt:
regexp_pattern        := 'regexpPattern',
regexp_replacement        := 'regexpReplacementChar',
[, regexp_flags        := 'regexpFlags']
```

Argument

Details are as follows.

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
All	schema_name	varchar(63)	Schema name of table for which the masking policy is created	'public'
	table_name	varchar(63)	Name of table for which the masking policy is created	Mandatory

Masking type for which an argument can be specified	Argument	Data type	Description	Default value
	policy_name	varchar(63)	Masking policy name	Mandatory
	expression	varchar(1024)	Masking condition	Mandatory
	enable	boolean	Masking policy status - 't': Enabled - 'f': Disabled	't'
	policy_description	varchar(1024)	Masking policy description	NULL
	column_name	varchar(63)	Masking target name	NULL
	function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking	'FULL'
	column_description	varchar(1024)	Masking target description	NULL
Partial masking	function_parameters	varchar(1024)	Masking format for partial masking	Mandatory
Regular expression masking	regexp_pattern	varchar(1024)	Search pattern for regular expression masking	Mandatory
	regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking	Mandatory
	regexp_flags	varchar(20)	Regular expression flags	NULL

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional		
	Full masking	Partial masking	Regular expression masking
schema_name	Y	Y	Y
table_name	N	N	N
policy_name	N	N	N
expression	N	N	N
enable	Y	Y	Y
policy_description	Y	Y	Y
column_name	Y	Y	Y
function_type	Y	Y	Y
column_description	Y	Y	Y
function_parameters	-	N	-
regexp_pattern	-	-	N
regexp_replacement	-	-	N
regexp_flags	-	-	Y

Y: Can be omitted; N: Cannot be omitted; -: Ignored when specified

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example 1

Creating masking policy p1 that does not contain a masking target

```
postgres=# select pgx_create_confidential_policy(table_name := 't1', policy_name := 'p1',
expression := '1=1');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 2

Creating masking policy p1 that contains masking target c1 of which the masking type is full masking

```
postgres=# select pgx_create_confidential_policy(schema_name := 'public', table_name := 't1',
policy_name := 'p1', expression := '1=1', enable := 't', policy_description := 'this policy is an
example.', column_name := 'c1', function_type := 'FULL', column_description := 'c1 column is FULL.');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 3

Creating masking policy p1 that contains masking target c2 of which the masking type is partial masking

```
postgres=# select pgx_create_confidential_policy( table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c2', function_type := 'PARTIAL', function_parameters :=
'VVVFVVVVFVVVV, VVV-VVVV-VVVV, *, 4, 11');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Execution example 4

Creating masking policy p1 that contains masking target c3 of which the masking type is regular expression masking

```
postgres=# select pgx_create_confidential_policy( table_name := 't1', policy_name := 'p1',
expression := '1=1', column_name := 'c3', function_type := 'REGEXP', regexp_pattern := '(.*)(@.*)',
regexp_replacement := 'xxx\2', regexp_flags := 'g');
 pgx_create_confidential_policy
--------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_create_confidential_policy system management function can be specified in any order.
- If column_name is omitted, only masking policies that do not contain masking target will be created.
- One masking policy can be created for each table. Use the pgx_alter_confidential_policy system management function to add a masking target to a masking policy.

- The function_parameters argument is enabled when the function_type is PARTIAL. If the function_type is other than PARTIAL, it will be ignored.
- The arguments below are enabled when the function_type is REGEXP. If the function_type is other than REGEXP, these arguments will be ignored.
  - regexp_pattern
  - regexp_replacement
  - regexp_flags

If a table for which a masking policy is to be applied is deleted, delete the masking policy as well.

- Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.
- Refer to "POSIX Regular Expressions" in the PostgreSQL Documentation and check pattern, replacement, and flags for information on the values that can be specified for regexp_pattern, regexp_replacement, and regexp_flags.

B.3.3 pgx_drop_confidential_policy

Description

Deletes masking policies

Format

```
pgx_drop_confidential_policy(
[schema_name    := 'schemaName', ]
table_name     := 'tableName',
policy_name    := 'policyName'
)
```

Argument

Details are as follows.

Argument	Data type	Description	Default value
schema_name	varchar(63)	Schema name of table for which a masking policy is deleted	'public'
table_name	varchar(63)	Name of table for which a masking policy is deleted	Mandatory
policy_name	varchar(63)	Masking policy name	Mandatory

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional
schema_name	Y
table_name	N
policy_name	N

Y: Can be omitted; N: Cannot be omitted

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Deleting masking policy p1

```
postgres=# select pgx_drop_confidential_policy(table_name := 't1', policy_name := 'p1');
 pgx_drop_confidential_policy
------------------------------
 t
(1 row)
```

Description

The arguments for the pgx_drop_confidential_policy system management function can be specified in any order.

Note

If a table for which a masking policy is to be applied is deleted, delete the masking policy as well.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.3.4 pgx_enable_confidential_policy

Description

Enables or disables masking policies

Format

```
pgx_enable_confidential_policy(
[schema_name    := 'schemaName', ]
table_name     := 'tableName',
policy_name    := 'policyName',
enable        := 'policyStatus'
)
```

Argument

Details are as follows.

Argument	Data type	Description	Default value
schema_name	varchar(63)	Schema name of table for which a masking policy is enabled or disabled	'public'
table_name	varchar(63)	Name of table for which a masking policy is enabled or disabled	Mandatory
policy_name	varchar(63)	Masking policy name	Mandatory
enable	boolean	Masking policy status - 't': Enabled	Mandatory

Argument	Data type	Description	Default value
		- 'f': Disabled	

Details about whether arguments can be omitted are as follows.

Argument	Mandatory or optional
schema_name	Y
table_name	N
policy_name	N
enable	N

Y: Can be omitted; N: Cannot be omitted

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Enabling masking policy p1

```
postgres=# select pgx_enable_confidential_policy(table_name := 't1', policy_name := 'p1', enable :=
't');
 pgx_enable_confidential_policy
--------------------------------
 t
(1 row)
```

Description

The arguments for the pgx_enable_confidential_policy system management function can be specified in any order.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.3.5 pgx_update_confidential_values

Description

Changes replacement characters when full masking is specified for masking type

Format

```
pgx_update_confidential_values(
[number_value    := 'numberValue']
[, char_value    := 'charValue']
[, varchar_value    := 'varcharValue']
[, date_value    := 'dateValue']
[, ts_value    := 'tsValue']
)
```

Argument

Details are as follows.

Argument	Data type	Description
number_value	integer	Replacement character in numeric type
char_value	varchar(1)	Replacement character in char type
varchar_value	varchar(1)	Replacement character in varchar type
date_value	date	Replacement character in date type
ts_value	timestamp	Replacement character in timestamp type

Return value

Return value	Description
TRUE	Ended normally
FALSE	Ended abnormally

Execution example

Using '*' as a replacement character in char type and varchar type

```
postgres=# select pgx_update_confidential_values(char_value := '*', varchar_value := '*');
 pgx_update_confidential_values
--------------------------------
 t
(1 row)
```

Description

- The arguments for the pgx_update_confidential_values system management function can be specified in any order.
- Specify one or more arguments for the pgx_update_confidential_values system management function. A replacement character is not changed for an omitted argument.

See

Refer to "String Constants" in the PostgreSQL Documentation for information on the strings to specify for arguments.

B.4 VCI Data Load Control Function

The table below lists the function that loads VCI data to buffer cache.

Table B.4 VCI data load control function

Name	Return type	Description
pgx_prewarm_vci(vci_index regclass)	int8	Loads the VCI data to buffer cache.

pgx_prewarm_vci loads the specified VCI data to buffer cache and returns the number of blocks of the loaded VCI data.

The aggregation process using VCI may take time immediately after an instance is started, because the VCI data has not been loaded to buffer cache. Therefore, the first aggregation process can be sped up by executing pgx_prewarm_vci after an instance is started.

The amount of memory required for preloading is the number of blocks returned by pgx_prewarm_vci multiplied by the size of one block.

This function can only be executed if the user has reference privilege to the VCI index and execution privilege to the pg_prewarm function.

B.5 High-Speed Data Load Control Functions

The table below lists the functions that can be used for high-speed data load.

Table B.5 High-speed data load control functions

Name	Return type	Description
pgx_loader	bigint	Creates dynamic shared memory, starts parallel workers and loads data
pgx_loader_recovery	smallint	Resolves in-doubt transactions

The pgx_loader command executes the above functions internally.

Appendix C System Views

This appendix describes how to use the system views in FUJITSU Enterprise Postgres.

See

Refer to "System Views" under "Internals" in the PostgreSQL Documentation for information on other system views.

C.1 pgx_tablespaces

The pgx_tablespaces catalog provides information related to the encryption of tablespaces.

Column	Type	References	Description
spctablespace	oid	pg_tablespace.oid	Tablespace OID
spcencalgo	text		Tablespace encryption algorithm

The spcencalgo string displays one of the following values:

- none: Tablespace is not encrypted
- AES128: AES with key length of 128 bits
- AES256: AES with key length of 256 bits

C.2 pgx_stat_lwlock

The pgx_stat_lwlock view displays statistics related to lightweight locks, with each type of content displayed on a separate line.

Table C.1 pgx_stat_lwlock view

Column	Type	Description
lwlock_name	name	Name of the lightweight lock
total_waits	bigint	Number of waits caused by the lightweight lock
total_wait_time	double precision	Number of milliseconds spent in waits caused by the lightweight lock
stats_reset	timestamp with timezone	Last time at which this statistics was reset

C.3 pgx_stat_latch

The pgx_stat_latch view displays statistics related to latches, with each type of wait information within FUJITSU Enterprise Postgres displayed on a separate line.

Table C.2 pgx_stat_latch view

Column	Type	Description
latch_name	name	Name of the latch
total_waits	bigint	Number of waits caused a wait
total_wait_time	double precision	Number of milliseconds spent in waits caused by the latch
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.4 pgx_stat_walwriter

The pgx_stat_walwriter view displays statistics related to WAL writing, in a single line.

Table C.3 pgx_stat_walwriter view

Column	Type	Description
dirty_writes	bigint	Number of times old WAL buffers were written to the disk because the WAL buffer was full when WAL records were added
writes	bigint	Number of WAL writes
write_blocks	bigint	Number of WAL write blocks
total_write_time	double precision	Number of milliseconds spent on WAL writing
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.5 pgx_stat_sql

The pgx_stat_sql view displays statistics related to SQL statement executions, with each type of SQL statement displayed on a separate line.

Table C.4 pgx_stat_sql view

Column	Type	Description
selects	bigint	Number of SELECT statements executed In database multiplexing mode, this number includes the SELECT statements executed in Mirroring Controller. Mirroring Controller executes the SELECT statement using the interval specified for the heartbeat_interval of the server definition file (milliseconds).
inserts	bigint	Number of INSERT statements executed
deletes	bigint	Number of DELETE statements executed
updates	bigint	Number of UPDATE statements executed
selects_with_parallelism	bigint	Number of times parallel scan was used in SELECT statements
inserts_with_parallelism	bigint	Not used
deletes_with_parallelism	bigint	Not used
updates_with_parallelism	bigint	Not used
copies_with_parallelism	bigint	Not used
declares	bigint	Number of DECLARE statements executed (number of cursor OPENs)
fetches	bigint	Number of FETCH statements executed
checkpoints	bigint	Number of CHECKPOINT statements executed
clusters	bigint	Number of CLUSTER statements executed
copies	bigint	Number of COPY statements executed
reindexes	bigint	Number of REINDEX statements executed
truncates	bigint	Number of TRUNCATE statements executed
locks	bigint	Number of times a lock occurred
stats_reset	timestamp with timezone	Last time at which this statistic was reset

C.6 pgx_stat_gmc

The pgx_stat_gmc view provides information about the GMC areas.

Table C.5 pgx_stat_gmc view

Column	Type	Description
searches	bigint	Number of times the cache table is searched.
hits	bigint	Number of times the cache table is hit.
size	bigint	The current amount of memory (bytes) used in the GMC area.
stats_reset	timestamp with timezone	Last time these statistics were reset.

Appendix D Tables Used by Data Masking

This appendix explains tables used by the data masking feature.

Note

These tables are updated by the data masking control function, so do not use SQL statements to directly update these tables.

D.1 pgx_confidential_columns

This table provides information on masking target for which masking policies are set.

Column	Type	Description
schema_name	varchar(63)	Schema name of table for which a masking policy is applied
table_name	varchar(63)	Name of table for which a masking policy is applied
policy_name	varchar(63)	Masking policy name
column_name	varchar(63)	Masking target name
function_type	varchar(63)	Masking type - 'FULL': Full masking - 'PARTIAL': Partial masking - 'REGEXP': Regular expression masking
function_parameters	varchar(1024)	Masking format for partial masking
regexp_pattern	varchar(1024)	Search pattern for regular expression masking
regexp_replacement	varchar(1024)	Replacement character/string for regular expression masking
regexp_flags	varchar(20)	Regular expression flags
column_description	varchar(1024)	Masking target description

Execution example

```
postgres=# select * from pgx_confidential_columns;
 schema_name | table_name | policy_name | column_name | function_type |
function_parameters           | regexp_pattern | regexp_replacement | regexp_flags |
column_description
-------------+------------+-------------+-------------+---------------
+---------------------------------------+----------------+--------------------+-------------
+--------------------
 public      | t1         | p1          | c1          | FULL          |
|                |                     |             |
 public      | t1         | p1          | c2          | PARTIAL       | VVVFVVVVFVVVV, VVV-VVVV-VVVV,
*, 4, 11 |                |                     |             |
(2  row)
```

D.2 pgx_confidential_policies

This table provides information on masking policies.

Column	Type	Description
schema_name	varchar(63)	Schema name of table for which a masking policy is applied

Column	Type	Description
table_name	varchar(63)	Name of table for which a masking policy is applied
policy_name	varchar(63)	Masking policy name
expression	varchar(1024)	Masking condition
enable	boolean	Masking policy status - 't': Enabled - 'f': Disabled
policy_description	varchar(1024)	Masking policy description

Execution example

```
postgres=# select * from pgx_confidential_policies;
 schema_name | table_name | policy_name | expression | enable | policy_description
-------------+------------+-------------+------------+--------+--------------------
 public      | t1         | p1          | 1=1        | t      |
(1 row)
```

D.3 pgx_confidential_values

This table provides information on replacement characters when full masking is specified for masking type.

Column	Data type	Description	Default value
number_value	integer	Numeric	0
char_value	varchar(1)	char type	Spaces
varchar_value	varchar(1)	varchar type	Spaces
date_value	date	date type	'1970-01-01'
timestamp_value	timestamp	timestamp type	'1970-01-01 00:00:00'

Execution example

```
postgres=# select * from pgx_confidential_values;
 number_value | char_value | varchar_value | date_value |      ts_value
--------------+------------+---------------+------------+---------------------
            0 |            |               | 1970-01-01 | 1970-01-01 00:00:00
(1 row)
```

Appendix E Tables Used by High-Speed Data Load

This appendix describes the tables used by high-speed data load.

E.1 pgx_loader_state

The pgx_loader_state table provides information about transactions prepared by high-speed data load.

Column	Type	Description
id	serial	Unique identifier. This value is assigned from the pgx_loader_state_id_seq sequence.
gid	text	Global transaction identifier assigned to a transaction.
state	text	State of the transaction. The value can be one of the following: - commit: The prepared transaction has been committed. - rollback: The prepared transaction is in in-doubt state.
master_pid	integer	Process ID of the backend process (master process) that executed the pgx_loader control function.
role_oid	integer	Role identifier (OID). A prepared transaction can only be completed by the same user who executed the original transaction or by a superuser.
relation_oid	integer	Object identifier (OID).

Note

The pgx_loader_state table and pgx_loader_state_id_seq sequence are updated by high-speed data load. Do not update these database objects directly using SQL.

Appendix F Starting and Stopping the Web Server Feature of WebAdmin

To use WebAdmin for creating and managing a FUJITSU Enterprise Postgres instance on a server where FUJITSU Enterprise Postgres is installed, you must first start the Web server feature of WebAdmin.

- Using WebAdmin in a single-server configuration

  You must start the Web server on the server on which FUJITSU Enterprise Postgres and WebAdmin are installed.

- Using WebAdmin in a multiserver configuration

  You must start the Web server on all servers on which WebAdmin has been installed.

This appendix describes how to start and stop the Web server feature of WebAdmin.

See

Refer to "Installing WebAdmin in a Multiserver Configuration" in the Installation and Setup Guide for Server for information on multiserver installation.

F.1 Starting the Web Server Feature of WebAdmin

Follow the procedure below to start the Web server feature of WebAdmin:

1. Display the [Services] window

   In the [Administrative Tools], click [Services].

2. Start a service

   Select the displayed name "FUJITSU Enterprise Postgres WebAdmin *version*", and then click [Start Service].

You can also start a service by specifying the service name of the Web server feature of WebAdmin in the net start command or sc start command.

F.2 Stopping the Web Server Feature of WebAdmin

This section describes how to stop the Web server feature of WebAdmin.

Follow the procedure below to stop the Web server feature of WebAdmin:

1. Display the [Services] window

   In the [Administrative Tools], click [Services].

2. Stop a service

   Select the displayed name "FUJITSU Enterprise Postgres WebAdmin *version*", and then click [Stop Service].

You can also stop a service by specifying the service name of the Web server feature of WebAdmin in the net stop command or sc stop command.

Appendix G WebAdmin Wallet

This appendix describes how to use the Wallet feature of WebAdmin.

When a remote instance or a standby instance is created, it is necessary to provide user name and password for authentication with the remote machine or the database instance.

The Wallet feature in WebAdmin is a convenient way to create and store these credentials.

Once created, these credentials can be repeatedly used in one or more instances.

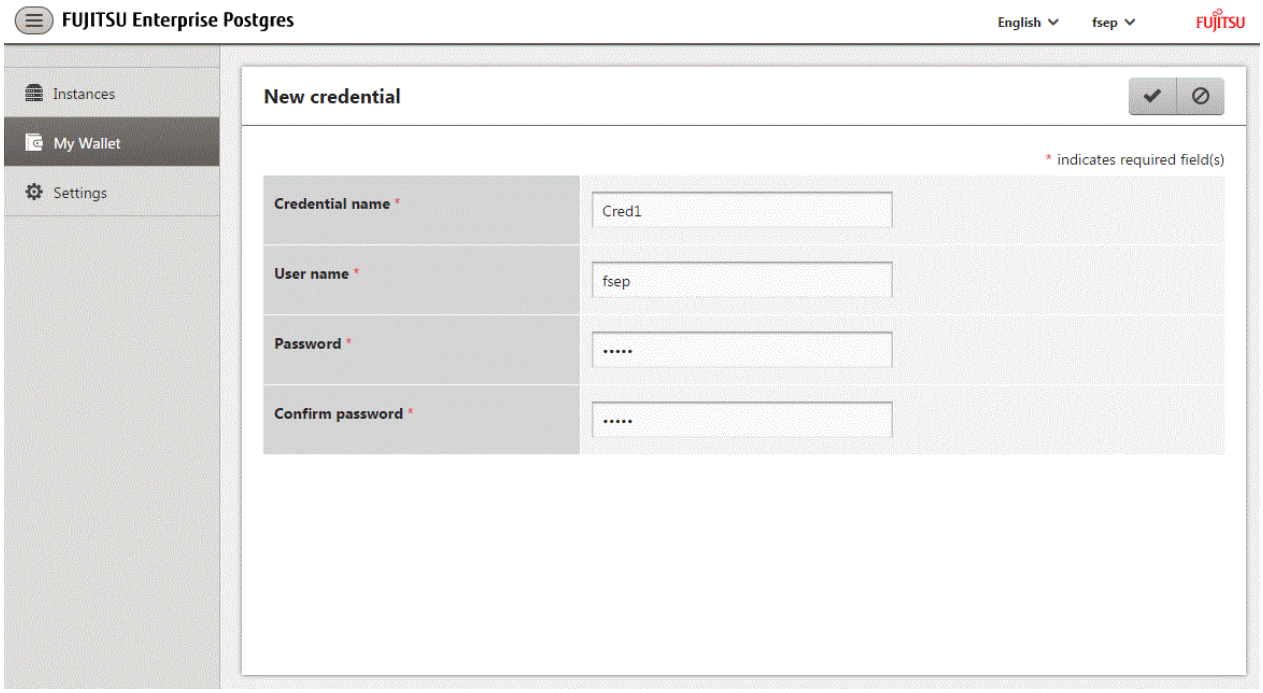
Note

It is not mandatory to create a credential in the Wallet. It is possible to create a remote instance or a standby instance without creating any credential in the Wallet.

If no credential is created beforehand, a user name and password can be entered in the instance creation page. When creating a "Remote" instance, if operating system credentials are entered without using a credential stored in the Wallet, WebAdmin automatically creates a credential with the given user name and password, and stores it in the user's wallet for future use.

G.1 Creating a Credential

1. In the [My Wallet] tab, click ➕. The [New credential] page will be displayed.
2. Enter the information for the credentials.



Enter the following items. Credential name, User name and Password should not contain hazardous characters. Refer to "Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters".

- [Credential name]: Name of the credential

  The name must meet the conditions below:

  - Maximum of 16 characters
  - The first character must be an ASCII alphabetic character
  - The other characters must be ASCII alphanumeric characters

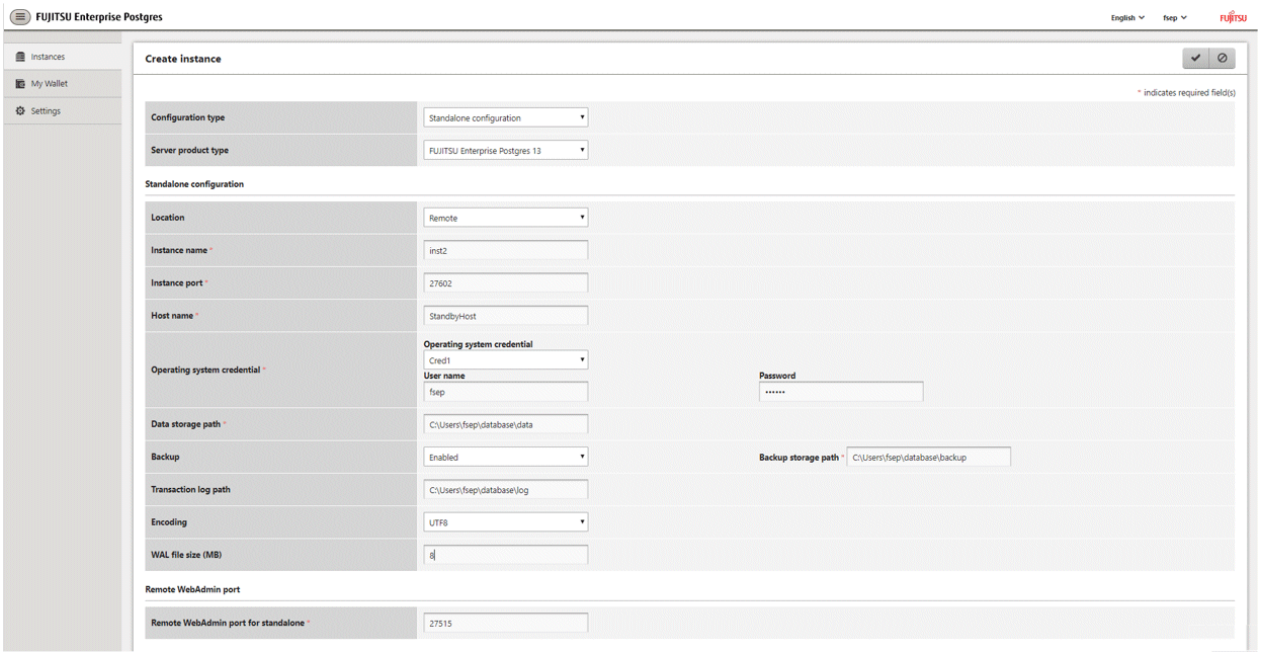
- [User name]: The operating system user name or database instance user name that will be used later
- [Password]: Password for the user
- [Confirm password]: Reenter the password.

3. Click ✔ to store the credential.

G.2 Using a Credential

Once a credential is created in the Wallet, it can be used during remote instance creation or standby instance creation.

The following page uses the credential that was created in the previous section.



When "Cred1" is selected in [Operating system credential], the user name and password are automatically populated from the credential.

Appendix H WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix I Collecting Failure Investigation Data

If the cause of an error that occurs while building the environment or during operations is unclear, data must be collected for initial investigation.

This appendix describes how to collect data for initial investigation.

Use FJQSS (Information Collection Tool) to collect data for initial investigation.

See

Refer to the following manual for information on how to use FJQSS.

- In the [Apps] menu, select [FJQSS (Information Collection Tool)], and then click [FJQSS User's Guide].

Note

- When using FJQSS to collect data for initial investigation, a window will be displayed for you to set the following environment variables:

  - PGDATA

    Set the data storage destination.

  - PGDATABASE

    Set the database name from which you want to collect data for initial investigation.

  - PGPORT

    Set the instance port number. This does not need to be set if the default port number (27500) has not been changed.

  - PGUSER

    Set the database superuser.
    Set the database superuser so that client authentication is possible.
    FJQSS establishes a TCP/IP connection with the template1 database and collects data from the database.

- Refer to "Collecting Failure Investigation Data" in the Cluster Operation Guide (Database Multiplexing) for information on how to collect failure investigation data when performing database multiplexing.

Information

FJQSS corresponds the required operating system of FUJITSU Enterprise Postgres described below.

- "Required Operating System" in the Installation and Setup Guide for Server.

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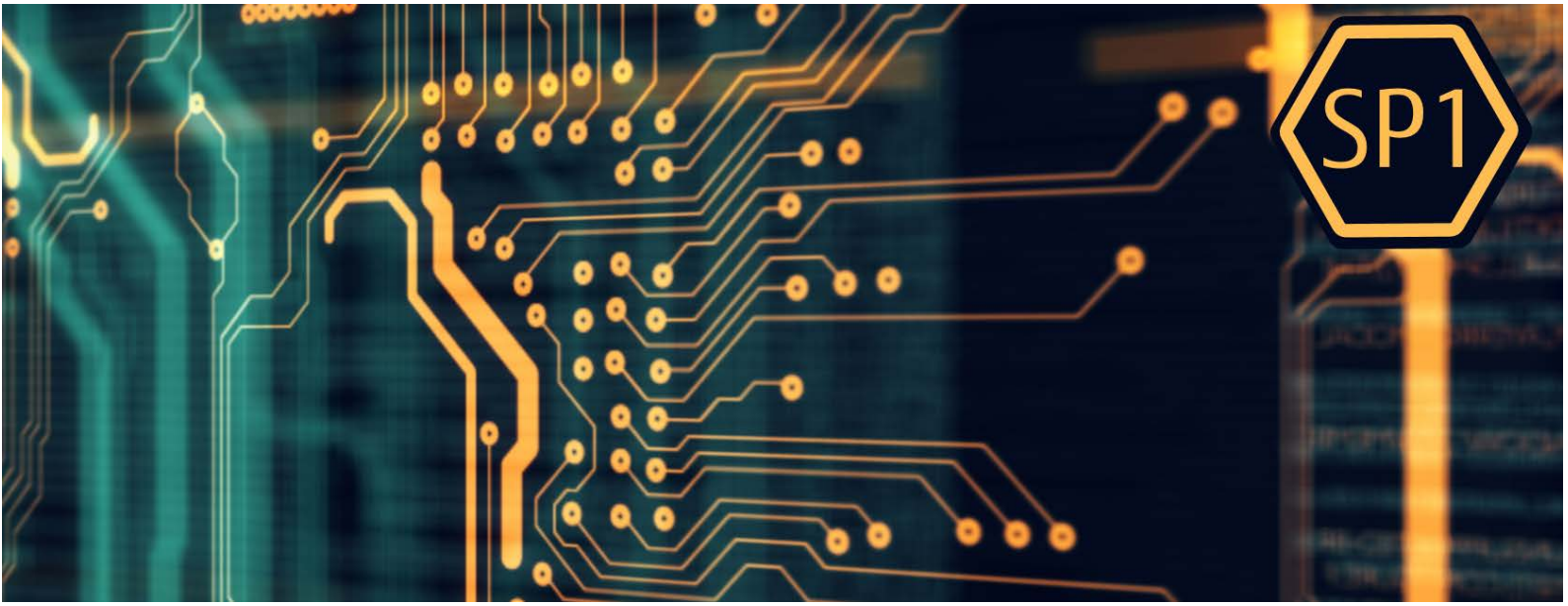

Security Operation Guide

Windows/Linux

J2UL-2680-02ENZ0(01)
July 2024

Preface

Purpose of this document

This document describes security when building and operating a FUJITSU Software Enterprise Postgres (hereinafter referred to as "FUJITSU Enterprise Postgres") database system.

Intended readers

This document is intended for those who are:

- Considering installing FUJITSU Enterprise Postgres
- Designing, building, and operating the security operating environment in FUJITSU Enterprise Postgres
- Accessing FUJITSU Enterprise Postgres database systems

Readers of this document are assumed to have general knowledge of:

- Business operations
- FUJITSU Enterprise Postgres
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Security

Provides an overview of the security system, and explains the security features provided by FUJITSU Enterprise Postgres.

Chapter 2 Overview of Security Operation

Provides an overview of security operation.

Chapter 3 Tasks of the Manager

Explains the tasks for security measures to be implemented by the manager.

Chapter 4 Tasks of Administrators

Explains the tasks for security measures to be implemented by administrators.

Chapter 5 Tasks of Users

Explains the tasks for security measures to be implemented by users.

Chapter 6 Audit Log Feature

Explains the audit log feature provided by FUJITSU Enterprise Postgres.

References

This document contains abstracts from the following document:

- Database Security Guideline Version 2.0
  (Database Security Consortium (DBSC))

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Issue date and version

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Edition 2.0: August 2021
Edition 1.0: April 2021
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Revision History

Revision	Location	Version
Added scalable audit logging. This feature is available by applying the bug fix that includes the PH23619.	Chapter 6 Audit Log Feature	Edition 2.1

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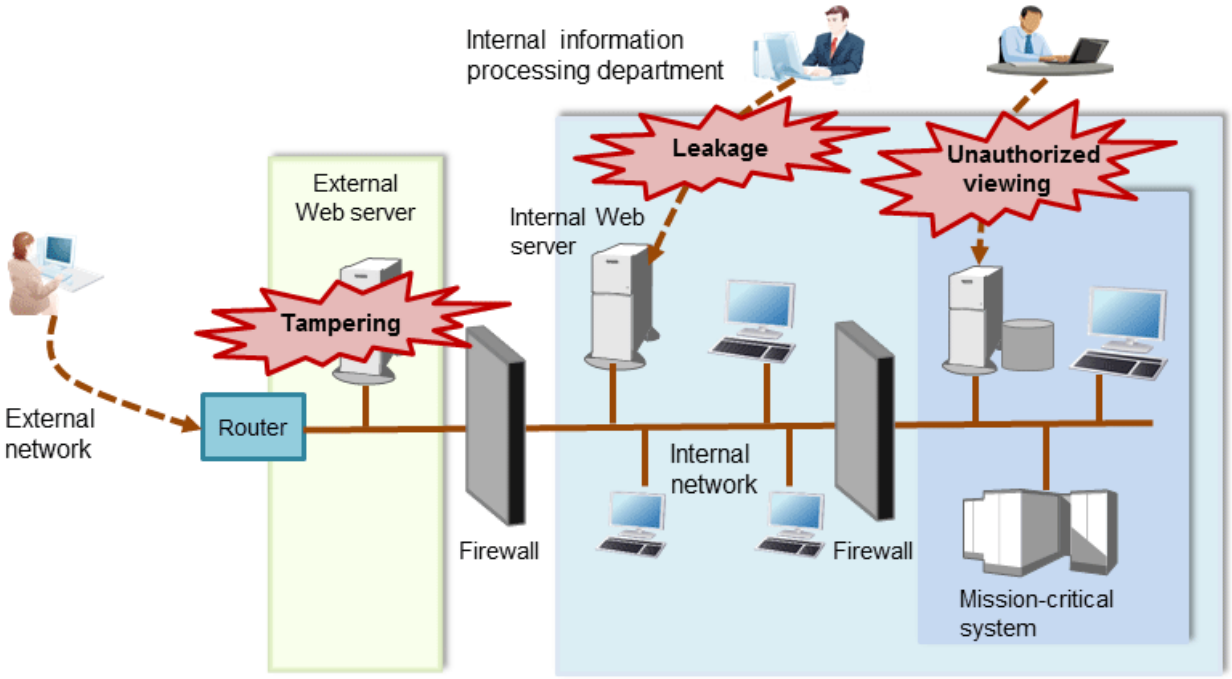
Chapter 1 Overview of Security

1.1 What is Security?

Computer security is the protection of information systems and data from risks such as leakage or tampering of information, attacks, intrusions, eavesdropping from external sources, and interference with information services. Security measures are essential for the advance prevention of security threats in order for information systems to gain trust as social infrastructure.

Figure 1.1 Security threats



The security measures in information systems can be classified as follows:

- Network
- Web
- Application
- Database
- PC

This document focuses on database security measures when using FUJITSU Enterprise Postgres.

1.2 Security Requirements

Below are the necessary security requirements for information systems.

Maintenance of security policies

A security policy clarifies the approach the company should take in relation to information assets, and the actions employees should take.

It is necessary to undertake security of information systems while maintaining security policies.

Integrated security management

Security has the aspects below. It is necessary to manage information in an integrated manner based on these aspects.

Confidentiality

Access to the information is restricted to prevent leakage of information outside of the company

Example measures: Prevention of information leakage or setup of access privileges

Integrity

Integrity is guaranteed, ensuring information does not become corrupted or tampered with

Example measures: Prevention or detection of tampering

Availability

Failure is prevented and normal operation is maintained so that information can be used when needed

Example measures: Power supply measures, system mirroring

1.3 Security Threats

A security threat is defined as something that threatens the confidentiality, integrity, and availability indicated in "1.2 Security Requirements" in respect to information assets. This includes technical threats such as accessing a database, but does not include physical destruction.

Threats are considered to be a combination of type of user who is the source of the threat, information assets that need to be protected, techniques, and unauthorized actions. For example, a threat might be a general user exploiting a database vulnerability to obtain database management information, and then tampering with that information.

When considering security measures, it is firstly necessary to clarify what kind of threats there are. A list of possible threats is shown in the table below. Refer to "Types of user" and "Information assets" for details on the definition of each type of user and information assets that should be protected.

Possible threats

Type of user	Information asset	Technique	Unauthorized action
General user Internal user System manager System developer System administrator System operator	Database management information	Eavesdropping of packets	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
		Dictionary attack of passwords	
		Unauthorized acquisition of IDs/passwords through social engineering	
		Unauthorized acquisition of information through misuse of settings	
		Unauthorized acquisition of information through exploiting a database vulnerability	
		Acquisition by an unauthorized route	
General user Internal user	General database information	Acquisition by a normal route	Misuse of information that can be acquired normally (taking data outside of the company)
		SQL issued with the aim of obstructing a job	Obstructing a job (resource depletion)

Type of user	Information asset	Technique	Unauthorized action
General user Internal user	General database information	Eavesdropping of packets	Unauthorized tampering or destruction (updating) of information
		Dictionary attack of passwords	
		Unauthorized acquisition of IDs/passwords through social engineering	
		Unauthorized acquisition of information through exploiting configuration errors	
		Unauthorized acquisition of information through exploiting a database vulnerability	
		Acquisition by an unauthorized route	
System manager System developer System administrator System operator	General database information	Eavesdropping of packets	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
		Dictionary attack of passwords	
		Unauthorized acquisition of IDs/passwords through social engineering	
		Unauthorized acquisition of information through exploiting configuration errors	
		Unauthorized acquisition of information through exploiting a database vulnerability	
		Acquisition by an unauthorized route	
System developer	Database management information	Creation of a backdoor	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
	General database information		
System manager System administrator	Database management information	Unauthorized acquisition of information by creating an unauthorized database administrator account	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
	General database information		
System manager System operator	Database management information	Unauthorized acquisition of information by tampering with database-related files	Unauthorized acquisition (viewing) of information

Type of user	Information asset	Technique	Unauthorized action
	General database information	(definition file, physical file, and so on)	Unauthorized tampering or destruction (updating) of information
Database administrator	Database management information	Misuse of information (taking information outside of the company) after obtaining it through the normal route	Misuse of information that can be acquired normally (taking information outside of the company)
		Unauthorized use of IDs/ passwords from the management information	Tampering with or destroying information that can be acquired
		Unauthorized acquisition of information by tampering with management information	
		SQL issued with the aim of obstructing a job	Obstructing a job (resource depletion)
	General database information	Eavesdropping of packets	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
		Misuse of information (taking information outside of the company) after obtaining it through an unauthorized route	
Database operator	Database management information	Eavesdropping of packets	Unauthorized acquisition (viewing) of information Unauthorized tampering or destruction (updating) of information
		Dictionary attack of passwords	
		Unauthorized acquisition of IDs/passwords through social engineering	
		Unauthorized acquisition of information by exploiting configuration errors	
		Unauthorized acquisition of information through exploiting a database vulnerability	
		Acquisition by an unauthorized route	
	General database information	Acquisition by a normal route	Misuse of information that can be acquired normally (taking data outside of the company)
		SQL issued with the aim of obstructing a job	Obstructing a job (resource depletion)

Types of user

In database security, the persons involved with databases and their roles are defined below.

Type of user	Role
System manager	Manages developers, administrators, and operators
System developer	Builds the network around the database server Builds the database server
System administrator	Operates devices of the surrounding database network Operates the database server
System operator	Operates the surrounding database network
Database administrator	Builds the database system Operates the database system
Database operator	Performs business operations
Internal user	End user inside the company
General user	End user outside the company

Information assets

In database security, it is necessary to protect the information assets to be stored on the database server.

Such assets are defined below.

Database management information

- Database configuration information (system catalog, user ID/password, and so on)
- Database logs (such as access logs)

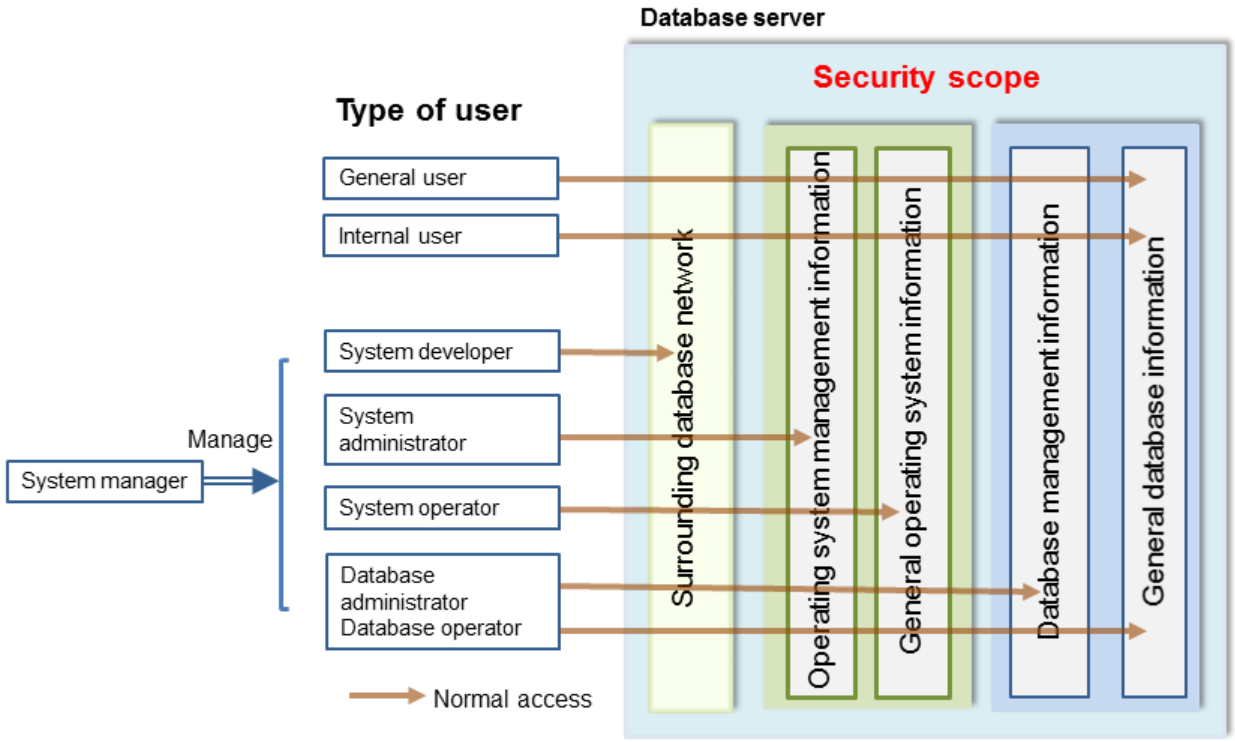
General database information

- Job data
- Applications

1.4 Security Scope

In database systems, both the database server and the surrounding database network are part of the security scope. It is necessary to clarify the extent of the security scope that each type of user is involved with, and consider security measures for the same.

The relationship of the security scope and the types of user is shown below.



1.5 Security Provided by FUJITSU Enterprise Postgres

FUJITSU Enterprise Postgres provides security features that satisfy the security requirements indicated in "1.2 Security Requirements".

This section describes security provided by FUJITSU Enterprise Postgres.

1.5.1 Roles Targeted For Security

In FUJITSU Enterprise Postgres database systems, the roles targeted in relation to security are "Manager", "Administrator", and "User". In order to build a robust security system, it is necessary to put security measures in place for each role.

The roles targeted for security and the mapping of Types of user indicated in "1.3 Security Threats" are shown in the table below.

Role targeted for security	Type of user
Manager	System manager
Administrator	System developer
	System administrator
	System operator
	Database administrator
	Database operator
User	General user
	Internal user

Manager

The manager establishes a security policy and decides on an operations policy for the organization as a whole.

Refer to "Chapter 3 Tasks of the Manager" for details.

Administrator

Administrators design, build and operate a system. While doing this, the administrators must implement the security measures in accordance with the security policy established by the manager.

Refer to "Chapter 4 Tasks of Administrators" for details.

User

A user is a person other than the manager or an administrator who accesses a database. There may be any number of users. It is necessary for users to be registered in the database system, and that access to the database is restricted according to the access privileges.

Refer to "Chapter 5 Tasks of Users" for details.

1.5.2 Security Features

FUJITSU Enterprise Postgres provides the following security features:

- Authentication
- Access control
- Encryption
- Audit log
- Data masking

This section describes each of these features.

Authentication

The databases that can be accessed can be restricted by authenticating the database users who access the database. Additionally, authentication of the server can be performed to prevent spoofing of the database server.

Refer to "Client Authentication" in "Server Administration" in the PostgreSQL Documentation for details on authentication.

Refer to "Secure TCP/IP Connections with SSL" in "Server Setup and Operation" in the PostgreSQL Documentation for details on server authentication.

Access control

Database objects can only be used by the object creator or database user who was specified as the owner when the object was created (both persons are hereinafter referred to as "owner"), or instance administrator, when objects are in their initial state. By having the object owner or instance administrator control access privileges for database users, it is possible to control what kind of tables the database users who connect to the database can access, and what kind of operations they can perform.

Refer to "Privileges" in "The SQL Language" in the PostgreSQL Documentation for details on object access control.

Encryption

FUJITSU Enterprise Postgres provides a transparent data encryption feature that satisfies the requirements below.

- Confidential information can be changed into an unidentifiable state.
- The encryption key and data are managed separately.
- The encryption key is replaced at regular intervals.

PostgreSQL provides an encryption feature called "pgcrypto" that can also be used in FUJITSU Enterprise Postgres, however, it is recommended to use the transparent data encryption features because it will otherwise be necessary to modify the applications that consider encryption. Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for details.

Additionally, if communication data transferred between a client and a server contains confidential information, it is necessary to encrypt the communication data to protect it against threats, such as eavesdropping on the network.

Refer to "Configuring Secure Communication Using Secure Sockets Layer" in the Operation Guide for details on encryption of communication data.

Audit log

A feature that addresses threats such as misuse of administrator privileges, unauthorized access to a database by a user, and other such threats. Information for tracing the processing of administrators and users is retrieved and stored as an audit log.

By periodically viewing and monitoring audit logs, the administrators can detect events that are impacting on the system in some way, or are depleting system resources as a result of incorrect operations by users, and can take appropriate measures to prevent information leakages or system failures in advance.

Refer to "Chapter 6 Audit Log Feature" for details.

Data masking

A feature that changes part of the data to make it available for reference in response to queries issued by an application.

For example, for a query of employee data, digits except the last four digits of an eight-digit employee number can be changed to "*" so that it can be used for reference without exposing the actual data.

Specifically, the data changed by the data masking feature can be transferred to a test database so that users who perform testing or development can reference the data. During testing, it is desirable to use the data that will be used on a production environment database. However, actual production data should not be used as is for testing because of the risk of leakage of confidential data. This feature enables data that is similar to actual production data to be safely used in test and development environments.

Refer to "Data Masking" in the Operation Guide for details on data masking.

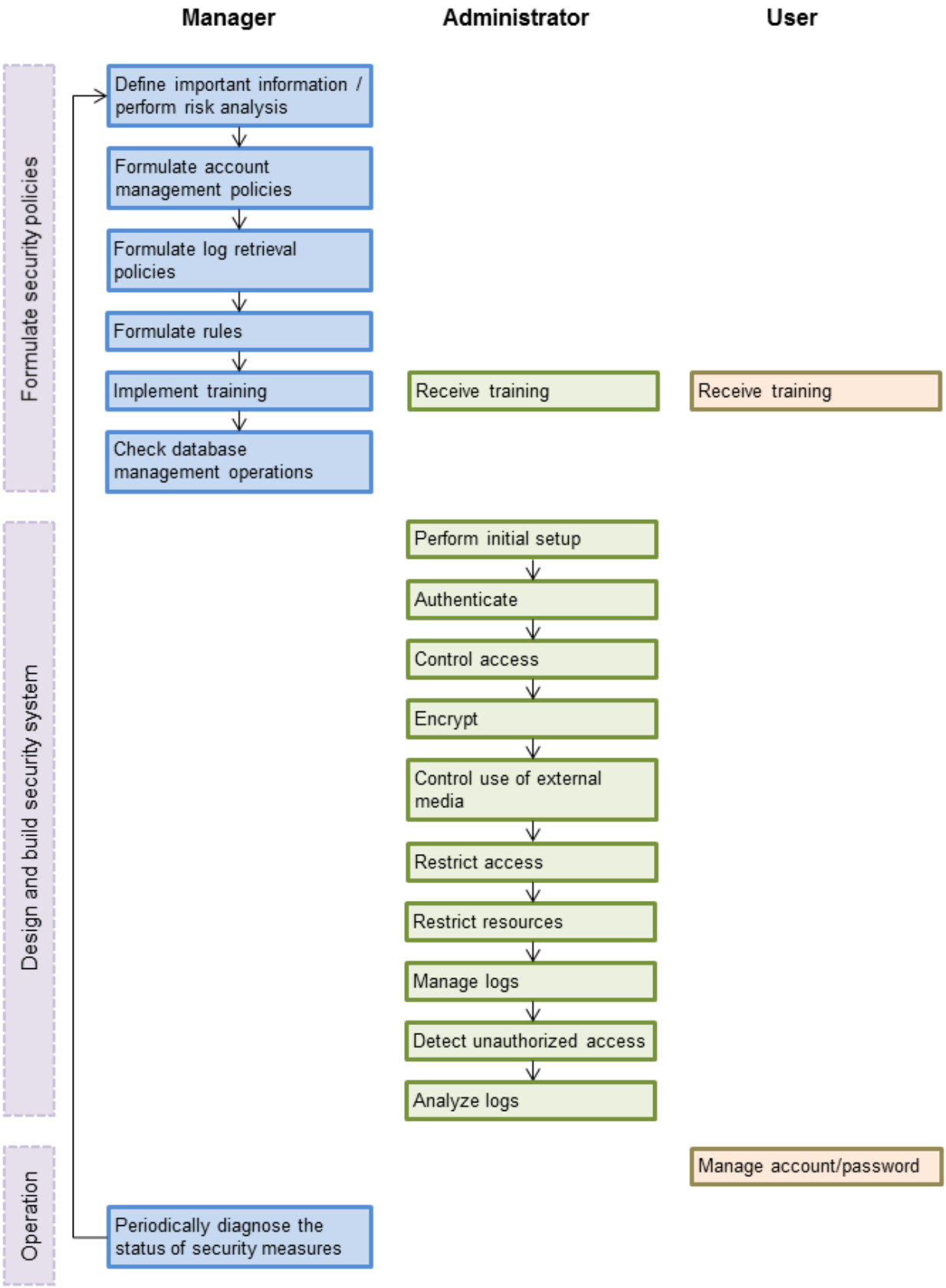
Chapter 2 Overview of Security Operation

2.1 Security Operation Flow

This section shows the flow of work when building a security environment and performing security operation in FUJITSU Enterprise Postgres.

When performing security operation, there are technical measures to be implemented to address security threats by equipping the system with security features, and manual work, such as the implementation of security guidelines, a training system, and the establishment of usage rules.

Figure 2.1 Security operation flow



Chapter 3 Tasks of the Manager

The manager formulates security policies, which become guidelines for security measures.

3.1 Defining Important Information and Risk Analysis

Before formulating security policies, define important information and perform risk analysis. Based on the importance of the information and the result of risk analysis, decide what kind of security measures to put in place.

In defining the important information, identify what should be protected and classify it by importance in order to effectively implement the security measures. Information that should be protected includes "database management information" and "general database information", as indicated in "Information assets". Examples of information classifications are "personal information" and "confidential information".

In the risk analysis, refer to "Possible threats" to identify threats that may arise, and analyze the risks in respect to such threats.

Additionally, by performing a risk analysis once annually as a guide, it is possible to identify threats that may adversely impact the business and related vulnerabilities.

3.2 Formulating Account Management Policies

In formulating an account management policy, implement the following and document the formulated policy.

Organize system users and roles

Identify the necessary roles of the relevant system based on "Types of user". Additionally, organize personnel for each role.

Organize accounts

Organize accounts with the appropriate privileges for each role, and decide on account policies.

- Database administrator account
  - Organize separate accounts for database administrators and database operators
  - Ensure that the database administrator account can only be used by specific persons
  - Perform tasks that do not require database administrator privileges using a separate account without database administrator privileges
- General account

  Create an account for general users by application usage.

Review account management policy

Review the accounts in order to effectively implement security measures.

- Regularly check the accounts mentioned above and their privileges, and determine if they are still appropriate
- If there have been system or operational changes, review the accounts and privileges
- If unsuitable accounts and privileges are discovered, modify them as required

3.3 Formulating Log Retrieval Policies

In formulating a log retrieval policy, implement the following and document the formulated policy.

Organize the purpose of log retrieval

To clarify what logs will be retrieved for, define their reason for retrieval.

Examples of the purpose might include, "To use for investigation in the event of unauthorized access", and "To submit to investigating authorities as evidence if any issues arise".

Decide on the types of logs to be retrieved

In order to retrieve appropriate logs, organize the types of logs that can be retrieved in the target system, and decide on the logs to be retrieved.

Examples of log types are "operating system logs", "application run logs", and "database audit logs".

Organize log retrieval target access

In order to decide on access for log retrieval targets, organize what kind of access will take place.

For example, the following access is possible:

- Access related to important information
  - Access to personal information, confidential information, and database management information
  - Access outside of business hours
  - Login
  - Specific SQL
- Access suspected to be unauthorized
  - Large amount of search access
  - Access from different locations
  - Access outside of business hours

Decide on the log retrieval content

In order to effectively use retrieved logs, organize the required content as a log, and decide on the retrieval content.

For example, the following output content is possible:

- When (time)
- Who (database account, application user)
- What (object ID, table name)
- Where from (machine name, IP address)
- How (SQL type, SQL statement)
- Execution result (success/fail)

Formulate log maintenance policy

In order to use the logs as purposed, formulate the log maintenance policy.

For each log, define its location, storage medium, retention period, access control, and so on.

3.4 Formulating Rules

Formulate the rules that will become the standard for security measures of the target system. Additionally, prescribe penalties for security violations. For example, formulate rules and penalties as below:

- Rules
  - Applying security patches and update programs
  - Prohibiting unauthorized acquisition of information from the database
  - Prohibiting the saving of acquired information to media that is not permitted for use
- Penalties
  - Prescribe penalties in the company's employment policies and procedures

- Set fines

3.5 Implementing Training

In order to have administrators and users recognize the importance and necessity of information security, and to prevent unauthorized access due to operational omissions and mistakes, implement and promote security-related training for administrators and users.

For example, implement promotion of security policies, formulation of training schedules, and formulation of training materials.

3.6 Checking the Database Management Operations

In order to prevent operational errors and unauthorized actions by administrators, implement the measures below:

- Always collect the latest information on security incidents and vulnerabilities related to databases
- Implement management operations only after providing advance notice
- Retain records of management operations

3.7 Periodic Diagnosis of the Status of Security Measures

In order to check if the security measures are effective, periodically diagnose if the security measures have been put in place appropriately based on the security threats.

Additionally, evaluate if the current security measures and policies are effective for the threats and vulnerabilities, and if there are any issues, review the security policies and security measures.

Chapter 4 Tasks of Administrators

Administrators perform the actions below as security measures when designing, building, and operating the system in accordance with the security policies formulated by the manager.

Preparation

- Implement training

Measures to protect against unauthorized behavior

- Perform initial setup
- Authenticate
- Control access
- Encrypt
- Control use of external media
- Restrict access
- Restrict resources

Measures to detect and trace unauthorized behavior

- Manage logs
- Detect unauthorized access
- Analyze logs

4.1 Receiving Training

Administrators receive security-related training in accordance with the training schedule formulated by the manager. Additionally, administrators instruct users to receive training.

4.2 Initial Setup

To minimize database vulnerabilities and the possibility of unauthorized access, implement the security measures below in the initial stage of system building. Additionally, configure the database server so that it primarily operates the database system only.

Making the server more robust

Configure the operating system and network to prevent intrusion into or destruction of a database server, so that the system operates on a secure server.

- Remove unnecessary features or services on the operating system
- Enable only the necessary protocols
- Implement the security features for services, protocols, and daemons considered to have a relatively low security level, such as file sharing and FTP

Installing the latest version

Always download and apply the latest patches in order to reflect the latest security measures.

Installing the minimum necessary features

Install only the necessary features in order to prevent unauthorized use of the system.

Additionally, delete or disable features and services that will not be used.

Changing the port

To prevent unauthorized use of the system, change the default port that is set during installation.

Point

Specify the port during setup of FUJITSU Enterprise Postgres. Refer to the Installation and Setup Guide for Server for details.

Access restrictions for communication features

To prevent unauthorized use of the system using the communication features, implement access restrictions for communication features.

Settings for prohibiting the access path to database configuration files

To prevent database destruction, implement the measures below:

- Restrict users who are permitted to access database configuration files, and periodically review the permissions
- Allow only administrators to access table or definition scripts

Restrictions on the access path to the database

To prevent unauthorized use or operating errors for the database, restrict the distribution range of applications used to access the database only to devices used by users who are permitted access.

Dealing with unauthorized programs

To prevent unauthorized intrusions into a system through a backdoor, such as by tampering with the program source code of an application, document the author of the program to be run and perform checking and testing so that the program will not be tampered with. Additionally, employ safe coding techniques so that issues with general coding vulnerabilities can be addressed.

System security settings

In cases where it is clear that the system security settings will impact security, set reliable security settings in the initial setup stage, such as setting appropriate security parameters.

4.3 Authentication

When accessing a database, authentication must always be performed in order to prevent tampering or information leakage from spoofing by a malicious user.

Password authentication is used when logging on to a database, and the account and password used for authentication are to be strictly managed by administrators.

Additionally, authentication must also be implemented reliably for connections to a database from clients, so that only permitted users can access the database.

4.3.1 Managing Accounts

For account management, perform the actions below.

Create the required accounts

To prevent unauthorized use of accounts, such as spoofing, implement the measures below when creating an account:

- Select the required account
- Specify the user privileges
- Create database administrator accounts and general user accounts separately according to the privileges

Point

Accounts are created using the CREATE ROLE statement. Refer to "CREATE ROLE" in the PostgreSQL Documentation for details.

Delete unnecessary accounts

Remove accounts not used on a daily basis, such as unused accounts and accounts not needed for operations that are created by default during product installation.

Point

Accounts are deleted using the DROP ROLE statement. Refer to "DROP ROLE" in the PostgreSQL Documentation for details.

Set up account lockout

The usage frequency of accounts is to be checked periodically, and if there are any accounts that have not been used for a long period, lock those accounts. Set a limit for failed login attempts, and if this limit is exceeded, lock the account. Additionally, set the period until a locked account is reenabled.

Point

Account locking can be performed by using LDAP authentication. Refer to "LDAP Authentication" in the PostgreSQL Documentation for details.

Manage database administrator accounts

Manage database administrator accounts in accordance with the account management policy formulated by the manager.

Manage development environment and production environment accounts

To prevent unauthorized use of accounts used in a development environment, delete accounts used in the development environment before operation starts in the production environment. In cases where it is unavoidable to use an account used in the development environment in the production environment, use different passwords in each environment.

Set up a temporary use account

If a temporary user will use the system, either provide a shared account with a temporary password for each use, or create a temporary account.

4.3.2 Managing Passwords

Manage passwords as below.

Make strong passwords

The use of account passwords that can easily be guessed by others, such as a password that matches the ID, or the default password provided during installation, is prohibited. Set a complex and strong password.

Change passwords regularly

Change passwords regularly to prevent others from accessing the account in case the password is obtained by unauthorized means. Additionally, configure the settings to force a password change when prompted after the first use.

Set the password expiry period

To encourage regular changing of passwords, set a password expiry period.

Point

Password setting and changing is specified using the CERATE ROLE statement or ALTER ROLE statement. Refer to "CREATE ROLE" and "ALTER ROLE" in the PostgreSQL Documentation for details.

Additionally, by using passwordcheck and LDAP authentication, the actions below can be performed:

- The default password set during installation can be changed
- The password expiry period can be set

- The number and types of characters used for the password can be checked

Refer to "passwordcheck" and "LDAP Authentication" in the PostgreSQL Documentation for details.

4.3.3 Configuring Connections and Authentication

Configure connections and authentication so that the database can only be accessed by permitted users.

Point

Client authentication is configured in pg_hba.conf. Refer to "Client Authentication" in the PostgreSQL Documentation for details.

4.4 Access Control

If appropriate access privileges are not set for administrators and users, security incidents may occur, such as information leakage resulting from access to information by an unauthorized person. To minimize such incidents, it is necessary to implement the security measures below for the access privileges and perform rule-based access control.

Point

Notes when setting access privileges

- The creation of a special account that allows granting of privileges to all users is prohibited
- The creation of a general account that allows access to general information such as operations data is prohibited

Identifying the database access requirements

To set the appropriate access privileges for each usage purpose for the database, follow the procedure below to identify the access requirements:

1. Classify the usage purpose of the account, such as "For database management", "For object management", and "For data access".
2. Classify the required privileges for each usage purpose, such as "By feature" and "By object".
3. Categorize the accounts based on each privilege.
4. Identify the minimum necessary range of data and minimum necessary access content (view, update, create, delete) to be accessed for each categorized account, and decide on the database access requirements.

Setting the access privileges

Assign the minimum necessary privileges based on the database access requirements for each categorized account. Additionally, restrict accounts when assigning administrator privileges.

Reviewing access privileges

To reflect changes in access requirements in the system, periodically review the access privileges and check if there are any access privileges that are no longer needed. If any unnecessary access privileges have been set, promptly modify the access privileges.

Point

Access privileges are set using the GRANT statement or REVOKE statement. Refer to "GRANT" and "REVOKE" in the PostgreSQL Documentation for details.

4.5 Encryption

To prevent unauthorized usage of data in the event information leakage occurs due to data theft, eavesdropping of communication, and other such activities, implement the encryption measures below.

Encrypt communication

To protect data from eavesdropping over the network between a database server and clients, use the encryption feature to encrypt communications.

Refer to "Configuring Secure Communication Using Secure Sockets Layer" in the Operation Guide for details.

Encrypt data

To protect data from theft, use the encryption feature to encrypt the data. The data below is targeted for encryption:

- Data to be stored on the database
- Backup data
- Data files

Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for details.

Manage encryption keys

Restrict the persons who can access the encryption key to a minimum number of database administrators.

Additionally, to ensure the encrypted information will not be easily decrypted, create a mechanism for appropriately managing the encryption key for the entire life cycle (generation, distribution, saving, and disposal), and strictly manage the encryption key.

Refer to "Configuring Secure Communication Using Secure Sockets Layer" and "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for details.

4.6 Controlling Use of External Media

Information leakage can be prevented by controlling use of external media (such as CD/DVD, USB drive, and external hard disk) and PCs that are connected to the database, and restricting the removal of data from the database.

Restricting connection of external media

Remove external media and printers that will not be used in operations, and restrict connection of external media to which information may be written.

Restricting use of external media

Restrict connections for external media and printers to control the writing of information to these devices.

Controlling use of connected PCs

Prevent leakage of information from PCs connected to the database:

- Limit connections of external media to PCs
- Implement security measures to make the PC robust
- Implement individual authentication for access from the PC
- Manage the installed software and monitor the software usage status
- Limit connections to printers

4.7 Security Measures for Servers/Applications

An even more robust security system can be achieved by strengthening security for servers and applications in addition to the security measures for databases. Implement the security measures below for servers and applications:

Restrict access

Implement the measures below and restrict access to the database server:

- Install the database server inside the firewall to prevent direct access to the database server from many unspecified PCs.
- In the local network, implement measures such as using the router to restrict IP addresses, and restrict PCs and segments that can directly access the database server.

Restrict resources

Restrict excessive use of CPU resources by general users to prevent the disruption of service and extraction of large amounts of data.

4.8 Log Management

Logs are a feature that addresses threats such as misuse of administrator privileges, and unauthorized access to a database by a user. Information for investigating/tracing processes and operations performed for the database is retrieved and managed as logs for identifying the cause in the event information leakage or unauthorized access occurs.

FUJITSU Enterprise Postgres provides the audit log feature for retrieving and managing logs. Refer to "Chapter 6 Audit Log Feature" for details.

This section describes the information that should be obtained as logs and how to maintain logs, as a measure for managing information leakage and unauthorized access.

4.8.1 Retrieving Logs

The audit logs below are retrieved in accordance with the log retrieval policy formulated by the manager.

Login information

Retrieves logs during login and logout.

Database access information (view/update)

Retrieves all access relating to the information below:

- General database information (such as personal information and confidential information used in the business)
- Database management information (system catalog, user ID/password, and so on)

Changed information of database objects

Retrieves logs related to creating, changing, and deleting database objects such as database accounts and tables.

Operation logs for audit logs

To prevent suppression of retrieved audit logs, operations such as initialization of audit logs, and stoppage of the audit log feature are retrieved as logs.

4.8.2 Maintaining Logs

Logs are maintained in accordance with the log retrieval policy formulated by the manager.

Storing logs

Perform the actions below and store logs securely so that the retrieved logs will not be updated by others:

- Save logs to external media, and store the external media in a secure location, such as lockable storage
- Restrict the viewing of logs to administrators only, and set access restrictions for logs, such as not assigning update rights
- Decide on the log retention period, with consideration to cases where investigation tracing back to the time of discovery of an issue is required

Preventing tampering of logs

Implement measures to prevent tampering of logs, such as retaining multiple copies of logs and using storage that cannot be rewritten.

Encrypting logs

Encrypt logs so that logs are not easily viewed.

4.9 Detecting Unauthorized Access

To address unauthorized access, it is necessary to establish a mechanism for detecting unauthorized access to databases and monitor access.

Communicating unauthorized access

Create a mechanism that notifies of detected unauthorized access, such as notifying the manager and the administrator, if an account lock occurs due to the limit for failed login attempts being exceeded.

Checking access times

Create a mechanism that can check for suspicious access to the information below outside of normal access hours, together with implementing measures to address such access.

Detecting access to database management information

- Monitor logs and detect access during timeframes that have not been applied for
- In the event a request for access permission outside of normal access hours is made, the log is checked for any discrepancies in the requested content and work result

Detecting access to general database information

- Decide on the timeframes during which access to the database is permitted for each general account
- Detect access outside of normal access hours from session information logs

Checking the connection source where access is not permitted

To detect access from connection sources that are not permitted, define the sources from where access is permitted, and detect access from connection sources that are not permitted.

Define the access patterns (connection source, operating system user and account) of database administrator accounts and general accounts, and check for access outside of these patterns.

4.10 Analyzing Logs

Create a mechanism that analyzes logs to detect unauthorized behavior in cases where information leakage, unauthorized access, or other such activity, is suspected. Analyses should include those shown below.

Periodic analysis of session information

Analyze session information of logs from the perspectives below to detect unauthorized logins:

- Trend of sessions with a large number of failed login attempts
- Trend of sessions with accounts that are logged in for long periods of time
- Trend of sessions in which a large amount of resources are used

Periodic analysis of database access information

Analyze SQL statements from the perspectives below to detect unauthorized access to the database:

- Trend of SQL being executed over a long period of time
- Trend of SQL using a large amount of resources

Chapter 5 Tasks of Users

The user performs the actions below as security measures when using the system.

5.1 Receiving Training

The user must receive security-related training as instructed by the manager or the administrator to learn about security. By having users with a common awareness relating to security, an even more stable security system can be established.

5.2 Managing Accounts/Passwords

Users can use the database system by using the account and password provided by the administrator. At such times, the user is to implement the measures below so that the account and password are not misused by others:

- Be responsible for managing the ID and password in a manner that ensures the account does not become locked during login
- Change the password regularly
- Comply with the expiry period set for the password by promptly changing the password when it is about to expire

Chapter 6 Audit Log Feature

In PostgreSQL, logs output as server logs can be used as audit logs by using the log output feature. There are, however, logs that cannot be analyzed properly, such as SQL runtime logs, which do not output the schema name. Additionally, because the output conditions cannot be specified in detail, log volumes can be large, which may lead to deterioration in performance.

The audit log feature of FUJITSU Enterprise Postgres enables retrieval of details relating to database access as an audit log by extending the feature to pgaudit. Additionally, audit logs can be output to a dedicated log file or server log. This enables efficient and accurate log monitoring.

The scalable audit log feature enables multiple output mechanisms to capture audit logs without performance degradation, even for systems with high application multiplicity and high output volumes.

The scalable audit log feature is available by applying the bug fix that includes the PH23619.

If you want to take advantage of the scalable audit log feature, refer to "6.2 Setup" and "6.3 Setting Up the Scalable Audit Log Feature.

Note

The audit log feature cannot be used if PostgreSQL is running in single-user mode.

6.1 Audit Log Output Modes

In pgaudit, the two types of audit log below can be output.

Session Audit Logging

Session Audit Logging outputs information related to SQL executed in backend processes (processes generated when connection requests are received from clients), information related to starting and connecting databases, and information related to errors, as a log. In Session Audit Logging, by specifying the log output conditions and filtering the logs to be output, performance degradation due to outputting large volumes of logs can be prevented.

Refer to "6.5 Session Audit Logging" for details.

Object Audit Logging

When SELECT, INSERT, UPDATE, and DELETE are executed for specific objects (tables, columns), Object Audit Logging outputs these as a log. TRUNCATE is not supported. Object Audit Logging outputs object operations for which privileges have been assigned to specified roles, as a log. Object Audit Logging can control log output at an even finer level of granularity than Session Audit Logging.

Refer to "6.6 Object Audit Logging" for details.

Information

Depending on the application or command, FUJITSU Enterprise Postgres may execute SQL internally and the audit logs may be retrieved.

Also, the audit logs of multiple SQLs with the same statement ID may be retrieved. This is because before the user executes the SQL, another SQL is executed internally by FUJITSU Enterprise Postgres.

6.2 Setup

This section describes the setup method of pgaudit.

1. Copy the pgaudit files

   As superuser, run the following command. Note that "<*x*>" in paths indicates the product version.

```
$ su -
Password:******
# cp -r /opt/fsepv<x>server64/OSS/pgaudit/* /opt/fsepv<x>server64
```

W

Open a command prompt as administrator privileges, run the following command. Note that "<*x*>" in paths indicates the product version.

```
> xcopy /E "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pgaudit\*"  "c:\Program
Files\Fujitsu\fsepv<x>server64"
```

2. Create the pgaudit configuration file

   Create the pgaudit configuration file, which describes the information required for pgaudit actions. Create the file using the same encoding as used for the database.

   In addition, set write permissions for the database administrator only in the pgaudit configuration file so that policies related to the audit log are not viewed by unintended users.

   Refer to "6.4 pgaudit Configuration File" for details.

   Note

   Do not define the rule section in the pgaudit configuration file at this point.

   Example of a pgaudit configuration file

   ```
   [output]
   logger = 'auditlog'
   ```

3. Configure postgresql.conf

   Configure the parameters below in postgresql.conf to use audit logs:

   shared_preload_libraries

   Specify "pgaudit".

   pgaudit.config_file

   Specify the deployment destination path of the pgaudit configuration file.

   If a relative path is specified, the path will be relative to the data storage directory.

   log_replication_commands

   Specify "on".

   log_min_messages

   Check if "ERROR" or higher has been specified.

   If outputting an audit log to a server log ("serverlog" is specified in the logger parameter of the pgaudit configuration file), check the parameters below relating to server logs.

   logging_collector

   Check if "on" has been specified.

   log_destination

   Check if "stderr" has been specified.

L

   log_file_mode

   Check if the server log permissions are appropriate, so that only the permitted persons can access it.

Information

The default for the log_file_mode parameter is 0600, which only allows the database administrator to have access.

For example, to permit other members of the group to which the database administrator belongs to view the audit logs, specify 0640 for log_file_mode.

Example

```
log_file_mode = 0640
```

The database administrator can also be prevented from viewing audit logs by specifying 0000. However, write privileges are assigned for outputting logs.

If outputting an audit log to a dedicated log file ("auditlog" is specified in the logger parameter of the pgaudit configuration file), check the parameter below.

max_worker_processes

If the max_worker_processes parameter has been set, add 1 to the specified value.

If you want to take advantage of the scalable audit log feature, refer to "6.3 Setting Up the Scalable Audit Log Feature".

See

Refer to "Error Reporting and Logging" in the PostgreSQL Documentation for details on server logs.

If using database multiplexing, refer to "6.7 Database Multiplexing" for details.

Example of postgresql.conf

In the example below, only the parameters that need to be configured when using the audit log feature are described.

```
shared_preload_libraries = 'pgaudit'
pgaudit.config_file = 'pgaudit.conf'
log_replication_commands = on
log_min_messages = WARNING
```

4. Start the instance

   Start the instance and check if the message below is output.

```
LOG: pgaudit extension initialized
```

5. Create the pgaudit extension

   Execute CREATE EXTENSION to create the pgaudit extension.

```
$ psql
=# CREATE EXTENSION pgaudit;
=# \dx
                  List of installed extensions
Name    | Version |   Schema   |     Description
--------+---------+------------+---------------------------------
pgaudit | 1.0     | public     | provides auditing functionality
plpgsql | 1.0     | pg_catalog | PL/pgSQL procedural language
(2 rows)
```

6. Configure the parameters in the pgaudit configuration file

   Add or change the parameters in the pgaudit configuration file as required.

   Refer to "6.4 pgaudit Configuration File" for details.

7. Restart the instance

   Restart the instance to apply the changes to the pgaudit configuration file. After restarting, check if the changes have been reflected correctly.

Linux

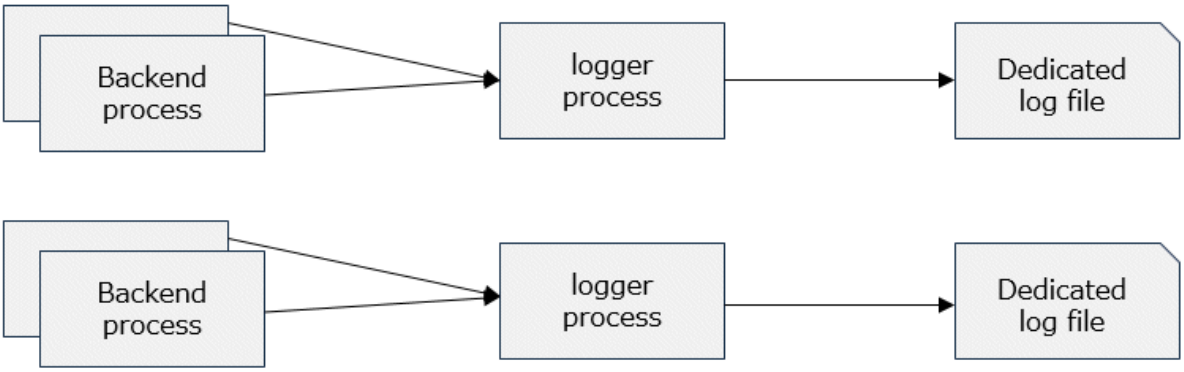
```
LOG:  log_catalog = 1
LOG:  log_level_string =
LOG:  log_level = 15
LOG:  log_parameter = 0
LOG:  log_statement_once = 0
LOG:  role =
LOG:  logger = auditlog
LOG:  log_directory = pgaudit_log
LOG:  log_filename = pgaudit-%Y-%m-%d_%H%M%S.log
LOG:  log_file_mode = 0600
LOG:  log_rotation_age = 1440
LOG:  log_rotation_size = 10240
LOG:  log_truncate_on_rotation = 0
LOG:  fifo_directory = /tmp
LOG:  Rule 0
LOG:  pgaudit extension initialized
```

Windows

```
LOG:  log_catalog = 1
LOG:  log_level_string =
LOG:  log_level = 15
LOG:  log_parameter = 0
LOG:  log_statement_once = 0
LOG:  role =
LOG:  logger = auditlog
LOG:  log_directory = pgaudit_log
LOG:  log_filename = pgaudit-%Y-%m-%d_%H%M%S.log
LOG:  log_file_mode = 0600
LOG:  log_rotation_age = 1440
LOG:  log_rotation_size = 10240
LOG:  log_truncate_on_rotation = 0
LOG:  Rule 0
LOG:  pgaudit extension initialized
```

6.3 Setting Up the Scalable Audit Log Feature

With normal audit log feature, there is only one logger process and only one dedicated log file.
Therefore, the load of audit logs, including logs output by all backend processes, in the instance concentrates to the logger process and dedicated log file.
The scalable audit log feature distributes multiple dedicated log files, as shown below, and executes multiple output processes (logger processes) in a one-to-one relationship with those files. The number of distributions can be changed by parameter settings.



Information

Because there is a one-to-one relationship between the dedicated log file and the logger process, the logger process also operates as many dedicated log files as there are. A number is appended to the end of the its command title as reported by ps or Process Explorer, as follows. Use this information as a reference when monitoring the process status.

Example

```
pgaudit logger 0
pgaudit logger 1
pgaudit logger 2
```

Parameters in the pgaudit configuration file

Set the following parameters to the "output section":
Refer to the "6.4 pgaudit Configuration File" for details on the parameters.

enable_parallel_logger

Set "on". The default is "off".
If the logger parameter in the pgaudit configuration file is not "auditlog" (the default), it is ignored even if set to "on"

parallel_loggers

Sets the number of logger processes. Specify a value greater than or equal to "2."
Refer to "6.4 pgaudit Configuration File" for an estimate of the values to set.

log_rotation_age

We strongly recommend that you set this parameter. Although the scalable audit log feature works without configuration, it is easier to avoid incorrect analysis when analyzing the output audit logs. Refer to "Considerations when Using the Scalable Audit Log Feature".

Example

```
[output]
enable_parallel_logger = on
parallel_loggers = 5
log_rotation_age = 1h
```

postgresql.conf Parameters

max_worker_processes

Adds the value set for parallel_loggers to the value set for the max_worker_processes parameter. This is because the logger process acts as a background worker.

Example

If max_worker_processes is set to 8 and you want to set parallel_loggers to 3, do the following:

```
max_worker_processes = 11
```

Storage location of the dedicated log file

A dedicated log file is output with the following path and name:
For more information about the log_directory and log_filename parameters, refer to "6.4 pgaudit Configuration File".

```
log_directory parameter setting/number/number-log_filename parameter setting
```

The number is a number between 0 and the number specified by parallel_loggers. If parallel_loggers is 3, it can be 0 or greater and 2 or less. For more information about how to analyze these multiple files, refer to "6.9 Analyzing Audit Logs in SQL".

Example

If you set parallel_loggers=3, a dedicated log file is generated as follows:

```
pgaudit_log/0/0-pgaudit-2024-02-02_153000.log
pgaudit_log/1/1-pgaudit-2024-02-02_153000.log
pgaudit_log/2/2-pgaudit-2024-02-02_153000.log
```

If you can use multiple disks, you can also distribute the disk I/O load by setting the dedicated log file storage directory as a symbolic link to another disk, as shown below.
For Windows, use junction instead of symbolic links.

Example

Place pgaudit_log/2 on a different disk:

L

```
ln -s /other_disk/2  pgaudit_log/2
```

W

```
mklink /J pgaudit_log\2 E:\other_disk\2
```

Depending on the situation, create a symbolic link as follows. If the directory (or symbolic link) specified as the log output destination for the scalable audit log feature does not exist, the directory is automatically created. If the directory already exists, it is used as the log output destination.

- If you are using the scalable audit log feature for the first time, there is no dedicated log file directory. In this case, create a symbolic link after stopping the instance.
- If you are already using the scalable audit log feature, you already have a dedicated log file directory. After stopping the instance, move the stored dedicated log file to another location, and then delete the storage directory. Then, create a symbolic link with the same name as the deleted directory.

For Windows, use junction instead of symbolic links.

6.4 pgaudit Configuration File

In the pgaudit configuration file, specify the information required for pgaudit actions. The pgaudit configuration file comprises three sections: "output section", "option section", and "rule section".

output section

The output section is specified using the format below:

- *paramName* = '*value*'

The valid parameters in the output section are shown in the table below.

L

Linux

Parameter name	Description	Remarks
logger	Dedicated log file (auditlog)/*serverLog* (serverlog) that will be the output destination of the audit log The default is "auditlog" (dedicated log file).	The dedicated log file is output using the same encoding as used for the database.
log_directory	Directory where the audit log is to be created Specify the full path or the relative path from the data storage directory. The default is "pgaudit_log". However, make sure that audit log files are not output under the data storage directory. This is because if you are a backup target, such as pg_basebackup, and recover using that backup data, the audit log from the current time to the backup time will disappear. This is fine if the audit log file is located at the end of the symbolic link. This is because backups such as pg_basebackup do not track such symbolic links. If you specify "on" for the enable_parallel_logger parameter, an audit log is created for "log_directory parameter setting/number". Refer to "6.3 Setting Up the Scalable Audit Log Feature" for more information.	Enabled only if "auditlog" is specified for the logger parameter
log_filename	File name of the audit log Specify a file name that varies according to the time, in the same manner as for log_filename in the postgresql.conf file. The default is "pgaudit-%Y-%m-%d_%H%M%S.log". If you specify "on" for the enable_parallel_logger parameter, the audit log filename is "number-log _filename parameter setting". Refer to "6.3 Setting Up the Scalable Audit Log Feature" for more information.	Enabled only if "auditlog" is specified for the logger parameter
log_file_mode	Specify the permissions of the audit log so that only permitted persons can access it. The parameter value is the numeric mode specified in the format permitted in chmod and umask system calls. The default is "0600". Refer to "log_file_mode" in "6.2 Setup" for information on audit log file permissions.	Enabled only if "auditlog" is specified for the logger parameter
log_rotation_age	Maximum age of the audit log file A new audit log file is generated when the time (minute units) specified here elapses. To disable generation of new log files based on time, specify "0". The valid units are "min" (minutes), "h" (hours), and "d" (days). If the unit is omitted, "min" will be used. The default is "1d" (1 day). We strongly recommend that you set this parameter if you want to take advantage of the scalable audit log feature. This is because all logger processes rotate their dedicated log files at the same time, making it easier to	Enabled only if "auditlog" is specified for the logger parameter

Parameter name	Description	Remarks
	avoid incorrect analysis. For more information, refer to "Considerations when Using the Scalable Audit Log Feature".	
log_rotation_size	Maximum size of the audit log file A new log file will be generated after logs of the size specified here are output to a log file. To disable generation of new log files based on size, specify "0". The valid units are "kB" (kilobytes), "MB" (megabytes), and "GB" (gigabytes). If the unit is omitted, "kB" will be used. The default is "10MB".	Enabled only if "auditlog" is specified for the logger parameter
log_truncate_on_rotation	If rotating audit log files based on time, this parameter is used to specify whether to overwrite (on)/not overwrite (off) existing audit log files of the same name. For example, if "on" is specified, and "pgaudit-%H.log" is specified for log_filename, 24 separate log files will be generated based on time, and those files will be cyclically overwritten. The default is "off". If "off" is specified, the logs will be written to the existing audit log files.	Enabled only if "auditlog" is specified for the logger parameter
fifo_directory	FIFO (named pipe) directory to be used between the daemon process that outputs audit log files and the backend process FIFO named p.PGAUDIT.*nnnn* (*nnnn* is the postmaster PID) are created in the fifo_directories directory. The files cannot be deleted manually. The default is "/tmp". If you specify "on" for the enable_parallel_logger parameter, the name of the FIFO is "p. PGAUDIT. nnnn. number". Refer to "6.3 Setting Up the Scalable Audit Log Feature" for more information about the numbers.	Enabled only if "auditlog" is specified for the logger parameter
enable_parallel_logger (*1)	Specify whether to distribute the audit log output load (on)/not (off). The default is "off". The setting of this parameter is ignored when you specify "serverlog" for the logger parameter, because the serverlog of the database server cannot be distributed.	Enabled only if "auditlog" is specified for the logger parameter
parallel_loggers (*1)	Specifies the multiplicity at which the output load of the audit log is to be distributed. You can specify a number greater than or equal to 1, but to distribute the audit log output load, specify a number greater than or equal to 2. The default is "2". Estimate parallel_loggers as follows: parallel_loggers = number of cores / 2 This estimate assumes the highest load to output audit logs, so setting a value less than the estimated value will not significantly degrade performance in most cases. The disadvantage of increasing this value is that it consumes a little more memory. For more information about estimating memory, refer to "FUJITSU Enterprise	Enabled only if "auditlog" is specified for the logger parameter

Parameter name	Description	Remarks
	Postgres Memory Requirements" in the Installation and Setup Guide for Server. Because the logger process acts as a background worker, add the value set for this parameter to the parameter max_worker_processes in postgresql.conf that sets the maximum number of background workers. [Note] If the max_worker_processes setting is insufficient, the instance cannot be started.	

*1) Enabled by applying the bug fix that includes the PH23619.

Windows

Parameter name	Description	Remarks
logger	Dedicated log file (auditlog)/*serverLog* (serverlog) that will be the output destination of the audit log The default is "auditlog" (dedicated log file).	The dedicated log file is output using the same encoding as used for the database.
log_directory	Directory where the audit log is to be created Specify the full path or the relative path from the data storage directory. The default is "pgaudit_log". However, make sure that audit log files are not output under the data storage directory. This is because if you are a backup target, such as pg_basebackup, and recover using that backup data, the audit log from the current time to the backup time will disappear. This is fine if the audit log file is located at the end of the junction. This is because backups such as pg_basebackup do not track such junction. If you specify "on" for the enable_parallel_logger parameter, an audit log is created for "log_directory parameter setting/number". Refer to "6.3 Setting Up the Scalable Audit Log Feature" for more information.	Enabled only if "auditlog" is specified for the logger parameter
log_filename	File name of the audit log Specify a file name that varies according to the time, in the same manner as for log_filename in the postgresql.conf file. The default is "pgaudit-%Y-%m-%d_%H%M%S.log". If you specify "on" for the enable_parallel_logger parameter, the audit log filename is "number-log _filename parameter setting". Refer to "6.3 Setting Up the Scalable Audit Log Feature" for more information.	Enabled only if "auditlog" is specified for the logger parameter
log_file_mode	This parameter is ignored in Windows.	
log_rotation_age	Maximum age of the audit log file A new audit log file is generated when the time (minute units) specified here elapses. To disable generation of new log files based on time, specify "0".	Enabled only if "auditlog" is specified for the logger parameter

Parameter name	Description	Remarks
	The valid units are "min" (minutes), "h" (hours), and "d" (days). If the unit is omitted, "min" will be used. The default is "1d" (1 day). We strongly recommend that you set this parameter if you want to take advantage of the scalable audit log feature. This is because all logger processes rotate their dedicated log files at the same time, making it easier to avoid incorrect analysis. For more information, refer to "Considerations when Using the Scalable Audit Log Feature".	
log_rotation_size	Maximum size of the audit log file A new log file will be generated after logs of the size specified here are output to a log file. To disable generation of new log files based on size, specify "0". The valid units are "kB" (kilobytes), "MB" (megabytes), and "GB" (gigabytes). If the unit is omitted, "kB" will be used. The default is "10MB".	Enabled only if "auditlog" is specified for the logger parameter
log_truncate_on_rotation	If rotating audit log files based on time, this parameter is used to specify whether to overwrite (on)/not overwrite (off) existing audit log files of the same name. For example, if "on" is specified, and "pgaudit-%H.log" is specified for log_filename, 24 separate log files will be generated based on time, and those files will be cyclically overwritten. The default is "off". If "off" is specified, the logs will be written to the existing audit log files.	Enabled only if "auditlog" is specified for the logger parameter
enable_parallel_logger (*1)	Specify whether to distribute the audit log output load (on)/not (off). The default is "off". The setting of this parameter is ignored when you specify "serverlog" for the logger parameter, because the serverlog of the database server cannot be distributed.	Enabled only if "auditlog" is specified for the logger parameter
parallel_loggers (*1)	Specifies the multiplicity at which the output load of the audit log is to be distributed. You can specify a number greater than or equal to 1, but to distribute the audit log output load, specify a number greater than or equal to 2. The default is "2". Estimate parallel_loggers as follows: parallel_loggers = number of cores / 2 This estimate assumes the highest load to output audit logs, so setting a value less than the estimated value will not significantly degrade performance in most cases. The disadvantage of increasing this value is that it consumes a little more memory. For more information about estimating memory, refer to "FUJITSU Enterprise Postgres Memory Requirements" in the Installation and Setup Guide for Server.	Enabled only if "auditlog" is specified for the logger parameter

Parameter name	Description	Remarks
	Because the logger process acts as a background worker, add the value set for this parameter to the parameter max_worker_processes in postgresql.conf that sets the maximum number of background workers. [Note] If the max_worker_processes setting is insufficient, the instance cannot be started.	

*1) Enabled by applying the bug fix that includes the PH23619.

Information

If the logger parameter is set to "serverlog", audit logs will be output to the server log as log messages, therefore the status information and message severity level according to the log_line_prefix parameter in postgresql.conf will be output to the beginning of the audit log.

If the logger parameter is omitted or set to "auditlog", audit logs will be output to a dedicated log file as dedicated logs, therefore the status information and message severity level according to the log_line_prefix parameter in the postgresql.conf file will not be output.

Refer to "Output format" in "6.5 Session Audit Logging"or "Output format" in "6.6 Object Audit Logging" for information on the output format of audit logs.

L

Point

The pgaudit log_file_mode configuration parameter setting is separate from, and unaffected by, the log_file_mode GUC parameter setting and the -g/-allow-group-access initdb option.

When using a dedicated pgaudit log file, since the pgaudit log_directory location defaults to inside the data storage directory, it is possible for the pgaudit log_file_mode permissions to conflict with the intended file permissions specified by the -g/-allow-group-access initdb option. In this case, the pgaudit log_directory should be specified to be a directory located outside of the data storage directory.

W

Point

If the file permissions for the server log do not satisfy the security requirements of the system, specify a dedicated log file for the output destination of the audit log, and set the access permissions for the output destination directory so that the security requirements are satisfied. At that time, assign read and write permissions to the database administrator.

option section

The option section is specified using the format below:

- *paramName* = '*value*'

The valid parameters in the option section are shown in the table below.

Parameter name	Description	Remarks
role	Name of roles used in Object Audit Logging If specifying a name containing uppercase characters, key words, multibyte characters and commas, enclose the name in double quotation marks.	Parameter used in Object Audit Logging only
log_catalog	Whether to enable (on)/disable (off) log output for pg_catalog If pgAdmin, and so on, will not be retrieving audit logs that access pg_catalog, specify "off". The default is "on" (enabled).	
log_parameter	Whether to enable (on)/disable (off) output of values passed by parameters in SQL execution The default is "off" (disabled).	
log_statement_once	Whether to control (on)/not control (off) output for the second and subsequent SQL statements if the same SQL statement is the log output target The default is "off" (do not control).	
log_level	Log level of audit logs The valid values are "DEBUG5", "DEBUG4", "DEBUG3", "DEBUG2", "DEBUG1", "INFO", "NOTICE", "WARNING", and "LOG". The default is "LOG".	Enabled only if "serverlog" is specified for the logger parameter

rule section

The rule section is used in Session Audit Logging. Refer to "6.5 Session Audit Logging" for details.

Note

Do not specify the rule section if the role parameter has been specified in the option section. If you specify the rule section, the audit logs of Object Audit Logging and Session Audit Logging will be output intermingled and you will be unable to view the logs in CSV format.

6.5 Session Audit Logging

In Session Audit Logging, specify the rules for filtering logs to be output in the rule section in the pgaudit configuration file.

Rules are specified using the formats below. Multiple values can be specified, using a comma as the delimiter.

- *paramName* = '*value*'
- *paramName* != '*value*'

If [rule] is described on its own in the rule section with no parameters specified, all audit logs will be output.

Example

```
[output]
logger = 'auditlog'
[rule]
```

If the rule section is not described ([rule] is not described), the audit logs will not be output.

Example

```
[output]
logger = 'auditlog'
```

The valid parameters in the rule section are shown in the table below.

Parameter name	Description	Example
timestamp	Timestamp range Refer to "timestamp" for details on how to specify timestamps.	timestamp = '09:00:00 - 10:00:00, 18:00:00 - 18:30:00'
database	Database name To specify a blank value, use a pair of double quotation marks (""). When specifying a name containing uppercase characters, key words, multibyte characters and commas, enclose the name in double quotation marks.	database = 'prodcut_db'
audit_role	Role name To specify a blank value, specify use a pair of double quotation marks (""). When specifying a name containing uppercase characters, key words, multibyte characters and commas, enclose the name in double quotation marks.	audit_role = 'appuser1'
class	Operation class Select from the values below. Multiple values can be specified. Refer to "class" for details on the meaning of each class. - BACKUP - CONNECT - DDL - ERROR - FUNCTION - MISC - READ - ROLE - WRITE - SYSTEM	class = 'READ, WRITE'
object_type	Object type This parameter is enabled when the class parameter is "READ" and "WRITE". Select from the values below. Multiple values can be specified. - TABLE - INDEX	object_type = 'TABLE, INDEX'

Parameter name	Description	Example
	- SEQUENCE - TOAST_VALUE - VIEW - MATERIALIZED_VIEW - COMPOSITE_TYPE - FOREIGN_TABLE - FUNCTION	
object_name	Object name This parameter is enabled when the class parameter is "READ" and "WRITE". For objects that can be modified by a schema, such as a table, modify such objects by schema name. When specifying a name containing uppercase characters, key words, multibyte characters and commas, enclose the name in double quotation marks. When specifying the object name "*schemaName.tableName*", enclose the entire object name modified by schema name in double quotation marks. To specify a blank value, use a pair of double quotation marks ("").	object_name = 'myschema.tbl1' object_name = 'myschema.tbl1, "*mySchema*.TABLE"'
application_name	Application name To specify a blank value, use a pair of double quotation marks ("").	application_name = 'myapp'
remote_host	Connection destination host name or IP address If "on" is specified for the log_hostname parameter in the postgresql.conf file, specify a host name. Otherwise, specify the IP address. If using a local host, specify "[local]". To specify a blank value, use a pair of double quotation marks ("").	remote_host = 'ap_server'

timestamp

Specify a timestamp range from "*startTime*" to "*endTime*" for the log output target. The timestamp format is 'hh:mm:dd-hh:mm:dd' (hh is expressed in 24-hour notation, and hh, mm, and dd are expressed in two-digit notation).

The start time must be earlier than the end time. If specifying multiple ranges, specify each start and end timestamp using a comma as the delimiter.

End timestamps consider milliseconds. For example, if '11:00:00 - 11:59:59' is specified for the timestamp, "11:00:00:000" to "11:59:59:999" will be the target range.

The timestamps used by evaluation in the rule section of pgaudit are different to the timestamps issued in the log entries. That is because log entries are output after evaluation by pgaudit, with the timestamp being generated at that time.

class

The meaning of each class specified in the class parameter is below:

- READ: SELECT, COPY FROM
- WRITE: INSERT, UPDATE, DELETE, TRUNCATE, COPY TO
- FUNCTION: Function call, DO
- ROLE: GRANT, REVOKE, CREATE ROLE, ALTER ROLE, DROP ROLE
- DDL: All DDLs (such as CREATE and ALTER) other than the DDLs of the ROLE class
- CONNECT: Events relating to connecting (request, authenticate, and disconnect)
- SYSTEM: Instance start, promotion to primary server
- BACKUP: pg_basebackup
- ERROR: Event completed by an error (PostgreSQL error codes other than 00). This class can be used if ERROR or lower level is specified for the log_min_messages parameter in postgresql.conf.
- MISC: Other commands (such as DISCARD, FETCH, CHECKPOINT, and VACUUM)

Evaluation of the rule section

- When a log event occurs, all expressions in the rule section are evaluated at once. Log entries are only output if all parameters in the rule section are evaluated as being true.

  For example, if the rule below has been set, of the operations performed by 'apserver' to 'myschema.tbl1', the operations applicable to classes other than 'WRITE'' in the period from 10 a.m. to 11 a.m. will be output as audit logs.

  ```
  [rule]
  timestamp = '10:00:00-11:00:00'
  remote_host = 'apserver'
  object_name = 'myschema.tbl1'
  class != 'WRITE'
  ```

- Multiple rule sections can be defined in the pgaudit configuration file. Log events are evaluated using each rule section, and an audit log is output for each matching rule section.

  For example, if the rules below are set, duplicated audit logs will be output.

  ```
  [rule]
  object_name = 'myschema.tbl1'
  [rule]
  object_name = 'myschema.tbl1'
  ```

- If the same parameter is specified multiple times in one rule section, the last specified parameter is effective.

  For example, if the rule below has been set, "object_name = 'myschema.tbl3'" will take effect.

  ```
  [rule]
  object_name = 'myschema.tbl1'
  object_name = 'myschema.tbl2'
  object_name = 'myschema.tbl3'
  ```

Output format

In Session Audit Logging, audit logs are output in the format below:

```
AUDIT: SESSION,READ,2020-03-12 19:00:58 PDT,
   (1)         (2)     (3)
[local],19944,psql,appuser,postgres,2/8, 2, 1,SELECT,,TABLE,myschema.account, ,
```

```
  (4)    (5)   (6)   (7)      (8)   (9)(10)(11)(12)(13)(14)    (15)        (16)
SELECT * FROM myschema.account;,<not logged>
       (17)                      (18)
```

No	Content
(1)	Log header Fixed as "AUDIT: SESSION".
(2)	Class
(3)	SQL start time
(4)	Remote host name If using a local host, [local] is output.
(5)	Backend process ID
(6)	Application name If an application name is not specified, [unknown] is output.
(7)	User name
(8)	Database name
(9)	Virtual transaction ID
(10)	Statement ID
(11)	Substatement ID
(12)	Command tag
(13)	SQLSTATE
(14)	Object type
(15)	Object name
(16)	Error message
(17)	SQL If the SQL contains a password, such as for CREATE ROLE, and so on, it will be replaced with "<REDACTED>". Additionally, if "on" is specified for the log_statement_once parameter of the option section in the pgaudit configuration file, "<previously logged>" is output for the second and subsequent statements.
(18)	Depending on the log_parameter parameter value of the option section in the pgaudit configuration file, the output content will be as below. - log_parameter=on is specified If parameters are specified in the SQL, the parameters are concatenated and output, using a space as the delimiter. If parameters are not specified in the SQL, "<none>" is output. - log_parameter=off (default) is specified "<not logged>" is output. Additionally, if "on" is specified for the log_statement_once parameter of the option section in the pgaudit configuration file, "<previously logged>" is output for the second and subsequent statements.

Information

If accessing resources that use the features below, the command tag (12) may be output as "???".

- INSTEAD OF trigger
- RULE
- VIEW
- Security policy per row
- Table inheritance

Example

Below is an example of retrieving audit logs in Session Audit Logging.

1. Settings

   In the pgaudit configuration file, specify the rule section below.

```
[rule]
class = 'READ, WRITE'
object_name = 'myschema.account'
```

2. Retrieving logs

   Execute the SQL below from the client.

```
CREATE TABLE myschema.account
(
    id int,
    name text,
    password text,
    description text
);
INSERT INTO myschema.account (id, name, password, description) VALUES (1, 'user1',
'HASH1', 'blah, blah');
SELECT * FROM myschema.account;
```

   The audit log below can be retrieved.

   'DDL' is not defined in the class parameter, so CREATE TABLE is not output as an audit log.

```
AUDIT: SESSION,WRITE,2020-03-12 19:00:49 PDT,[local],19944,psql,appuser,postgres,
2/7,1,1,INSERT,,TABLE,myschema.account,,"INSERT INTO myschema.account (id, name,
password, description) VALUES (1, 'user1', 'HASH1', 'blah, blah');",<not logged>
AUDIT: SESSION,READ,2020-03-12 19:00:58 PDT,[local],19944,psql,appuser,postgres,
2/8,2,1,SELECT,,TABLE,myschema.account,,SELECT * FROM myschema.account;,<not logged>
```

6.6 Object Audit Logging

In Object Audit Logging, retrieval of audit logs is achieved by using roles.

Roles are specified in the role parameter of the option section to retrieve audit logs. If there are privileges for commands executed by a role, or if privileges have been inherited from another role, those command operations are output as audit logs.

For example, after "auditor" is set for the role parameter of the option section, the SELECT and DELETE privileges for the account table are assigned to "auditor". In this case, when SELECT or DELETE is executed for the account table, audit logs are output.

Output format

In Object Audit Logging, audit logs are output in the format below:

```
AUDIT: OBJECT,1,1,READ,SELECT,TABLE,public.account,SELECT password FROM account;,<not
logged>
    (1)    (2)(3)(4)  (5)    (6)        (7)              (8)                    (9)
```

No	Content
(1)	Log header Fixed as "AUDIT: OBJECT".
(2)	Statement ID
(3)	Substatement ID
(4)	Class name
(5)	Command tag
(6)	Object type
(7)	Object name
(8)	SQL If "on" is specified for the log_statement_once parameter of the option section in the pgaudit configuration file, "<previously logged>" is output for the second and subsequent statements.
(9)	Depending on the log_parameter parameter value of the option section in the pgaudit configuration file, the output content will be as below. - When log_parameter=on If parameters are specified in the SQL, the parameters are concatenated and output, using a comma as the delimiter. If parameters are not specified in the SQL, "<none>" is output. - When log_parameter=off (default) "<not logged>" is output. Additionally, if "on" is specified for the log_statement_once parameter of the option section in the pgaudit configuration file, "<previously logged>" is output for the second and subsequent statements.

Information

If accessing resources that use the features below, the command tag (5) may be output as "???".

- INSTEAD OF trigger
- RULE
- VIEW
- Security policy per row
- Table inheritance

Example

Below is an example of retrieving logs in Object Audit Logging.

By setting the target for assigning privileges to roles in detail, log output can be controlled.

In the example below, log retrieval of the account table is controlled by the privileges assigned to the columns, however, log retrieval of the account_role_map table is controlled by the privileges assigned to the table.

1. Settings

The role parameter below is specified for the option section in the pgaudit configuration file.

```
[option]
role = 'auditor'
```

2. Defining a role

A role is defined for Object Audit Logging.

```
CREATE USER auditor NOSUPERUSER LOGIN;
```

3. Retrieving logs

Execute the SQL below from the client.

```
CREATE TABLE account
(
    id int,
    name text,
    password text,
    description text
);
GRANT SELECT (password) ON public.account TO auditor;
SELECT id, name FROM account;
SELECT password FROM account;
GRANT UPDATE (name, password) ON public.account TO auditor;
UPDATE account SET description = 'yada, yada';
UPDATE account SET password = 'HASH2';
CREATE TABLE account_role_map
(
    account_id int,
    role_id int
);
GRANT SELECT ON public.account_role_map TO auditor;
SELECT account.password, account_role_map.role_id
  FROM account
  INNER JOIN account_role_map ON account.id = account_role_map.account_id;
```

The audit log below can be retrieved.

In the account table, only the operations for columns that privileges have been assigned to are output as logs.

In the account_role_map table, privileges are assigned to the table, so operations performed for the table are output as logs.

```
AUDIT: OBJECT,4,1,READ,SELECT,TABLE,public.account,SELECT password FROM account;,<not
logged>
AUDIT: OBJECT,7,1,WRITE,UPDATE,TABLE,public.account,UPDATE account SET password =
'HASH2';,<not logged>
AUDIT: OBJECT,10,1,READ,SELECT,TABLE,public.account,"SELECT account.password,
account_role_map.role_id
        FROM account
        INNER JOIN account_role_map ON account.id = account_role_map.account_id;",<not
logged>
AUDIT: OBJECT,10,1,READ,SELECT,TABLE,public.account_role_map,"SELECT account.password,
account_role_map.role_id
```

```
        FROM account
        INNER JOIN account_role_map ON account.id = account_role_map.account_id;",<not
logged>
```

6.7 Database Multiplexing

This section describes audit log retrieval while in database multiplexing mode.

6.7.1 Setup

If setting up the audit log feature in a database multiplexing environment that has already been built, follow the procedure below.

1. Copy the pgaudit files

   Copy the pgaudit files on the primary server and standby server.

   Refer to step 1 in "6.2 Setup" for details on copying the pgaudit files.

2. Create the pgaudit configuration file

   Create the pgaudit configuration file on the primary server. Copy the pgaudit configuration file you created to the standby server.

   Refer to step 2 in "6.2 Setup" for details on creating the pgaudit configuration file.

3. Configure postgresql.conf

   In the postgresql.conf file on the primary server and standby server, configure the parameters for using audit logs. Set the same values for the parameters.

   Refer to step 3 in "6.2 Setup" and "6.7.2 Configuring Audit Log Retrieval" for details on the parameters to configure.

4. Configure the *serverIdentifier*.conf file of Mirroring Controller

   In the *serverIdentifier*.conf file on the primary server and standby server, configure the parameters for using audit logs.

   Refer to "6.7.2 Configuring Audit Log Retrieval" for details on the parameters to be set.

5. Start the instance

   Start the instance of the primary server and standby server.

6. Create the pgaudit extension

   Execute CREATE EXTENSION on the primary server to create a pgaudit extension.

   Refer to step 5 in "6.2 Setup" for details on creating pgaudit extensions.

7. Configure the parameters in the pgaudit configuration file

   Add/change the parameters of the pgaudit configuration file on the primary server. Copy the pgaudit configuration file with the added/changed parameters to the standby server.

   Refer to "6.4 pgaudit Configuration File" and "6.7.2 Configuring Audit Log Retrieval" for details on the parameters to set.

8. Restart the instance

   Restart the instance of the primary server and standby server.

6.7.2 Configuring Audit Log Retrieval

In database multiplexing mode, Mirroring Controller periodically accesses the database to check the multiplexing status and detect failure. Due to this, audit logs are also periodically retrieved, so log files become used up. Therefore, set the parameters below so that audit logs are not retrieved by Mirroring Controller.

postgresql.conf

log_connections

Omit, or specify "off".

log_disconnections

Omit, or specify "off".

serverIdentifier.conf file of Mirroring Controller

target_db

Specify "template1".

Note

If creating a new database, create it after stopping Mirroring Controller, or specify a name other than "template1" for the template database.

pgaudit configuration file

rule section database

Specify database != 'template1'.

6.8 Failover

This section explains audit log retrieval performed by the failover feature integrated with the cluster software.

6.8.1 Configuring Audit Log Retrieval

The failover feature accesses the database periodically to check the instance status. Due to this, audit logs are also periodically retrieved, so log files become depleted. Therefore, set the parameters below so that audit logs are not retrieved.

postgresql.conf

log_connections

Omit, or specify "off".

log_disconnections

Omit, or specify "off".

pgaudit configuration file

rule section database

Specify database != 'template1'.

6.9 Analyzing Audit Logs in SQL

In general, you can quickly and easily analyze the audit log by creating a table for analysis and loading the audit log into that table.
Maybe the analysis table is not updated, so we recommend creating that table as an UNLOGGED table. This is because when loading, the write-ahead log (WAL) is not output and it is not replicated, so it can be loaded faster without interfering with other tasks.

How to Identify the Audit Log Files to Load

To analyze audit logs for a specific time period, load all files that contain audit logs for that time period.
However, do not access dedicated log files with the latest update date. This is because it contains incomplete audit log data that is being written.

Loading Method

The audit log is output in csv format, and can be loaded using the COPY FROM statement or the pgx_loader command.
The following example shows how to load Session Audit Logging output to a dedicated log file.

1. Creating Tables

   Define a table with the columns required to reference the audit log.

```
$ psql
=# CREATE UNLOGGED TABLE auditlog (
header text,
class text,
sql_start_time timestamp with time zone,
remote_host_name text,
backend_process_id integer,
application_name text,
session_user_name text,
database_name text,
virtual_transaction_id text,
statement_id integer,
substatement_id integer,
command_tag text,
sqlstate text,
object_type text,
object_name text,
error_message text,
sql text,
parameter text
);
```

2. Creating an Index

   For example, creating an index on a timestamp is useful for time-series analysis.

```
$ psql
=# CREATE INDEX auditlog_time_index ON auditlog (sql_start_time);
```

3. Loading the Audit Log

   Specify a dedicated log file in the FROM clause of COPY FROM.

```
$ psql
=# COPY auditlog FROM
'pgaudit-2024-02-02_150000.log' WITH CSV DELIMITER ',';
```

   You can also use the PROGRAM clause to load multiple dedicated log files together.
   The following example loads one day of audit logs by specifying wildcard for day part of file name:

```
$ psql
=# COPY auditlog FROM
PROGRAM 'cat pgaudit-2024-02-02_*' WITH CSV DELIMITER ',';
```

```
$ psql
=# COPY auditlog FROM
PROGRAM 'type pgaudit-2024-02-02_*' WITH CSV DELIMITER ',';
```

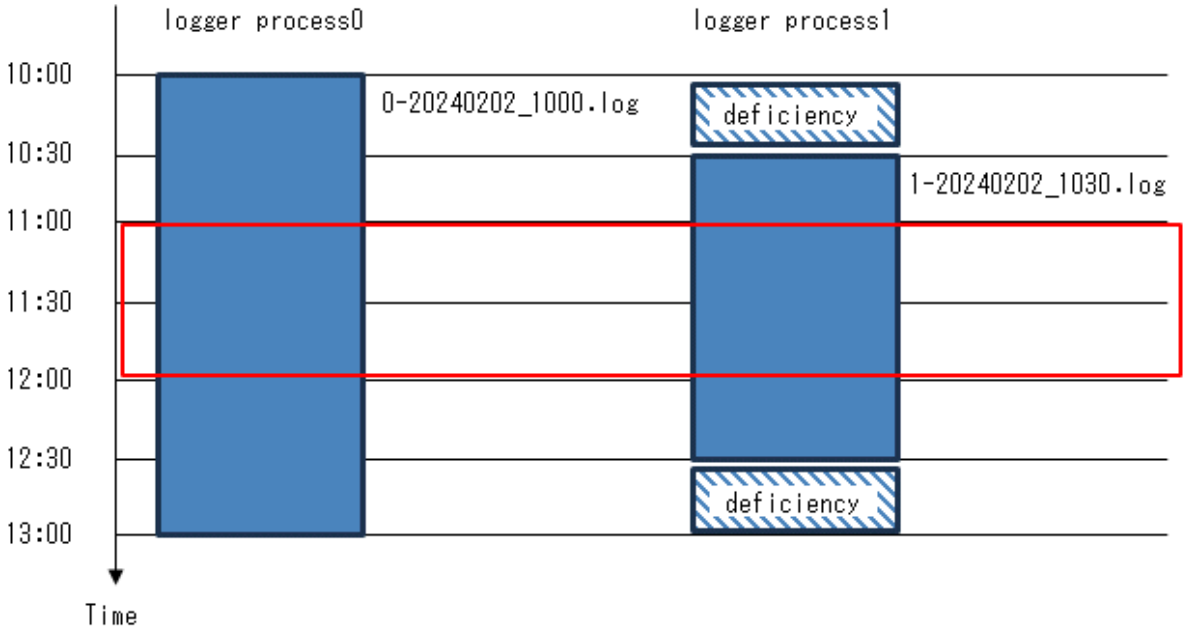
4. Audit Log Analysis

   Access the table that loaded the audit log.
   Loaded records are not in chronological order, but can be sorted by timestamp

```
$ psql
=# SELECT * FROM auditlog ORDER BY sql_start_time;
 header         |  class |        sql_start_time     | remote_host_name  |  ...
----------------+--------+---------------------------+-------------------+  ...
AUDIT: SESSION | DDL    | 2024-02-02 15:00:49+09    | ::1               |  ...
AUDIT: SESSION | SYSTEM | 2024-02-02 15:00:58+09    |                   |  ...
```

Considerations when Using the Scalable Audit Log Feature

- When you enable the scalable audit log feature, there are many dedicated log files for the target period as you specify for parallel_loggers, so make sure to load all the dedicated log files.
- When you disable log_rotation_age, do not analyze the time except target period because not all audit logs may have been loaded.
  For example, suppose that you are analyzing the audit log at 11:00-12:00, and you load the file output by logger process 0 at 10:00-13:00 and the file output by logger process 1 at 10:30-12:30, as shown in the following figure. Audit log records up to 10:00-13:00 appears in the table loaded with log files, but some audit logs (Audit log output by logger process 1 at 10:00-10:30 and 12:30-13:00) have not been loaded.
  When log_rotation_age is enabled, the timing of the dedicated log file changeover is consistent across all logger processes to prevent such erroneous analysis.



6.10 Removing Setup

This section describes how to remove the setup of pgaudit.

1. Start the instance
2. Remove the pgaudit extension

   Execute DROP EXTENSION to remove the pgaudit extension from the database.

```
$ psql -d <database name>
=# DROP EXTENSION pgaudit;
=# \q
```

3. Change postgresql.conf

   Remove the parameters below relating to pgaudit.

   - shared_preload_libraries
   - pgaudit.config_file

4. Restart the instance
5. Remove the pgaudit files

L

As superuser, run the following command. Note that "<*x*>" in paths indicates the product version.

```
$ su -
Password:******
# rm -rf /opt/fsepv<x>server64/filesCopiedDuringSetup
```

Information

The files copied during setup can be checked below.

```
# find /opt/fsepv<x>server64/OSS/pgaudit
```

W

Open a command prompt as administrator privileges, run the following command. Note that "<*x*>" in paths indicates the product version.

```
> del "c:\Program Files\Fujitsu\fsepv<x>server64\filesCopiedDuringSetup"
```

Information

The files copied during setup can be checked below.

```
> dir /b /s "c:\Program Files\Fujitsu\fsepv<x>server64\OSS\pgaudit"
```

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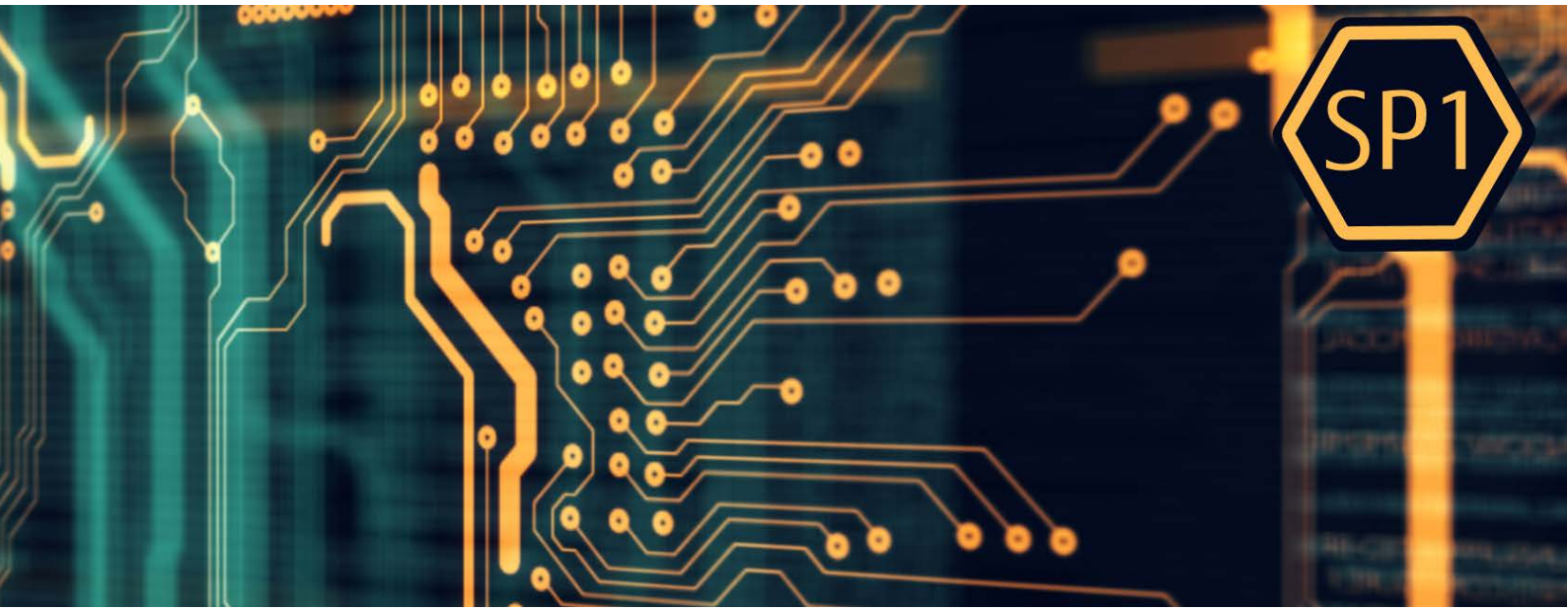

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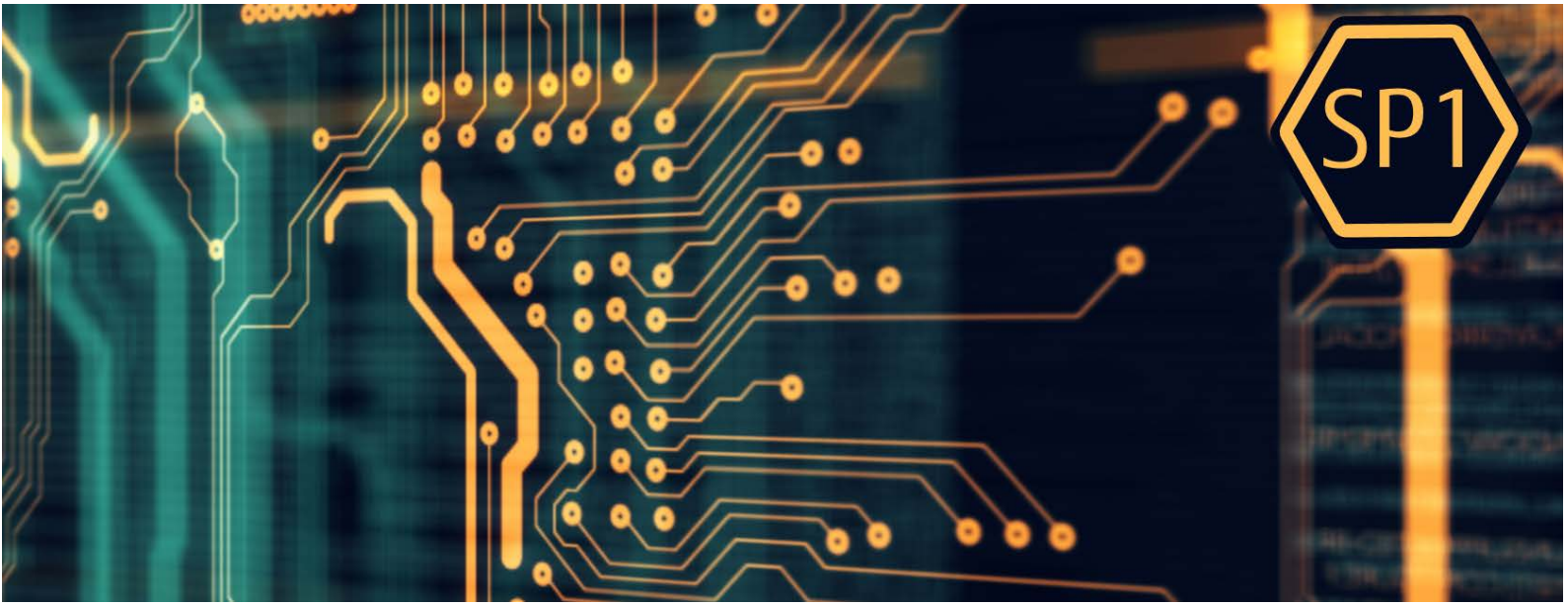

Cluster Operation Guide

Database Multiplexing

(Linux)

Linux

J2UL-2678-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document describes the tasks required for using the database multiplexing feature of FUJITSU Enterprise Postgres.

Intended readers

This document is intended for those who set up and use the database multiplexing feature.

Readers of this document are also assumed to have general knowledge of:

- PostgreSQL
- SQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Database Multiplexing Mode

Provides an overview of database multiplexing mode.

Chapter 2 Setting Up Database Multiplexing Mode

Describes how to set up database multiplexing mode.

Chapter 3 Operations in Database Multiplexing Mode

Explains periodic database multiplexing mode.

Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode

Explains the action required when an error occurs during a database multiplexing mode.

Chapter 5 Managing Mirroring Controller Using WebAdmin

Explains how to set up and manage Mirroring Controller in a streaming replication cluster using WebAdmin.

Appendix A Parameters

Explains the configuration files and parameters required for database multiplexing mode.

Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server

Explains supplementary information on building the primary server and standby server on the same server.

Appendix C User Commands

Explains the user commands.

Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality

Provides notes when performing automatic degradation unconditionally after a heartbeat abnormality is detected during heartbeat monitoring of an operating system or server.

Appendix E Supplementary Procedure on Configuring for Operation in Database Multiplexing Mode

Explains supplementary procedure on the configuration required for operation in database multiplexing mode.

Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters

Explains characters not allowed in WebAdmin.

Appendix G Collecting Failure Investigation Data

Explains how to collect data for initial investigation.

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Chapter 1 Overview of Database Multiplexing Mode

This chapter provides an overview of database multiplexing mode.

Point

In this and subsequent chapters, the word "Mirroring Controller" may be used in the process or management directory name or explanation.

1.1 What is Database Multiplexing Mode

Database multiplexing mode is an operation mode (log shipping mode) based on PostgreSQL streaming replication. Other software such as cluster software is not required.

This mode replicates the database on all servers that comprise the cluster system. It achieves this by transferring the updated transaction logs of the database from the server that receives the updates (primary server) to another server (standby server), and then reflecting them on the standby server. The client driver automatically distinguishes between the primary and standby servers, so applications can be connected transparently regardless of the physical server.

It consists of a feature that detects faults in the elements that are essential for the continuity of the database operation (such as the database process, disk, and network), as well as simplified switchover and standby server disconnection features. Furthermore, referencing can be performed on the standby server. The database will be copied in synchronous mode.

Note

If using WebAdmin or Mirroring Controller, FUJITSU Enterprise Postgres supports cluster systems comprising one primary server and one standby server.

- Although it is possible to connect an asynchronous standby server to the cluster system as an additional server, the standby server is not targeted for monitoring by Mirroring Controller.
- A synchronous standby server cannot be connected to the cluster system as an additional server.

See

The streaming replication feature is not described in this manual.

Refer to "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation for information on the streaming replication feature.

Figure 1.1 Failover from the primary server to the standby server

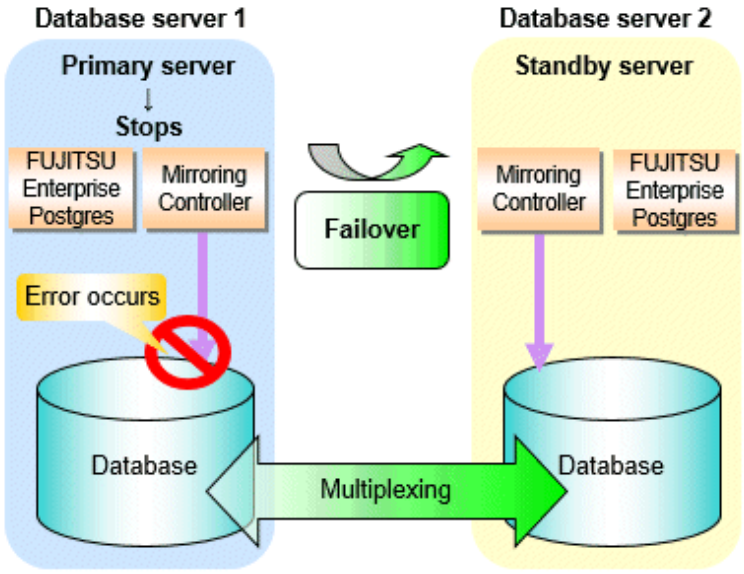
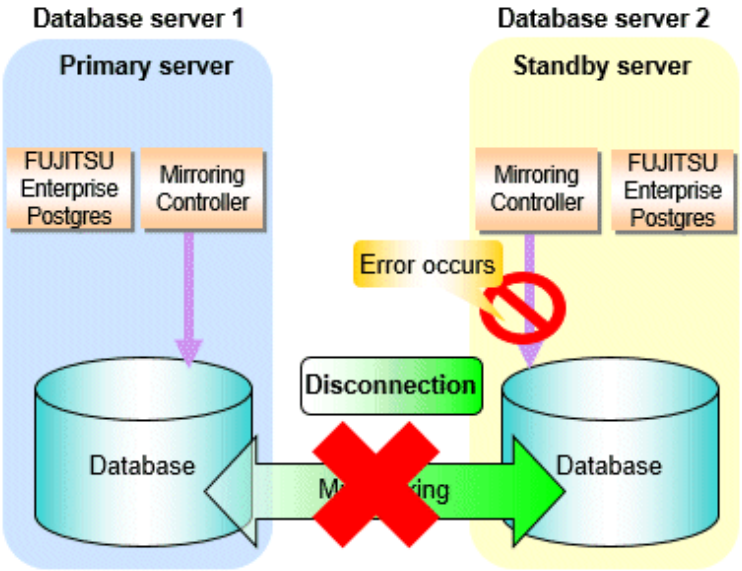


Figure 1.2 Standby server disconnection



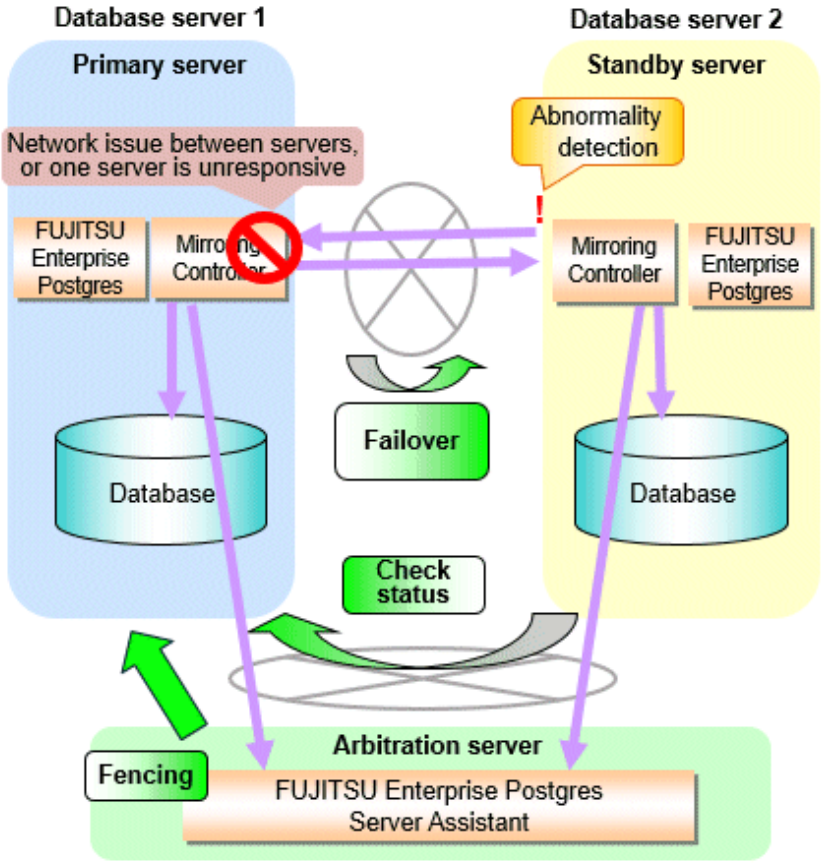
Database degradation using the arbitration server

FUJITSU Enterprise Postgres provides the Server Assistant that objectively determines the status of database servers as a third party, and if necessary, isolates affected databases if the database servers are unable to accurately ascertain their mutual statuses in database multiplexing mode, such as due to a network error between database servers, or server instability. Database degradation can be performed by using the server (arbitration server) on which the Server Assistant is installed.

For database degradation using the arbitration server, if the database servers are unable to check their mutual statuses (due to a network error between database servers or server instability), then the database server queries the arbitration server for the status of the other database server. If it is determined based on the heartbeat result that the status is unstable, the applicable database server will be isolated from the cluster system (fencing). The arbitration server periodically heartbeats the database server so that it can respond immediately to queries from the database server. The fencing process can be customized according to the environment where Mirroring Controller is used.

Additionally, the database servers are always performing their heartbeats for the arbitration server so that it can perform check requests any time.

Figure 1.3 Database degradation using the arbitration server



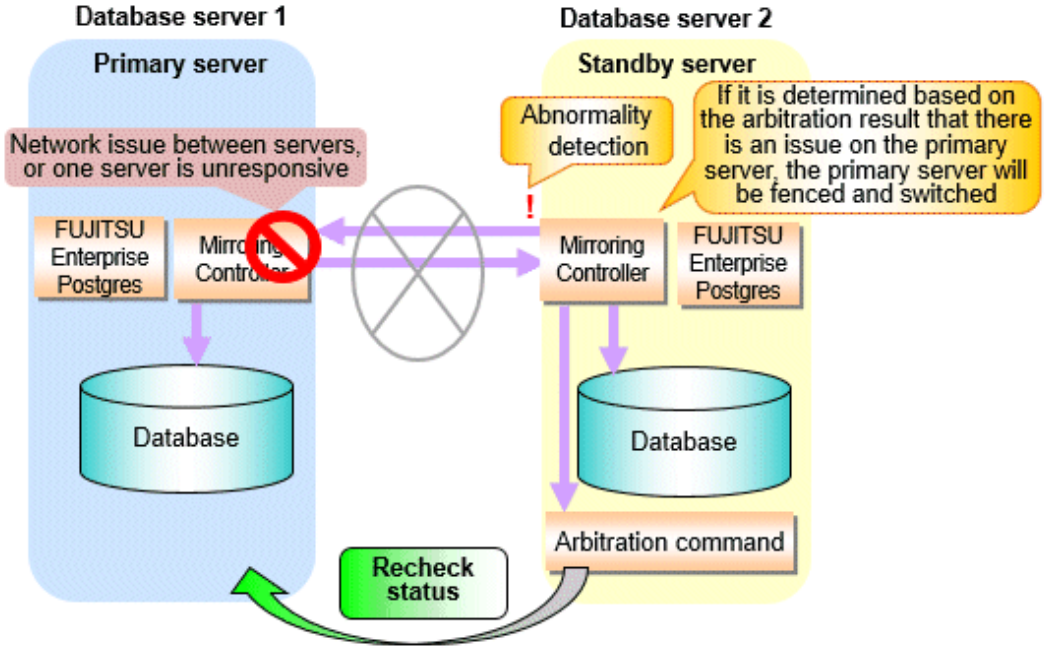
Note

Install the arbitration server on a different physical server to that of the database server. Refer to "1.2 System Configuration for Database Multiplexing Mode" for information on the system configuration when using the arbitration server.

Database degradation using the arbitration command

The arbitration command is a user command that performs arbitration processing in lieu of the arbitration server. If an arbitration server cannot be deployed, arbitration of the database server can be performed using the arbitration command.

Figure 1.4 Database degradation using the arbitration command



See

Refer to "2.6 Creating a User Exit for a Database Server" or "Appendix C User Commands" for information on user commands.

1.1.1 Monitoring Using Database Multiplexing Mode

In database multiplexing mode, perform the monitoring below.

- Operating system or server failures, and no-response state

  By generating a heartbeat between Mirroring Controller on each server, operating system or server errors are detected and acknowledged between the relevant servers.

  The optimal operating method for environments where database multiplexing mode is performed can be selected from the following:

  - Use the arbitration server to perform automatic degradation (switch/disconnect)

    This is the default method.

    The arbitration server objectively determines the status of database servers, then isolates and degrades from the cluster system the ones with an unstable status.

    Refer to "Database degradation using the arbitration server" for details.

  - Call the user exit (user command) that will perform the degradation decision, and perform automatic degradation

    If the arbitration server cannot be installed, select if arbitration processing can be performed by the user instead.

    Mirroring Controller queries the user exit on whether to degrade. The user exit determines the status of the database server, and notifies Mirroring Controller whether to perform degradation.

    Refer to "Database degradation using the arbitration command" for details.

  - Notification messages

    Use this method if using a two-database server configuration.

    Mirroring Controller outputs messages to the system log when an abnormality is detected. This ensures that a split brain will not occur due to a heartbeat abnormality - however, automatic switching will not be performed if the primary server operating system or server fails or becomes unresponsive.

  - Perform automatic degradation unconditionally after a heartbeat abnormality

    This method is handled as in FUJITSU Enterprise Postgres 9.6 or earlier versions.

    This method is not recommended, because Mirroring Controller unconditionally will perform automatic degradation after heartbeat abnormalities.

- Database process failures, and no-response state

  Mirroring Controller periodically accesses the database processes and checks the status. A process error is detected by monitoring whether an access timeout occurs.

- Disk failure

  Mirroring Controller periodically creates files on the data storage destination disk below. A disk error is detected when an I/O error occurs.

  - Data storage destination disk
  - Transaction log storage destination disk
  - Tablespace storage destination disk

  Failures that can be detected are those that physically affect the entire system, such as disk header or device power failures.

- Streaming replication issue

  Mirroring Controller detects streaming replication issues (log transfer network and WAL send/receive processes) by periodically accessing the PostgreSQL system views.

- Mirroring Controller process failure and no response

  In order to continue the monitoring process on Mirroring Controller, Mirroring Controller process failures and no responses are also monitored.

  The Mirroring Controller monitoring process detects Mirroring Controller process failures and no responses by periodically querying the Mirroring Controller process. If an issue is detected, Mirroring Controller is automatically restarted by the Mirroring Controller monitoring process.

Point

- If output of messages is selected as the operation to be performed when a heartbeat abnormality is detected during heartbeat monitoring of the operating system or server, automatic degradation will not be performed.
  However, if an issue in the WAL send process is detected on the primary server, then the standby server will be disconnected, and as a result an automatic disconnection may be performed even if the standby server operating system or server fails or becomes unresponsive.
- You can select in the parameters if the primary server will be switched if a database process is unresponsive or if tablespace storage destination disk failure is detected. Refer to "Appendix A Parameters" for details.
- If the standby server was disconnected, Mirroring Controller will automatically comment out the synchronous_standby_names parameter in the postgresql.conf file of the primary server. Accordingly, you can prevent the application processing for the primary server being stopped.

Note

If the role of primary server was switched to another server and then starts degrading, the original primary server will not become the standby server automatically. Remove the cause of the error, and then change the role of the original primary server to the server currently acting as standby server. Refer to "4.1 Action Required when Server Degradation Occurs" for details.

1.1.2 Referencing on the Standby Server

1.1.2.1 If Prioritizing the Main Job on the Primary Server

If a reference job is performed on the standby server and the primary server is switched, this may impact the main job from the point of view of load and conflict. This is because, on the new primary server (that is, the original standby server), both the main job that was being executed on the original primary server and the reference job that was being continued on the original standby server will be processed.

Therefore, to degrade the reference job (so that the impact on the main job is reduced), you can select the user exit below to disconnect the reference job that was performed on the original standby server.

- Post-switch command

Note

If continuing with the referencing job after switching the primary server, give careful consideration to the server resource estimates, and the likely impact on performance.

1.1.2.2 If Performing the Referencing Job on the Synchronous Standby Server

If an issue such as a log transfer network failure obstructs the continuation of a job on the primary server, the standby server may be automatically disconnected from the cluster system.

Therefore, if operating the reference job on the assumption that the connection destination is the synchronous standby server, you can select to temporarily stop the job by using the user exit or the feature below, so that unexpected referencing of past data does not occur as a result of the disconnection.

- Pre-detach command
- Forced stoppage of the standby server instance on disconnection (specify in the parameter of the server configuration file)

Additionally, if the standby server is incorporated into the cluster system, reference jobs can be started or resumed by using the user exit below.

- Post-attach command

See

- Refer to "2.6 Creating a User Exit for a Database Server" or "Appendix C User Commands" for information on each user exit.
- Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the server configuration file of the database server.

Point

Mirroring Controller will continue processing regardless of the processing result of the above user exits and features.

1.2 System Configuration for Database Multiplexing Mode

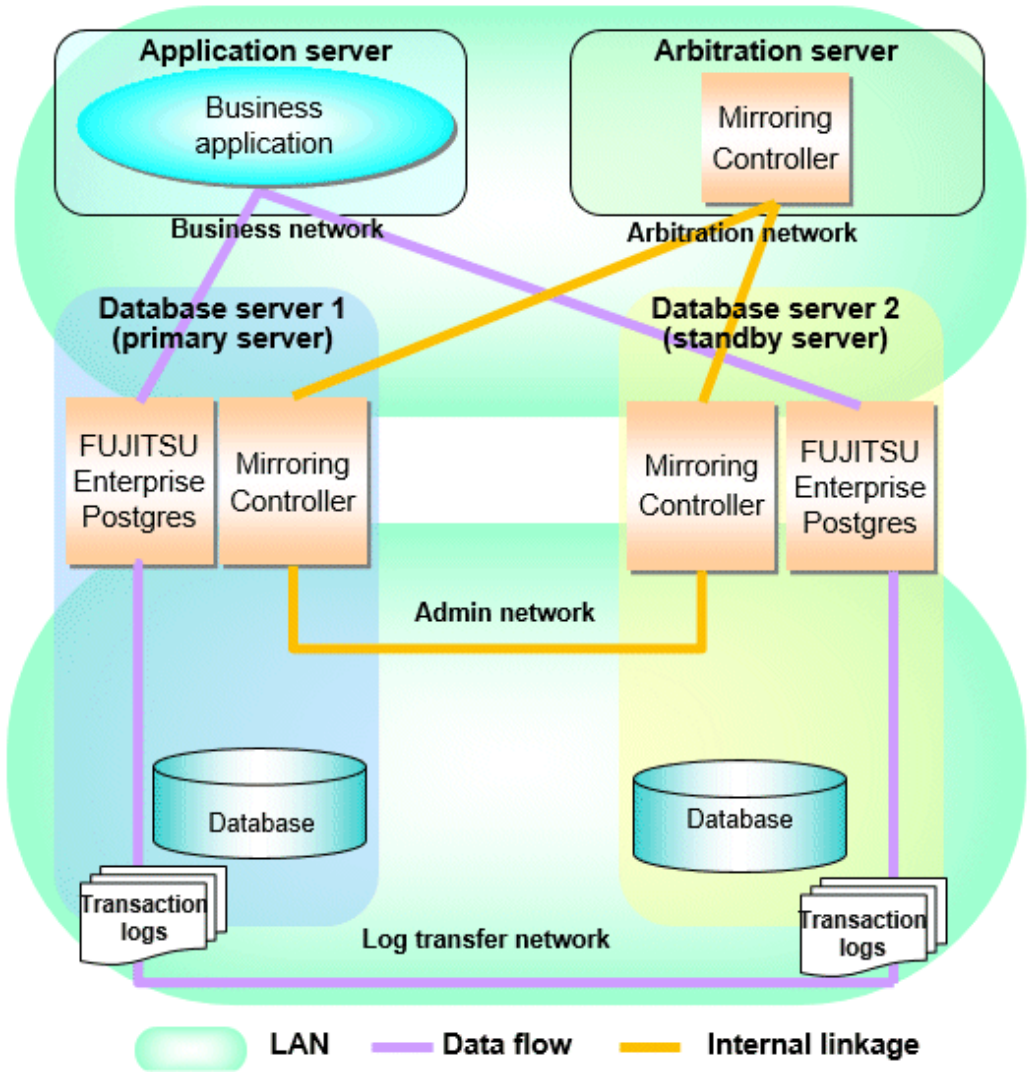
This section explains the products, features, and networks that are part of a database multiplexing system.

The following table shows the network types uses by database multiplexing systems.

Network type	Description
Job network	Network between the application that accesses the database, and the database server.

Network type	Description
Arbitration network	Network used by the arbitration server to check the status of the primary server and standby server, and communicate with Mirroring Controller of the database servers. Additionally, if the job network is disconnected from outside, it can also be used as the arbitration network. Refer to "1.4 Security in Database Multiplexing" for details on network security.
Admin network	Network used by the primary server and the standby server to monitor each other using Mirroring Controller, and to control Mirroring Controller of other servers.
Log transfer network	Network used to transfer the transaction logs of the database, which is part of database multiplexing.

Figure 1.5 System configuration for database multiplexing mode



The arbitration server is installed to check the database server status as a third party, and to perform fencing. Therefore, to obtain the intended benefits, consider the following.

- Install the arbitration server on a different server to that of the database server.
- For the arbitration network, use a network that will not be impacted by line faults or the load on the admin network or log transfer network. This is necessary to correctly determine issues on the admin network or log transfer network.

Point

- The arbitration server can also be used as an application server. However, consider the server load.
- It is recommended to link the arbitration server with other cluster systems, in order to provide redundancy.
- Use the arbitration server in combination with the same version of FUJITSU Enterprise Postgres as that of the primary server and standby server.
- The arbitration server can be built on a different platform to that of the database server.

Note

Because the ping command of the operating system is used for heartbeat monitoring of the database server, configure the network so that ICMP can be used on the admin network and the arbitration network.

1.2.1 Mirroring Controller Resources

This section describes the database server and arbitration server resources of Mirroring Controller.

1.2.1.1 Database Server Resources

The only Mirroring Controller resource is the Mirroring Controller management directory, which stores the files that define the Mirroring Controller behavior, and the temporary files that are created when Mirroring Controller is active.

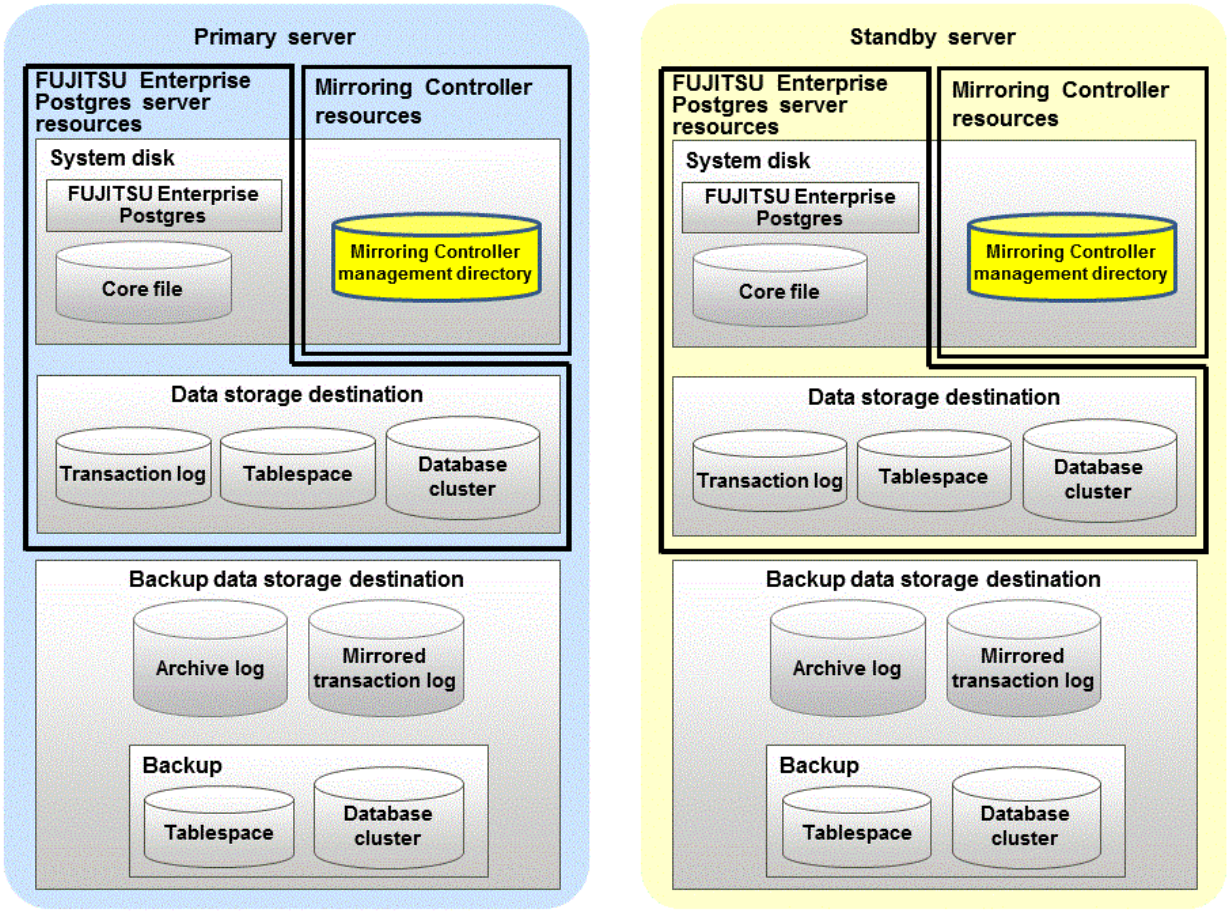
Note

- Do not create the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake or may cause unexpected problems when FUJITSU Enterprise Postgres recovery is performed (such as old version of files being restored).

  Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for information on the directories managed by FUJITSU Enterprise Postgres.
- The backup methods described in "Backing Up the Database" in the Operation Guide cannot be used to back up the Mirroring Controller resources. Therefore, users must obtain their own backup of Mirroring Controller resources, in addition to FUJITSU Enterprise Postgres server resources. Retrieve backups after stopping Mirroring Controller.
- If the automatic switch/disconnection is enabled, do not edit synchronous_standby_names for the Mirroring Controller monitoring target instance. Otherwise, if Mirroring Controller is switched after editing, data may be lost or SQL access may stop.
- If you are building on a virtual machine or cloud, make sure the virtual machines are on different physical servers. Refer to your virtual machine software and cloud vendor documentation for instructions on how to deploy virtual machines.

The content on the primary server will be backed up. You cannot tell which server is the primary server to be backed up, because switching and failback may be performed between the servers. It is also impossible to tell which server is to be restored using the backed up data. Accordingly, ensure that you create a backup of each server when it is working as the primary server.

Figure 1.6 Configuration when backing up Mirroring Controller resources



1.2.1.2 Arbitration Server Resources

The only arbitration server resource is the Mirroring Controller arbitration process management directory. This directory stores the files that define the Mirroring Controller arbitration process behavior and the temporary files created when Mirroring Controller is active.

1.2.2 Mirroring Controller Processes

This section describes the database server and arbitration server processes of Mirroring Controller.

1.2.2.1 Database Server Processes

The database server processes comprise the Mirroring Controller process and Mirroring Controller monitoring process.

Process type	Description
Mirroring Controller process	Performs operating system/server and process heartbeat monitoring and disk abnormality monitoring between database servers. Additionally, it issues arbitration requests to the arbitration server.
Mirroring Controller monitoring process	Performs heartbeat monitoring of the Mirroring Controller process. If the Mirroring Controller process returns no response or is down, the monitoring process is restarted automatically.

1.2.2.2 Arbitration Server Process

The only arbitration process is the Mirroring Controller arbitration process.

Process type	Description
Mirroring Controller arbitration process	Performs rechecks for issues detected on the primary server or the standby server. Additionally, this process performs fencing if it determines that there is an issue on the primary server or the standby server.

1.2.3 Redundancy of the Admin and Log Transfer Networks

The admin network is an important one, because it is used by Mirroring Controller to check the status of each server.

Additionally, the log transfer network is an important one, because it is necessary to ensure data freshness.

Accordingly, configure a failure-resistant network by implementing network redundancy via channel bonding provided by the operating system or network driver vendor.

1.2.4 Notes on CPU Architecture and Products

Use the same CPU architecture (endian) for the primary server, standby server, and the arbitration server.

A server using only PostgreSQL streaming replication cannot be specified as the database multiplexing system log transfer destination.

1.3 Deciding on Operation when a Heartbeat Abnormality is Detected

The operation to be performed when a heartbeat abnormality is detected using operating system/server heartbeat monitoring is decided on according to the environment where database multiplexing mode is performed or the operating method.

It is possible to select from the four operations below, and specify this in the parameters of Mirroring Controller:

- Use the arbitration server to perform automatic degradation (switch/disconnect)
- Call the user exit (user command) that will perform the degradation decision, and perform automatic degradation
- Notification messages
- Perform automatic degradation unconditionally (switch/disconnect)

The table below shows if jobs can be continued on the primary server when an issue is detected during heartbeat monitoring of the operating system/server.

Continuation of jobs on the primary server when an issue is detected during heartbeat monitoring of the operating system/server

Operation	Abnormal event				
	Server/operating system failures or no responses		Admin network issue	Log transfer network issue	Issue on a network for both admin and log transfer
	Primary server	Standby server			
Automatic degradation using the arbitration server	Y (switch)	Y (disconnect)	Y	Y (disconnect)	Y (disconnect)
Call a user exit and perform automatic degradation	Y (switch)	Y (disconnect)	Y	Y (disconnect)	Y (disconnect)
Notification messages	N (message notification only)	N (message notification only)	Y	Y (disconnect)	Y (disconnect)
Unconditional automatic degradation	Y (switch)	Y (disconnect)	N (split brain occurs)	Y (disconnect)	N (split brain occurs)

Y: Job can be continued

N: Job cannot be continued

1.4 Security in Database Multiplexing

The database server replicates the database on all servers that comprise the cluster system. It achieves this by transferring and reflecting the updated transaction logs of the database from the primary server to the standby server.

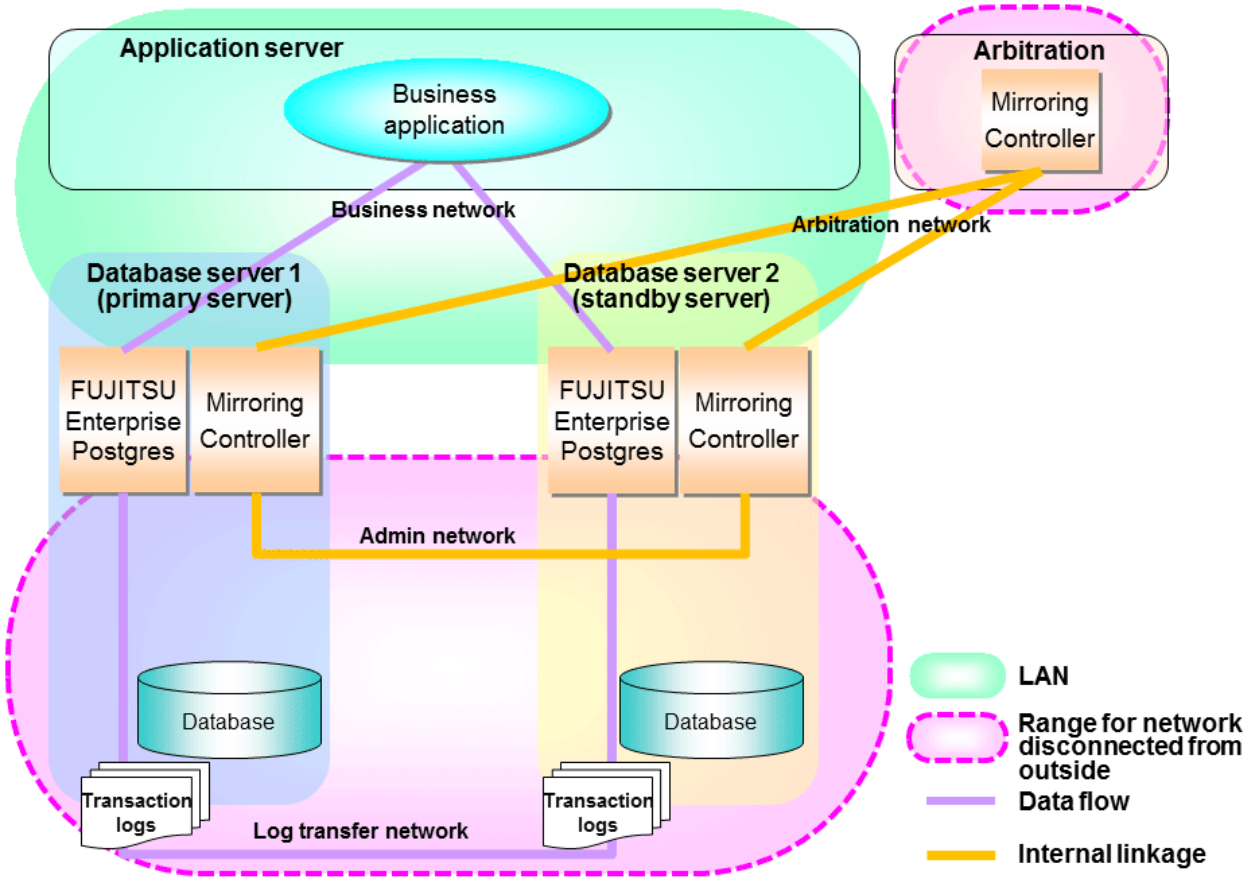
To safeguard the database against unauthorized access and preserve data confidentiality in transaction log transfers, carefully consider security and take note of the following when performing database multiplexing:

- Do not use trust authentication when using replication connection.
- Configure the admin network and the log transfer network so that they cannot be connected from the outside, as shown in Figure 1.7 Security.

Additionally, for the line on which Mirroring Controller connects from the database server to the arbitration server, take note of the following points and consider security carefully.

- Build a network with the arbitration server disconnected from outside, as shown in Figure 1.7 Security.

Figure 1.7 Security



However, it may not always be possible to adopt the configuration mentioned above. For example, you may want to place the servers in a nearby/neighboring office to minimize network delays.

In this case, combine the following features to enhance security:

- Authentication of the Standby Server
- Encryption of Transaction Logs Transferred to the Standby Server

When these features are combined, security will be achieved as shown below.

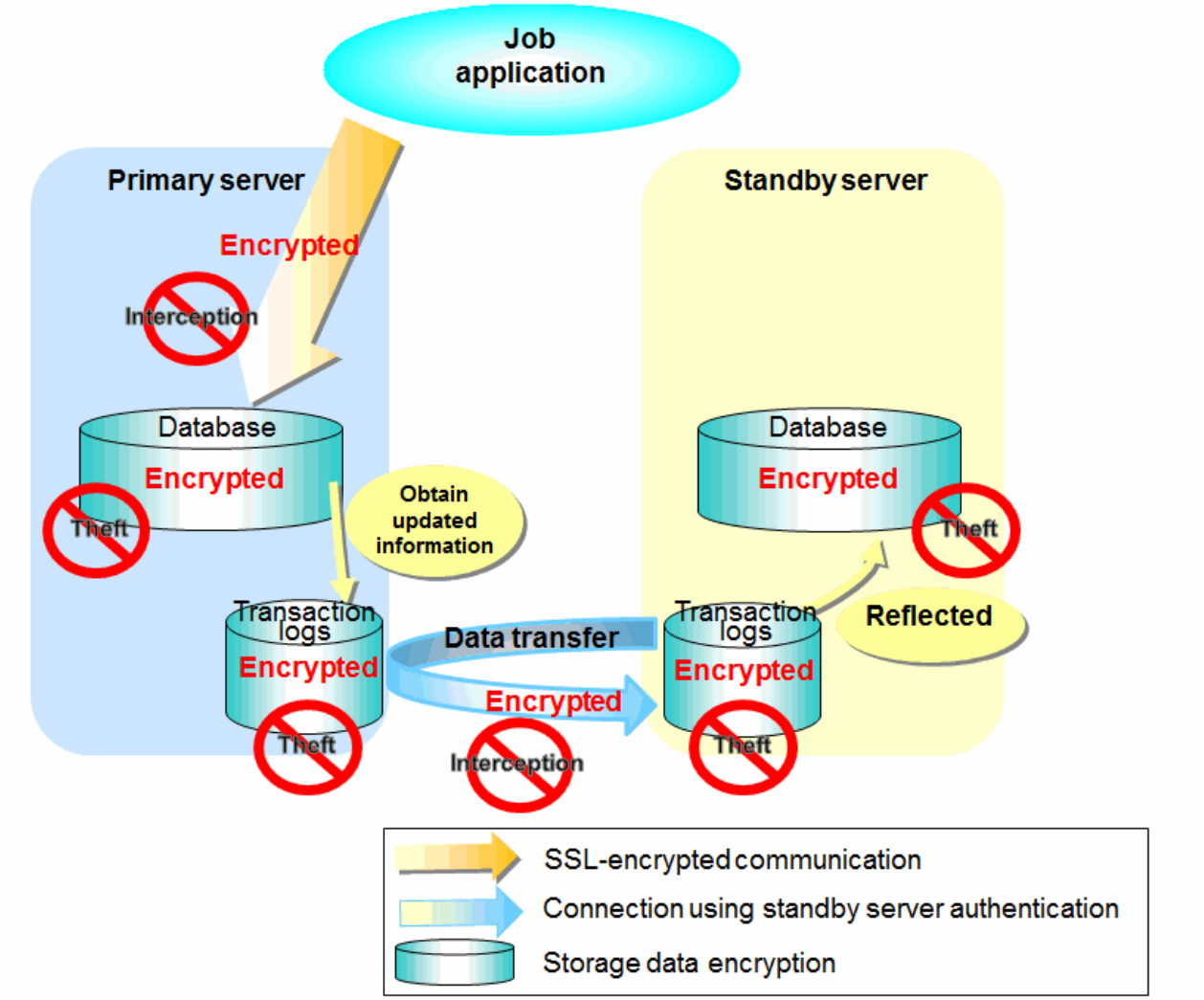
Point

If the job network is disconnected from outside, it can be used as the arbitration network. However, if a network is to be used as both a job network and arbitration network, consider the load on the network.

Note

If a port is blocked (access permission has not been granted) by a firewall, etc., enable use of the target port by granting access. Refer to the vendor document for information on how to open (grant access permission to) a port. Consider the security risks carefully when opening ports.

Figure 1.8 Security achieved when standby server authentication is combined with transaction log encryption



See

Refer to "Performing Database Multiplexing" under "Configuring Secure Communication Using Secure Sockets Layer" in the Operation Guide for information on encrypting SSL communications.

1.4.1 Authentication of the Standby Server

You can prevent spoofing connections from an external server purporting to be the standby server by using authentication with a user name and password.

Configure the setting in the primary server pg_hba.conf file so that authentication is performed for connections from the standby server in the same way as for connections from the client.

Refer to "Client Authentication" in the PostgreSQL Documentation for information on content that can be configured in pg_hba.conf.

1.4.2 Encryption of Transaction Logs Transferred to the Standby Server

In case the authentication of the standby server is breached so that a malicious user purporting to be the standby server can spoof data, the transaction log data can be encrypted to prevent it from being deciphered. The transparent data encryption feature is used to encrypt the data.

Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for details.

Chapter 2 Setting Up Database Multiplexing Mode

This chapter describes how to set up database multiplexing mode, and how to check it.

Users who perform setup and operations on the database server

Setup and operations of the database server must be performed by the instance administrator user.

Users who perform setup and operations on the arbitration server

The following users may perform setup and operations on the arbitration server when it is used for automatic degradation.

Linux

Any operating system user.

Windows

Any user with administrator privileges. This user must be assigned the "Log on as a service" user right.

Point

- Mirroring Controller selects a database superuser as the user who will connect to the database instance. This enables instance administrator users and database superusers who operate the Mirroring Controller commands to run database multiplexing mode in different environments.
- The application name for connecting to the database instance is "mc_agent".

Matching the system times

Before starting the setup, ensure that the times in the primary server, standby server and arbitration server match, by using the operating system time synchronization feature, for example.

The tolerated difference is approximately one second.

If the system times are not synchronized (because the tolerated difference is exceeded, for example), problem investigation may be affected.

Configuring ICMP

Because the ping command of the operating system is used for heartbeat monitoring of the database server, configure the network so that ICMP can be used on the admin network and the arbitration network. Refer to the relevant operating system procedure for details.

Setup

The setup procedure is shown in the table below. However, the procedure on the arbitration server should be performed only when the arbitration server is used for automatic degradation. A distinction is made between the procedures on the primary server and standby server according to whether the arbitration server is used.

Step	Task			Refer to
	Primary server	Standby server	Arbitration server	
1	Installation			2.1 Installation
2	Preparing the database server		Preparing the arbitration server	2.2 Preparing for Setup
3			Configuring the arbitration server	2.3.1 Configuring the Arbitration Server
4			Creating a user exit	2.3.2 Creating a User Exit for the Arbitration Server

Step	Task			Refer to
	Primary server	Standby server	Arbitration server	
5			Starting the arbitration process	2.3.3 Starting the Mirroring Controller Arbitration Process
6	Setting up database multiplexing mode			2.4.1 Setting Up Database Multiplexing Mode on the Primary Server
7	Creating, setting, and registering the instance			2.4.2 Creating, Setting, and Registering the Primary Server Instance
8	Creating a user exit			2.6 Creating a User Exit for a Database Server
9	Starting Mirroring Controller			2.4.3 Starting Mirroring Controller on the Primary Server
10		Setting up database multiplexing mode		2.5.1 Setting Up Database Multiplexing Mode on the Standby Server
11		Creating, setting, and registering the instance		2.5.2 Creating, Setting, and Registering the Standby Server Instance
12		Creating a user exit		2.6 Creating a User Exit for a Database Server
13		Starting Mirroring Controller		2.5.3 Starting Mirroring Controller on the Standby Server
14	Confirming the streaming replication status			2.7 Confirming the Streaming Replication Status
15	Checking the connection status			2.8.1 Checking the Connection Status on a Database Server
16		Checking the connection status		2.8.1 Checking the Connection Status on a Database Server
17			Checking the connection status	2.8.2 Checking the Connection Status on the Arbitration Server
18	Creating applications			2.9 Creating Applications
19	Checking the behavior			2.10 Checking the Behavior

Explanations for each step are provided below.

Information

- The setup procedure is also the same when changing the mode on a single server to database multiplexing mode. In this case, omit the installation of FUJITSU Enterprise Postgres and the creation of the instance.

  Refer to "3.9.2 Changing from Single Server Mode to Database Multiplexing Mode" for details.

- The primary and standby server can be pseudo-configured on the same server for system testing, for example. In this case, the setup can be performed using the same procedure, however there will be some supplementary steps.

  Before performing the setup, refer to "Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server".

2.1 Installation

Refer to the manuals below, and then install the product.

See

- Refer to the Installation and Setup Guide for Server for details on how to install FUJITSU Enterprise Postgres.
- Refer to the Installation and Setup Guide for Server Assistant for information on installing the Server Assistant on the arbitration server.

Note

Do not use the arbitration server also as a database server. The arbitration server is installed to check the database server status as a third party, and to perform fencing. Using the arbitration server also as a database server nullifies the effectiveness of the arbitration server.

2.2 Preparing for Setup

This section describes the preparation required before setting up Mirroring Controller.

2.2.1 Preparing the Database Server

2.2.1.1 Preparing the Backup Disk

In Mirroring Controller, by performing a backup, recovery is possible even if all server disks are corrupted.

The content on the primary server should be backed up. However, through switching and failback, the standby server may also become the primary server. Accordingly, prepare each of the backup disk devices for the primary and standby servers. Perform backup on the primary server used at the time of the backup.

2.2.2 Preparing the Arbitration Server

2.2.2.1 Preparing to Output Error Logs to the Event Log (Windows)

This section explains the preparatory tasks for outputting error logs to the event log.

Note

If no event source name is registered, messages output to the event log may be incomplete.

Configuring each server

Event logs for the Mirroring Controller commands on the arbitration server may be output with the default event source name "MirroringControllerArbiter". Therefore, register this default event source name beforehand.

```
Example)
The following is an example in which the DLL of a 64-bit product is registered under the default event
source name. Note that "<x>" indicates the product version.
```

```
> regsvr32 "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib\mcarbevent.dll"
```

Setting each instance

You can output messages to any event source named by the user, so that messages output to the event log can be identified by each instance.

```
Example)
The following is an example in which the DLL of a 64-bit product is registered under the event source
name "Mirroring Controller arbiter1". Note that "<x>" indicates the product version.
```

```
> regsvr32 /n /i:"Mirroring Controller arbiter1" "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib
\mcarbevent.dll"
```

The parameter must be edited for each instance. Refer to "A.4.2 Arbitration Configuration File" and set the event_source parameter.

If installing multiple versions

If FUJITSU Enterprise Postgres is already installed on the same machine, search for the key below in Registry Editor, and make a note of the path of the registered DLL. Afterwards, register a new DLL using the default event source name.

Use the DLL path that you made a note of in the above step when re-registering the default event source name during uninstallation.

```
MirroringControllerArbiter
```

2.2.2.2 Security Policy Settings (Windows)

On the arbitration server, operating system user accounts that operate the Mirroring Controller arbitration process must be assigned the "Log on as a service" user right in order to use Windows Services to start and stop the Mirroring Controller arbitration process.

If the security settings to enable this have not been configured, refer to "E.1 Security Policy Settings" and configure the settings.

2.3 Setting Up the Arbitration Server

This section explains how to set up the arbitration server.

2.3.1 Configuring the Arbitration Server

This section explains how to set up database multiplexing mode on the arbitration server.

In database multiplexing mode, the files that are required for operations are managed in the Mirroring Controller arbitration process management directory.

There is one Mirroring Controller arbitration process management directory for each arbitration process.

Point

The arbitration process for each database multiplexing system can be started on a single arbitration server.

See

- Refer to the Reference for information on the mc_arb command.
- Refer to "Appendix A Parameters" for information on the parameters to be edited for the setup.

Perform the following procedure:

Linux

1. On the arbitration server, log in as any operating system user who starts and stops the arbitration process.
2. Configure the environment variables.

   Set the following environment variables:

   - PATH

     Add the installation directory "/bin".

   - MANPATH

     Add the installation directory "/share/man".

- LD_LIBRARY_PATH

  Add the installation directory "/lib".

Example

The following example configures environment variables when the installation directory is "/opt/fsepv<*x*>assistant".

Note that "<*x*>" indicates the product version.

sh, bash

```
$ PATH=/opt/fsepv<x>assistant/bin:$PATH ; export PATH
$ MANPATH=/opt/fsepv<x>assistant/share/man:$MANPATH ; export MANPATH
$ LD_LIBRARY_PATH=/opt/fsepv<x>assistant/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
```

csh, tcsh

```
$ setenv PATH /opt/fsepv<x>assistant/bin:$PATH
$ setenv MANPATH /opt/fsepv<x>assistant/share/man:$MANPATH
$ setenv LD_LIBRARY_PATH /opt/fsepv<x>assistant/lib:$LD_LIBRARY_PATH
```

If you execute any command other than FUJITSU Enterprise Postgres (OS commands, etc.) after LD_LIBRARY_PATH is set, remove the installation directory/lib from LD_LIBRARY_PATH.

3. Create the Mirroring Controller arbitration process management directory that will store the files required by the arbitration server.

   Use ASCII characters in the Mirroring Controller arbitration process management directory.

4. In the network configuration file (network.conf), define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Create network.conf in the Mirroring Controller arbitration process management directory, based on the sample file. For network.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1.

   If users other than this are granted access permissions, the mc_arb command will not work. Accordingly, users other than the operating system user who starts and stops the arbitration process in step 1 are prevented from operating the Mirroring Controller arbitration process.

   Sample file

   ```
   /installDir/share/mcarb_network.conf.sample
   ```

   In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Refer to "A.3 Network Configuration File" for details.

   A definition example is shown below.

   ```
   Example)
   The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
   "27541".
   ```

   ```
   server1 192.0.3.100 27541
   server2 192.0.3.110 27541
   ```

5. In the arbitration configuration file (arbitration.conf), define the information related to control of the Mirroring Controller arbitration process.

   Create arbitration.conf in the Mirroring Controller arbitration process management directory, based on the sample file. For arbitration.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work.

Sample file

```
/installDir/share/mcarb_arbitration.conf.sample
```

Set the parameters shown in the table below in arbitration.conf.

Table 2.1 Parameters

Parameter	Content specified	Remarks
port	Port number of the Mirroring Controller arbitration process	The port number must be 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	IPv4 and IPv6 addresses can be specified. Specify the IP address, enclosed in single quotation marks (').
syslog_ident	'*programName*'	Specify using single quotation marks (') to enclose the program name used to identify the Mirroring Controller arbitration process message in the system log. Use ASCII characters excluding spaces to specify this parameter. The default is 'MirroringControllerArbiter'.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/arbiter/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where it is determined that an error has occurred. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
fencing_command_timeout	Timeout for fencing command (seconds)	If the command does not respond within the specified number of seconds, it is determined that fencing has failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Information

Refer to "A.4.2 Arbitration Configuration File" for information on the parameters and for other parameters.

Windows

1. On the arbitration server, log in as any operating system user who starts and stops the arbitration process.
2. Configure the environment variables.

   Set the following environment variable:

   - PATH

     Add the installation folders "\bin" and "\lib".

Example

The following example configures environment variables when the installation folder is "c:\Program Files\Fujitsu \fsepv<*x*>assistant64".

Note that "<*x*>" indicates the product version.

```
> SET PATH=c:\Program Files\Fujitsu\fsepv<x>assistant64\bin;c:\Program Files\Fujitsu
\fsepv<x>assistant64\lib;%PATH%
```

3. Create the Mirroring Controller arbitration process management directory that will store the files required by the arbitration server.

   Use ASCII characters in the Mirroring Controller arbitration process management directory.

4. In the network configuration file (network.conf), define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Create network.conf in the Mirroring Controller arbitration process management directory, based on the sample file.

   Sample file

   ```
   installDir\share\mcarb_network.conf.sample
   ```

   In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Refer to "A.3 Network Configuration File" for details.

   A definition example is shown below.

   ```
   Example)
   The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
   "27541".
   ```

   ```
   server1 192.0.3.100 27541
   server2 192.0.3.110 27541
   ```

5. Change the access permissions for network.conf.

   For network.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work. Accordingly, users other than the operating system user who starts and stops the arbitration process in step 1 are prevented from operating the Mirroring Controller arbitration process.

   ```
   Example)
   The following is an execution example, in which the operating system user who starts and stops the
   arbitration process in step 1 is granted full access permissions as the owner when the user is
   "fsepuser". The following procedure applies when the user is logged in to the Windows server as
   "fsepuser".
   ```

   ```
   > takeown /f network.conf
   > icacls network.conf /reset
   > icacls network.conf /inheritance:r
   > icacls network.conf /grant fsepuser:F
   ```

6. In the arbitration configuration file (arbitration.conf), define the information related to control of the Mirroring Controller arbitration process.

   Create arbitration.conf in the Mirroring Controller arbitration process management directory, based on the sample file.

   Sample file

   ```
   installDir\share\mcarb_arbitration.conf.sample
   ```

   Set the parameters shown in the table below in arbitration.conf.

Table 2.2 Parameters

Parameter	Content specified	Remarks
port	Port number of the Mirroring Controller arbitration process	The port number must be 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	IPv4 and IPv6 addresses can be specified. Enclose the parameter value in single quotation marks (').
service_name	'*registeredServiceNameOfArbitrationProcessInWindowsServices*'	Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter. Enclose the parameter value in single quotation marks ('). The maximum length of the service name is 124 bytes.
event_source	'*eventSourceNameUsedToIdentifyArbitrationProcessMsgInEventLog*'	Use ASCII characters excluding spaces to specify this parameter. Enclose the parameter value in single quotation marks ('). The maximum length of the event source name is 255 bytes.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\arbiter\\fencing_dir\\execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where it is determined that an error has occurred. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes. Any multibyte characters must use the same encoding as the operating system.
fencing_command_timeout	Timeout for fencing command (seconds)	If the command does not respond within the specified number of seconds, it is determined that fencing has failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Information

Refer to "A.4.2 Arbitration Configuration File" for information on the parameters and for other parameters.

7. Change the access permissions for arbitration.conf.

   For arbitration.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work.

Example)
The following is an execution example, in which the operating system user who starts and stops the arbitration process in step 1 is granted full access permissions as the owner when the user is "fsepuser". The following procedure applies when the user is logged in to the Windows server as "fsepuser".

```
> takeown /f arbitration.conf
> icacls arbitration.conf /reset
> icacls arbitration.conf /inheritance:r
> icacls arbitration.conf /grant fsepuser:F
```

8. Configure Windows Firewall.

   If Windows Firewall is used, enable the port number of Mirroring Controller specified in the network configuration file in step 3. Refer to "E.2 Windows Firewall Settings" for details.

9. Register the Mirroring Controller arbitration process as a Windows service.

   Execute the mc_arb command in register mode.

   For the -P option of the mc_arb command, specify the password of the operating system user who executes the command.

   Example)

```
> mc_arb register -M D:\mcarb_dir\arbiter1 -P ********
```

Note

When specifying the password in the -P option of the mc_arb command, for security reasons, you should be careful not to allow other users to access it.

Information

Use the mc_arb command with the -S option to specify automatic start and stop of the Mirroring Controller arbitration process. Refer to "2.13 Setting Automatic Start and Stop of the Mirroring Controller Arbitration Process" for details.

The Mirroring Controller arbitration process is registered as a Windows service using the service name specified in the service_name parameter of arbitration.conf in step 6.

You can execute the sc qc command to check the registration status.

2.3.2 Creating a User Exit for the Arbitration Server

The only user exit for the arbitration server is the fencing command.

The fencing command is a user command that is called by the Mirroring Controller arbitration process if Mirroring Controller performs arbitration processing and determines that a database server is unstable.

In the fencing command, the user implements a process that isolates a database server from a cluster system by, for example, stopping the target operating system or server. The fencing command that was created is to be specified for the parameter in the arbitration configuration file. Refer to "A.4.2 Arbitration Configuration File" for information on the parameters.

- Fencing the primary server during the switch
  - Prevent the Mirroring Controller management process on the primary server from communicating with the Mirroring Controller management process on the other server.
  - Prevent applications from connecting to the primary server instance.
- Fencing the standby server during disconnection
  - Prevent the Mirroring Controller management process on the standby server from communicating with the Mirroring Controller management process on the other server.

- Prevent applications from connecting to the standby server instance.
- Prevent the standby server from continuing streaming replication.

See

Refer to "Appendix C User Commands" for information on user exits.

2.3.3 Starting the Mirroring Controller Arbitration Process

This section explains how to start the Mirroring Controller arbitration process.

An operating system user who has logged in to the arbitration server can start the Mirroring Controller arbitration process by executing the mc_arb command in start mode.

Linux

```
Example)
```

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Windows

```
Example)
```

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

2.4 Setting Up the Primary Server

This section explains how to set up the primary server.

2.4.1 Setting Up Database Multiplexing Mode on the Primary Server

This section explains how to set up database multiplexing mode on the primary server.

In database multiplexing, the files that are required for operations are managed in the Mirroring Controller management directory.

There is one Mirroring Controller management directory for each instance.

Note

- Do not place the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake with the directories managed by FUJITSU Enterprise Postgres, and an old version of files may be restored.

See

- Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for details on the directories that are managed by FUJITSU Enterprise Postgres.
- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Appendix A Parameters" for details on each parameter to be edited for the setup.

Perform the following procedure:

1. Log in to the primary server.

2. Create the Mirroring Controller management directory that will store the files required by database multiplexing.

   Use ASCII characters in the Mirroring Controller management directory.

   Additionally, grant "Write" permission to the instance administrator user for the Mirroring Controller management directory.

3. In the network configuration file (network.conf), define the network configuration that will link between the Mirroring Controller processes.

   Create the network.conf file in the Mirroring Controller management directory, based on the sample file. For network.conf, set read and write permissions for the instance administrator user only.

   If users other than the instance administrator user are granted access, the mc_ctl command will not work. In this way, users other than the instance administrator user are prevented from operating Mirroring Controller.

   Sample file

   ```
   /installDir/share/mc_network.conf.sample
   ```

   In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the network configuration that will link between the Mirroring Controller processes, and between Mirroring Controller processes and the Mirroring Controller arbitration process.

   Refer to "A.3 Network Configuration File" for details.

   A definition example is shown below.

   The content to be defined depends on the operation settings at the time a heartbeat abnormality is detected.

   When automatic degradation by the arbitration server is selected

   ```
   Example)
   The IDs of the primary server and standby server are set to "server1" and "server2", and their
   port numbers are set to "27540" and "27541". The ID of the server of the Mirroring Controller
   arbitration process is set to "arbiter", and its port number is set to "27541".
   ```

   ```
   server1 192.0.2.100,192.0.3.100 27540,27541 server
   server2 192.0.2.110,192.0.3.110 27540,27541 server
   arbiter 192.0.3.120 27541 arbiter
   ```

   Ensure that the port numbers set for the primary server, standby server, and arbitration server do not conflict with other software. In addition, when the arbitration server is used for automatic degradation, use a network in which the arbitration network is not affected by a line failure in the admin network.

   When the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:

   - IP address or host name of the database server used as the admin network
   - IP address or host name of the database server used as the arbitration network
   - Port number of the database server used as the admin network
   - Port number of the database server used as the arbitration network

   If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf of the arbitration server.

   When operation other than automatic degradation by the arbitration server is selected

   ```
   Example)
   The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
   "27540".
   ```

   ```
   server1 192.0.2.100 27540
   server2 192.0.2.110 27540
   ```

   Ensure that the port numbers for the primary and standby server do not conflict with other software.

   Register in /etc/services the port number of the primary server, because programs such as WebAdmin use it to search for available port numbers.

Register any name as the service name.

4. Define the information related to Mirroring Controller monitoring and control in the *serverIdentifier*.conf file.

   Create the *serverIdentifier*.conf file in the Mirroring Controller management directory, based on the sample file.

   For *serverIdentifier*.conf, set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access, the mc_ctl command will not work.

   As the file name for the *serverIdentifier*.conf file, use the server identifier name that was specified in the network.conf file in step 3.

   Sample file

   ```
   /InstallDir/share/mc_server.conf.sample
   ```

   Set the parameters shown in the table below in the *serverIdentifier*.conf file.

Table 2.3 Parameters

Parameter	Content specified	Remarks
db_instance	'*dataStorageDestinationDir*'	Use ASCII characters, enclosed in single quotation marks (').
db_instance_password	'*passwordOfInstanceAdminUser*'	If password authentication is performed, you must specify this parameter in the settings used when Mirroring Controller connects to a database instance. Use ASCII characters, enclosed in single quotation marks ('). If the specified value of this parameter includes ' or \, write \' or \\, respectively.
enable_hash_in_password	on or off	Specify on to treat the # in the db_instance_password specification as a password character, or off to treat it as a comment. The default is "off".
syslog_ident	'*programName*'	Specify the program name to be used to identify the Mirroring Controller messages in the system log. Use ASCII characters excluding spaces, enclosed in single quotation marks ('). Use the same program name as the parameter in the postgresql.conf file ensures that the Mirroring Controller output content can be referenced transparently, so log reference is easy.
remote_call_timeout	Admin communication timeout	Specify the timeout value (milliseconds) of the Mirroring Controller agent process for communication between servers. Specify a value that is less than the operation system TCP connection timeout.
heartbeat_error_action	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring	arbitration: Perform automatic degradation using the arbitration server. command: Call a user exit to determine degradation, and perform automatic degradation if required. message: Notify messages.

Parameter	Content specified	Remarks
		fallback: Perform automatic degradation unconditionally. Set the same value on the primary server and standby server.
heartbeat_interval	Interval time for abnormality monitoring during heartbeat monitoring of the operating system or server (milliseconds)	Abnormality monitoring of the operating system or server is performed at the interval (milliseconds) specified in heartbeat_interval. This parameter setting is used as the default for database process heartbeat monitoring, streaming replication abnormality monitoring, and disk abnormality monitoring. When setting the monitoring time, there are some considerations to take into account to optimize degradation using abnormality monitoring. Refer to "2.11.4.1 Tuning for Abnormality Monitoring of the Operating System or Server" for details.
heartbeat_timeout	Timeout for abnormality monitoring during heartbeat monitoring of the operating system or server (seconds)	
heartbeat_retry	Number of retries for abnormality monitoring during heartbeat monitoring of the operating system or server (number of times)	
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/mc/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Enclose the path in single quotation marks ('). This parameter must be specified when "command" is set for heartbeat_error_action. Specify the path using less than 1024 bytes.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
arbitration_timeout	Timeout for arbitration processing in the Mirroring Controller arbitration process (seconds)	The specified value must be at least equal to the heartbeat monitoring time of the operating system or server + fencing_command_timeout in the arbitration configuration file. If there is no response for at least the number of seconds specified, the primary server will not be switched and the standby server will not be disconnected. Therefore, perform degradation manually. Specify a value between 1 and 2147483647. This parameter does not need to be set for operation that does not use the arbitration server.
arbitration_command	'*arbitrationCmdFilePath*' [Setting example]	Specify the full path of the arbitration command to be executed when an abnormality is detected during heartbeat monitoring of the operating system or server.

Parameter	Content specified	Remarks
	arbitration_command = '/mc/arbitration_dir/execute_arbitration_command.sh'	Enclose the path in single quotation marks ('). This parameter must be specified when "command" is set for heartbeat_error_action. Specify the path using less than 1024 bytes.
arbitration_command_timeout	Timeout for arbitration command (seconds)	If the arbitration command does not respond within the specified number of seconds, it is determined that execution of the arbitration command has failed and a signal (SIGTERM) is sent to the arbitration command execution process. Specify a value between 1 and 2147483647. This parameter can be specified only when "command" is set for heartbeat_error_action.

Information

Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the parameters and for other parameters.

2.4.2 Creating, Setting, and Registering the Primary Server Instance

This section explains how to create, set, and register the primary server instance.

See

- Refer to "Client Authentication" in the PostgreSQL Documentation for information on the pg_hba.conf file.
- Refer to "A.1 Parameters Set on the Primary Server" for information on the postgresql.conf file.
- Refer to "mc_ctl" in Reference for information on the command.

Perform the following procedure:

1. Refer to "Setup" in the Installation and Setup Guide for Server, and then perform the FUJITSU Enterprise Postgres setup and create the FUJITSU Enterprise Postgres instance.

   Use ASCII characters in the data storage destination directory.

   ### Note

   - If degradation starts occurring due to an error during operations in database multiplexing mode, recovery is required for the standby server. There are some conditions to execute the pg_rewind command to recover the standby server. One of the conditions can be satisfied by enabling checksums when executing the initdb command. This is not mandatory. Refer to "4.1.1.1.3 Identify cause of error and perform recovery" for details.

2. When using transparent data encryption, configure the encryption settings for the storage data.

   Create the keystore file.

   Refer to "Database Multiplexing Mode" in the Operation Guide for details, and then configure the settings.

3. Add the following entry to the pg_hba.conf file to authenticate connections from the standby server.

   Copy the file to the standby server later.

```
# TYPE    DATABASE        USER        ADDRESS                         METHOD
  host    replication     fsep        standbyServerAddress        authenticationMethod
  host    replication     fsep        primaryServerAddress        authenticationMethod
```

For the primary and standby server addresses, specify the IP address that will connect to the log transfer network.

Additionally, all servers can be used as the primary server or the standby server, so add entries for the addresses of all servers that comprise the database multiplexing system.

Point

Setting an authentication method other than trust authentication

If the primary server becomes the standby server, to perform automatic authentication of connections to the primary server, create the .pgpass file in the home directory of the instance administrator user, and then specify a password for the replication database. Accordingly, the instance administrator operating system user and the user registered in the database will be the same, so you can verify that the connection was not made by an unspecified user. Additionally, the password that was set beforehand will be used in the authentication, so that the connection will be automatic.

Note

If trust authentication is set, all OS users who can log in to the primary server will be able to connect, and if one of these is a malicious user, then that user can corrupt the standby server data, or cause the job system to fail, by sending an erroneous transaction log. Therefore, decide on the authentication method according to the security requirements of the system using database multiplexing mode.

Refer to "Authentication Methods" in the PostgreSQL Documentation for details on the authentication methods that can be set.

4. Configure this setting to enable the instance administrator user of the primary server to connect as a database application.

   This setting enables the connection to the instance using the user name of the instance administrator user, so that Mirroring Controller can monitor instance errors. Configure this setting to enable the connection to the postgres database.

   - If password authentication is used

     In the db_instance_password parameter of the *serverIdentifier*.conf file, specify the password for the instance administrator user. This password is used to connect to the database instance. If a password is not specified in the db_instance_password parameter, the connection to the database instance from Mirroring Controller will fail, and it will not be possible to perform the process monitoring of the instance.

   - If password authentication is not used

     There is no need to specify the password in the db_instance_password parameter.

     Even if the password for the instance administrator user is specified in the db_instance_password parameter, it will be ignored.

   - If certificate authentication using SSL is used

     Specify connection parameters for SSL in the db_instance_ext_ pq_conninfo parameter and db_instance_ext_jdbc_conninfo parameter in the *serverIdentifier*.conf file. If the pasrameters are not specified, the connection to the database instance from Mirroring Controller will fail, and it will not be possible to perform the process monitoring of the instance. If certificate authentication using SSL is not performed, the parameters specification is not required.

   An example of setting the authentication method is shown below.

```
# TYPE    DATABASE        USER        ADDRESS         METHOD
  host    postgres        fsep        127.0.0.1/32    authenticationMethod
```

Note

Mirroring Controller uses the PostgreSQL JDBC 4.2 driver to connect to the database instance. Therefore, for the authentication method, specify a method supported by the JDBC driver. If an authentication method not supported by the JDBC driver is specified,

Mirroring Controller will fail to start. Refer to the PostgreSQL JDBC Driver Documentation for information on authentication methods supported by the JDBC driver.

5. To use database multiplexing mode, specify the parameters shown in the table below in the postgresql.conf file.

   The postgresql.conf file is copied when the standby server instance is created. Accordingly, set the required parameters in the standby server.

   To use database multiplexing mode, specify the parameters shown in the table below in the postgresql.conf file. After editing the postgresql.conf file, restart the instance.

Table 2.4 Parameters

Parameter	Content specified	Remarks
wal_level	replica or logical	Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*standbyServerName*'	Specify the name that will identify the standby server. Enclose the name in single quotation marks ('). Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the primary server may be deleted. Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WAL save size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred in the transaction log transfer on the primary server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
archive_mode	on	Specify the archive log mode.
archive_command	'*installDir*/bin/pgx_walcopy.cmd "%p" "*backupDataStorageDestinationDirectory*/archived_wal/%f"'	Specify the command and storage destination to save the transaction log.

Parameter	Content specified	Remarks
backup_destination	Backup data storage destination directory	Specify the name of directory where to store the backup data. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers, so that the backup data of other servers can be used to perform recovery.
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the heartbeat monitoring time of the database process, you can unify the time after which it is determined that an error has occurred.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally. However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is "on" or "remote_apply" to prevent data loss caused by operating system or server down immediately after a switch or switch.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

*1: Number of simultaneous executions of the mc_ctl command in the status mode.

2.4.3 Starting Mirroring Controller on the Primary Server

This section explains how to start Mirroring Controller on the primary server.

When the arbitration server is used for automatic degradation, start the Mirroring Controller arbitration process on the arbitration server in advance.

1. Start the Mirroring Controller process.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

   ```
   $ mc_ctl start -M /mcdir/inst1
   ```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

   ```
   $ mc_ctl start -M /mcdir/inst1 -F
   ```

   Note

   - When the arbitration server is used for automatic degradation, the database server must connect to the arbitration server, and as a result, Mirroring Controller startup may take longer than when the arbitration server is not used.
   - If the parameter for heartbeat monitoring of operating systems or servers set by the abitration server is greater than parameter for heartbeat monitoring of operating systems and servers of the Mirroring Controller, the Mirroring Controller may fail to start. In this case, check the contents of the message notification and review the parameters for heartbeat monitoring of operating systems or servers for the arbitration server or Mirroring Controller.
   - If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - switch/disconnection is not performed.
   - Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore ensure that the admin network is connected before starting Mirroring Controller.

   Point

   - The mc_ctl command fails if the Mirroring Controller arbitration process has not been started on the arbitration server when the arbitration server is used for automatic degradation. However, if the Mirroring Controller arbitration process cannot be started in advance, it can be started by specifying the --async-connect-arbiter option in the mc_ctl command.
   - After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

2. Obtain the backup.

   Use the pgx_dmpall command to collect the backup.

2.5 Setting Up the Standby Server

This section explains how to set up the standby server.

2.5.1 Setting Up Database Multiplexing Mode on the Standby Server

This section explains how to set up database multiplexing mode on the standby server.

In database multiplexing, the files that are required for operations are managed in the Mirroring Controller management directory.

There is one Mirroring Controller management directory for each instance.

Note

- Do not place the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake with the directories managed by FUJITSU Enterprise Postgres, and an old version of files may be restored.
- When creating a standby server for a large database, stop job system operations, specify a large value for the wal_keep_size parameter, or use replication slots.
  This is because WALs generated after the standby server is built using the pg_basebackup command, but before it is started, need to be retained. However, the number of WAL segments that can be retained is constrained by the wal_keep_size parameter.
  Additionally, setting the wal_keep_size parameter requires consideration regarding stabilization of the database multiplexing mode (refer to "2.11.1 Tuning to Stabilize the Database Multiplexing Mode" for details).

See

- Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for details on the directories that are managed by FUJITSU Enterprise Postgres.
- Refer to "pg_basebackup" in "Reference" in the PostgreSQL Documentation for information on the pg_basebackup command.
- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Appendix A Parameters" for details on each parameter to be edited for the setup.
- Refer to "Replication Slots" in the PostgreSQL Documentation for information on replication slots.

Perform the following procedure:

1. Log in to the standby server.
2. Create the Mirroring Controller management directory that will store the files required by database multiplexing.

   Use ASCII characters in the Mirroring Controller management directory.

   Additionally, grant "Write" permission to the instance administrator user for the Mirroring Controller management directory.
3. Copy, and then deploy, the network.conf file of the primary server.

   Copy the network.conf file that was defined in the primary server setup, and deploy it to the Mirroring Controller management directory of the standby server.

   Set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access, the mc_ctl command will not work. Accordingly, users other than the instance administrator user are prevented from operating Mirroring Controller.

   Register in /etc/services the port number of the standby server that was specified in the network.conf file, because programs such as WebAdmin use it to search for available port numbers.

   Register any name as the service name.
4. Copy, and then deploy, the *serverIdentifier*.conf file of the primary server.

   Copy the *serverIdentifier*.conf file that was defined in the primary server setup, and deploy it to the Mirroring Controller management directory of the standby server.

   Set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access permissions, the mc_ctl command will not work.

2.5.2 Creating, Setting, and Registering the Standby Server Instance

This section explains how to create, set, and register the standby server instance.

See

- Refer to "Appendix A Parameters" for details on each parameter.
- Refer to "mc_ctl" in Reference for information on the command.

Perform the following procedure:

1. Set the kernel parameters.

   Refer to "Configuring Kernel Parameters" in the Installation and Setup Guide for Server for details.

2. When using transparent data encryption, configure the encryption settings for the storage data.

   Deploy a copy of the keystore file of the primary server on the standby server.

   Refer to "Database Multiplexing Mode" in the Operation Guide for details.

3. Execute the pg_basebackup command to create a copy of the primary server instance on the standby server.

   Example)

   ```
   $ pg_basebackup -D /database/inst1 -X fetch --waldir=/transaction/inst1 --progress --verbose -R
   --dbname='application_name=standbyServerName' -h primaryServerIpAddress -p
   primaryServerPortNumber
   ```

Note

- Use the pg_basebackup command with the -R option to create a standby.signal file. If you do not create the standby.signal file, the Mirroring Controller cannot be started as a standby server.
- If using a method that requires password authentication for connections to the primary server, you will need to ensure that authentication is performed automatically. If the -R option is specified for the pg_basebackup command and the password parameter is specified for the --dbname option, the pg_basebackup command will set the password in the primary_conninfo parameter in postgresql.auto.conf file, enabling connections to be performed automatically.

  If a password is not set in the primary_conninfo parameter in postgresql.auto.conf file, it will be necessary to create a .pgpass file in the home directory of the instance administrator user, and specify a password for the replication database.
- The primary_conninfo parameter should not be set in the postgresql.conf file, but only in the postgresql.auto.conf file using the pg_basebackup command.
- When executing the pg_basebackup command, consider the following for collection of transaction logs.
  - When "fetch" is specified for the -X option of the command

    Transaction logs are collected at the end of the backup, so it is necessary to ensure that transaction logs that occur during backup are not deleted from the primary server. Therefore, allow for a sufficient value for the wal_keep_size parameter in postgresql.conf.
  - When the -X option is omitted or "stream" is specified for the -X option of the command

    Transaction logs are streamed, so when Mirroring Controller is running on the primary server, the connection is changed to a synchronous standby server on detection of a streaming replication connection using this command. Therefore, if a job has started on the primary server, the primary server will be impacted, therefore execute this command after stopping only the Mirroring Controller process on the primary server.

See

Refer to "Hot Standby" in the PostgreSQL Documentation for information on the standby.signal file.

4. Set the parameters shown in the table below in the postgresql.conf file.

Table 2.5 Parameters

Parameter	Content specified	Remarks
synchronous_standby_names	'*primaryServerName*'	Required after switching the primary server and then changing the original primary server to the new standby server. Enclose the name in single quotation marks ('). Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.

2.5.3 Starting Mirroring Controller on the Standby Server

This section explains how to start Mirroring Controller on the standby server.

When the arbitration server is used for automatic degradation, start the Mirroring Controller arbitration process on the arbitration server in advance.

1. After ensuring that the Mirroring Controller process of the primary server has started, start Mirroring Controller on the standby server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -f option specified. This action enables automatic switch/disconnection.

   If you start Mirroring Controller and the instance without specifying the -f option, automatic switch/disconnection will not be enabled. To enable both, start Mirroring Controller and then execute the mc_ctl command in enable-failover mode or restart Mirroring Controller with the -f option specified.

   ```
   Example)
   ```

   ```
   $ mc_ctl start -M /mcdir/inst1
   ```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   ```
   Example)
   ```

   ```
   $ mc_ctl start -M /mcdir/inst1 -F
   ```

2. Check the status of the Mirroring Controller process.

   As the instance administrator user, execute the mc_ctl command in status mode. Ensure that "mirroring status" is switchable.

   ```
   Example)
   ```

   ```
   $ mc_ctl status -M /mcdir/inst1
   ```

Note

- When the arbitration server is used for automatic degradation, the time required for the database server to connect to the arbitration server is added on. Therefore, Mirroring Controller startup may take longer than when the arbitration server is not used.
- If the parameter for heartbeat monitoring of operating systems or servers set by the abitration server is greater than parameter for heartbeat monitoring of operating systems and servers of the Mirroring Controller, the Mirroring Controller may fail to start. In this

case, check the contents of the message notification and review the parameters for heartbeat monitoring of operating systems or servers for the arbitration server or Mirroring Controller.

- If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - switch/disconnection is not performed.
- Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore, ensure that the admin network is connected before starting Mirroring Controller.

Point

- The mc_ctl command fails if the Mirroring Controller arbitration process has not been started on the arbitration server when the arbitration server is used for automatic degradation. However, if the Mirroring Controller arbitration process cannot be started in advance, it can be started by specifying the --async-connect-arbiter option in the mc_ctl command.
- After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

2.6 Creating a User Exit for a Database Server

This section explains how to create a user exit for a database server.

The user command types explained below can be used as user exits. These commands are called by Mirroring Controller management processes.

The user can create user exits as required.

Specify the user commands that were created for the parameters in the server configuration file of the database server. Refer to "A.4.1 Server Configuration File for the Database Servers" for information on these parameters.

User command types

- Fencing command

  This user command performs fencing if Mirroring Controller performs arbitration processing and determines that a database server is unstable.

- Arbitration command

  This user command performs arbitration processing in lieu of the arbitration server when there is no arbitration server.

- State transition commands

  These user commands are called when Mirroring Controller performs state transition of a database server.
  It includes the following types:

  - Post-switch command

    This user command is called after a promotion from standby server to primary server.

  - Pre-detach command

    This user command is called before the standby server is disconnected from a cluster system.
    If the pre-detach command is specified on both the primary server and standby server, it is called first on the standby server and then on the primary server.

    If the settings are configured to forcibly stop the instance on the standby server when the standby server is disconnected, the pre-detach command is called on the standby server and then the instance on the standby server is stopped.

- Post-attach command

  This user command is called after the standby server has been attached to a cluster system.
  If the post-attach command is specified on both the primary server and standby server, it is called first on the primary server and then on the standby server.

Point

When the arbitration server is used for automatic degradation and the requirements can be satisfied using the fencing command on the arbitration server only, the fencing command on the database server is not required. In addition, if the requirements can be satisfied using the fencing command on the database server only, create a fencing command on the arbitration server for termination processing only (without implementation).

Table 2.6 Availability of user commands, and database server calling the command

User command	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring				Database server calling the command	
	Message output	Automatic degradation by arbitration server	Automatic degradation by arbitration command	Unconditional automatic degradation	Primary server	Standby server
Fencing command	Y (*1)	Y (*2)	R	N	Y	Y
Arbitration command	N	N	R	N	Y	Y
Post-switch command	Y	Y	Y	Y	Y	N
Pre-detach command	Y	Y	Y	Y	Y	Y (*3)
Post-attach command	Y	Y	Y	Y	Y	Y (*3)

R: Required

Y: Can be used

N: Cannot be used

*1: Called only when the mc_ctl command is used to execute forced switching or forced disconnection.

*2: Creation of a fencing command on a database server is optional, but it must be created on the arbitration server.

*3: If message output or unconditional automatic degradation is selected, this command is called only from the primary server.

See

Refer to "Appendix C User Commands" for information on the interface for each user command.

2.7 Confirming the Streaming Replication Status

Before performing the setup of the database multiplexing mode, ensure that the prerequisite streaming replication feature has been set up correctly.

Perform the following procedure:

1. On the primary server, ensure that single-row searches can be performed using the pg_stat_replication statistics view.

   An example output of the psql command is shown below.

   ```
   Example)
   ```

```
postgres=# select * from pg_stat_replication;
-[ RECORD 1 ]----+------------------------------
pid              | 10651
usesysid         | 10
usename          | fsep
application_name | standby
client_addr      | 192.0.2.210
client_hostname  |
client_port      | 55098
backend_start    | 2020-03-23 11:17:49.628793+09
backend_xmin     |
state            | streaming
sent_lsn         | 0/3000060
write_lsn        | 0/3000060
flush_lsn        | 0/3000060
replay_lsn       | 0/3000060
write_lag        |
flush_lag        |
replay_lag       |
sync_priority    | 1
sync_state       | sync
reply_time       | 2020-03-23 11:23:27.703366+09
```

2. Confirm the search results of step 1.

   Ensure that the connection established with the intended standby server is in synchronous mode.

   Table 2.7 Items to be checked

Item	Required value
application_name	Value specified for synchronous_standby_names parameter in the postgresql.conf file of the primary server.
client_addr	IP address of the standby server.
state	"streaming".
sync_state	"sync".

See

- Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for information on the pg_stat_replication statistics view.
- Note that the pg_stat_replication statistics view may change in the future.

2.8 Checking the Connection Status

This section explains how to check the connection status from a database server or the arbitration server.

2.8.1 Checking the Connection Status on a Database Server

This section explains how to use a database server to check the connection status of the Mirroring Controller arbitration process and the Mirroring Controller process on the primary server and standby server.

Perform the following procedure:

1. On the primary server and standby server, execute the mc_ctl command in status mode with the --arbiter option specified.

   ```
   Example)
   The mc_ctl command is executed with the --arbiter option specified, and the status is output.
   ```

```
$ mc_ctl status --arbiter -M /mcdir/inst1

arbiter_id   host            status
-------------------------------------
arbiter      192.0.3.120     online
```

2. On the primary server and standby server, check the result displayed by executing the mc_ctl command in status mode in step 1.

   Items to be checked

   Check that the output status" is "online".

See

Refer to the Reference for information on the mc_ctl command.

2.8.2 Checking the Connection Status on the Arbitration Server

This section explains how to use the arbitration server to check the connection status of the Mirroring Controller arbitration process and the Mirroring Controller process on the primary server and standby server.

Perform the following procedure:

1. Execute the mc_arb command in status mode on the arbitration server.

   The example below executes the mc_arb command, and shows the status.

   Linux

   Example)

```
$ mc_arb status -M /mcarb_dir/arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

   Windows

   Example)

```
> mc_arb status -M D:\mcarb_dir\arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

2. Check the result displayed by executing the mc_arb command in step 1.

   Items to be checked

   Check that the output status is "online" on both lines.

See

Refer to the Reference for information on the mc_arb command.

2.9 Creating Applications

This section explains how to create applications using database multiplexing, and points that should be noted when you create the applications.

2.9.1 Application Connection Server Settings

If database multiplexing is used and a failover occurs, it will be necessary to switch the application connection server. Accordingly, use the application connection switch feature to create applications.

Refer to "Application Connection Switch Feature" in the Application Development Guide for details.

2.10 Checking the Behavior

To check if the environment setup was performed correctly, start the application and then check the behavior of the switch and rebuild.

2.11 Tuning

This section explains how to tune database multiplexing mode.

2.11.1 Tuning to Stabilize the Database Multiplexing Mode

When large amounts of data are updated, the write-to load for the database will become great, and the multiplexing state may become unstable.

Accordingly, by editing the parameters below in the postgresql.conf file, a stable multiplexing state can be maintained. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on transaction log space requirements.

Table 2.8 Parameters

Parameter	Content
wal_keep_size	Refer to "2.4.2 Creating, Setting, and Registering the Primary Server Instance" for details.
max_wal_size	The transaction log is written out according to the checkpoint trigger. If a transaction log with the capacity of the value specified in this parameter is generated, the checkpoint will be executed. If a large value is specified in this parameter, the time required for crash recovery will increase. If a small value is specified in this parameter, many checkpoints will be generated, which will affect the performance of the applications that connect to the primary server.

2.11.2 Tuning to Stabilize Queries on the Standby Server

Queries made using reference jobs on the standby server may be canceled by jobs executed on the primary server.

To reduce the possibility of a job being canceled, specify as large a value as possible for the max_standby_archive_delay parameter in the postgresql.conf file.

- Refer to "Handling Query Conflicts" in the PostgreSQL Documentation for details.
- Refer to "Standby Servers" in the PostgreSQL Documentation for details on the max_standby_archive_delay parameter.

2.11.3 Tuning to Stabilize Queries on the Standby Server (when Performing Frequent Updates on the Primary Server)

If jobs are updated on the primary server regularly and frequently, it will be easy for the query made by the reference job on the standby server to be canceled. In this case, edit one of the postgresql.conf file parameters shown in the table below.

Table 2.9 Parameters

Parameter	Description
hot_standby_feedback	When "on" is set, the deletion (vacuum) of the data area that was deleted or updated on the primary server is suppressed. Accordingly, the query on the standby server will not be canceled. (*1)
vacuum_defer_cleanup_age	The deletion (vacuum) of the data area that was deleted or updated on the primary server is delayed until the specified number of transactions is processed. Accordingly, the probability that the query on the standby server will be canceled decreases.

*1: Because the vacuum is delayed, the data storage destination disk space of the primary server comes under pressure.
Additionally, if there is conflict between accesses and queries executed on the standby server, transaction logs indicating this conflict will be transferred.
Accordingly, specify as large a value as possible for the max_standby_archive_delay parameter so that access conflicts do not occur.

See

- Refer to "Standby Servers" in the PostgreSQL Documentation for details on the hot_standby_feedback parameter.
- Refer to "Master Server" in the PostgreSQL Documentation for details on the vacuum_defer_cleanup_age parameter.

2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring

Mirroring Controller uses a monitoring method that outputs an error if the timeout or number of retries is exceeded when accessing resources targeted for monitoring. Setting inappropriate values in these settings may lead to misdetection or a delay in automatic degradation, so you must design these values appropriately.

For example, the following type of issue occurs if the tuning related to abnormality monitoring is not performed appropriately.

- If the timeout is too short

  Results in redundant degradation and availability falls.

- If the timeout is too long

  It takes longer for automatic degradation to be performed even when an error affecting operational continuity occurs, potentially causing downtime.

You can optimize degrading operation by editing the values for the parameters in the server configuration file described below in accordance with the system. Refer to "A.4 Server Configuration File" for information on how to edit these parameters.

2.11.4.1 Tuning for Abnormality Monitoring of the Operating System or Server

Tuning for abnormal monitoring of the operating system or server depends on the operation when heartbeat abnormality is detected by the heartbeat monitoring of operating systems or servers.

See

Refer to "1.1.1 Monitoring Using Database Multiplexing Mode" for the operation when heartbeat abnormality is detected in the the heartbeat monitoring of operating systems or servers.

2.11.4.1.1 Tuning Abnormality Monitoring for Operations that Use an Arbitration Server for Automatic Degeneration

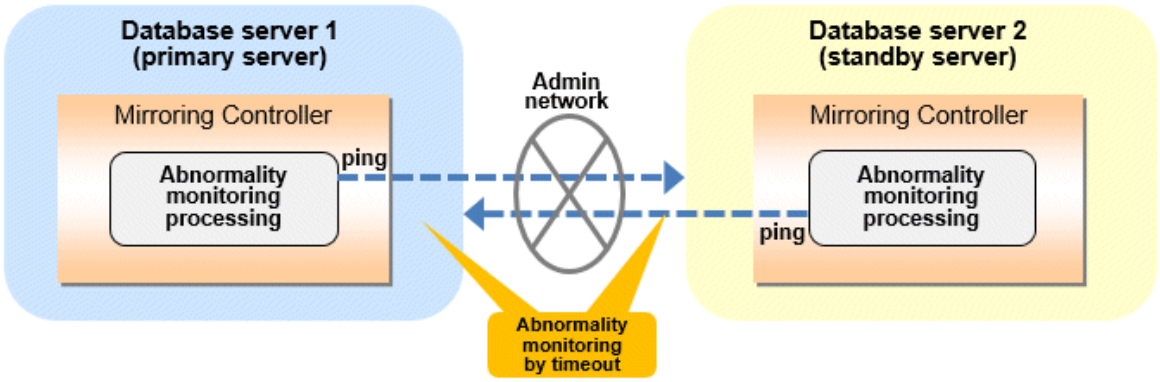
In an operation that use an arbitration server for automatic degeneration, the database server is periodically monitored for abnormalities so that the Mirroring Controller arbitration process can immediately respond to an arbitration request from the Mirroring Controller.The automatic degradation using the arbitration server can optimize the time from error detection to automatic degradation of the operating systems or servers by editing the following parameters.

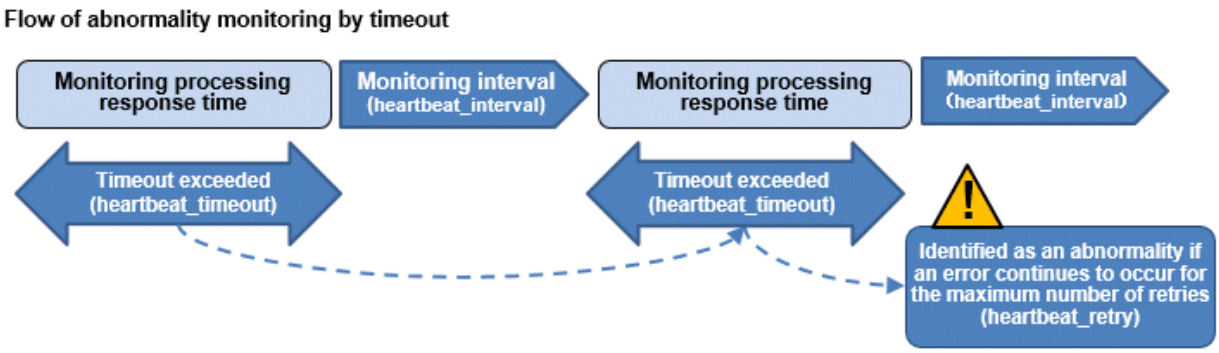
- Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server
- Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file
- Parameters for the arbitration processing and fencing

Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server

Table 2.10 Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server

Parameter	Description
Abnormality monitoring interval (heartbeat_interval)	Mirroring Controller is configured so that abnormality monitoring does not place a load on the system. This parameter does not normally need to be set. (The default is 800 milliseconds.)
Abnormality monitoring timeout (heartbeat_timeout)	Take into account the time during which a load is placed continuously on the server or admin network performance. For example, it is envisaged that this parameter will be used in situations such as when performing high-load batch jobs or when a large number of online jobs occur continuously and concurrently. (The default is 1 second.)
Abnormality monitoring retries (heartbeat_retry)	This parameter can be set when needing a safety value for situations in which the value specified for heartbeat_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is 2 times.)





The expression for calculating the time required to detect an abnormality by Mirroring Controller is shown below.

```
Abnormality detection time of Mirroring Controller = ( heartbeat_timeout(seconds) +
heartbeat_interval(milliseconds) / 1000 ) x ( heartbeat_retry(number of times) + 1)
```

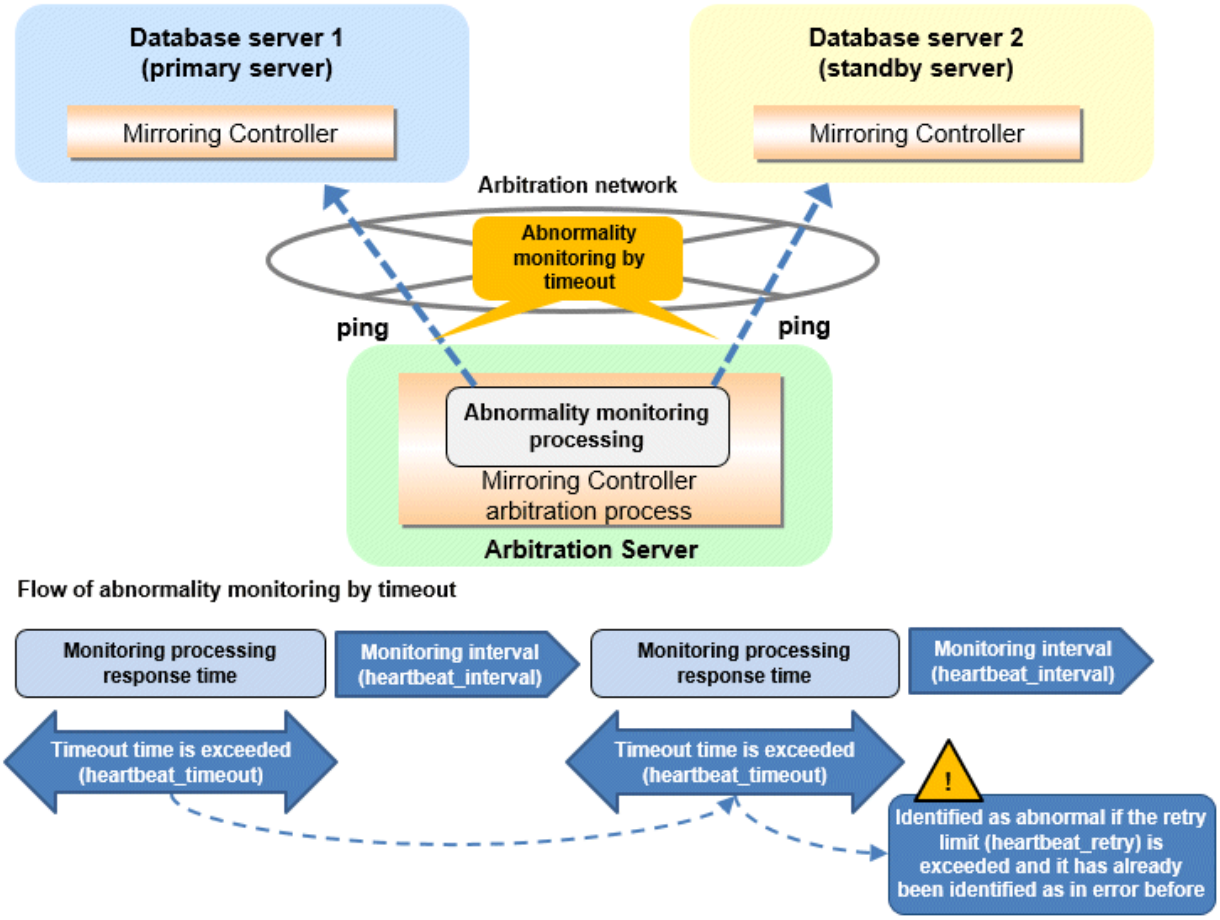
The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time of Mirroring Controller = ( 1 + 800 / 1000 ) x ( 2 + 1 )
            = 5.4(seconds)
```

Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file

Table 2.11 Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file

Parameter	Description
Abnormality monitoring interval (heartbeat_interval)	Mirroring Controller arbitration process is configured so that abnormality monitoring does not place a load on the system. This parameter does not normally need to be set. (The default is the value set in heartbeat_interval in the server configuration file of the database server.) (milliseconds).
Abnormality monitoring timeout (heartbeat_timeout)	Take into account the time during which a load is placed continuously on the server and arbitration network capabilities. (The default is the value set in heartbeat_timeout in the server configuration file of the database server.) (seconds).
Abnormality monitoring retries (heartbeat_retry)	This parameter can be set when needing a safety value for situations in which the value specified for heartbeat_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is the value set in heartbeat_retry in the server configuration file of the database server.) (number of times)



The expression for calculating the time required to detect an abnormality by Mirroring Controller arbitration process is shown below.

```
Abnormality detection time of Mirroring Controller arbitration process = ( heartbeat_timeout(seconds)
+ heartbeat_interval(milliseconds) / 1000 ) x ( heartbeat_retry(number of times) + 1)
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time of Mirroring Controller arbitration process = ( 1 + 800 / 1000 ) x ( 2 + 1 )
            = 5.4(seconds)
```

Point

The abnormality detection time of the operation for automatic degradation using the arbitration server can be calculated as follows.

```
Abnormality detection time = Max(Abnormality detection time by Mirroring Controller, Abnormality
detection time by Mirroring Controller arbitration process)
```

Note

If the heartbeat_interval is set in the arbitration configuration file, the relationship between the parameter for operating system or server abnormality monitoring specified in the server configuration file of the database server file and the heartbeat_interval of the arbitration configuration file must satisfy the following relational expression.

```
 Heartbeat_interval in the arbitration configuration file (milliseconds) / 1000 ) <
( heartbeat_timeout(seconds) + heartbeat_interval(milliseconds) / 1000 ) * heartbeat_retry(number of
times) + heartbeat_timeout(seconds)
```

Parameters for the arbitration processing and fencing

Table 2.12 Parameters for the arbitration processing and fencing

Parameter	Description
Arbitration processing timeout (arbitration_timeout in the server configuration file of the database server)	Take into account the time to perform arbitration processing on the Mirroring Controller arbitration process. The value must be greater than or equal to abnormality detection time of Mirroring Controller arbitration process + fencing_command_timeout in the arbitration configuration file (seconds).
Fencing timeout (fencing_command_timeout in the arbitration configuration file)	Take into account the time to execute the fencing command (seconds).

Flow from the abnormality detection to the automatic degeneracy

When performing automatic degradation using the arbitration server, the flow from the abnormality detection in the operating system or server to the occurrence of automatic degeneracy and the parameters is shown below.

<table>
<tr><th>Flow from the abnormality detection to the automatic degeneracy</th><th>Description</th><th colspan="2">Parameter</th></tr>
<tr><td>(1) Abnormality detection</td><td>Mirroring Controller detect the database server operating system or server errors.</td><td colspan="2">Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server</td></tr>
<tr><td>(2) Arbitration request</td><td>Mirroring Controller that detect the operating system or server error asks the Arbitration Server to check the status of the other server's operating system or server.</td><td>-</td><td rowspan="3">arbitration_timeout in the server configuration file of the database server</td></tr>
<tr><td>(3) Arbitration processing</td><td>The Mirroring Controller arbitration process checks the status of the other server's operating system or server. However, if the result of the operating system or server abnormality monitoring by the arbitration server has been determined before the arbitration request from the Mirroring Controller of the database server, this process is not performed.</td><td>Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file</td></tr>
<tr><td>(4) Fencing</td><td>If the Mirroring Controller arbitration process determines that the other server is an abnomaly of the operating system or server, it fences the other server and isolates it from the cluster system. If the Mirroring Controller arbitration process determines that the operating system or server status is normal, this process and the (6) are not performed.</td><td>fencing_command_timeout in the arbitration configuration file</td></tr>
<tr><td>(5) Return of the arbitration results</td><td>Returns the results of the arbitration to the Mirroring Controller of the database server that requested the arbitration.</td><td colspan="2">-</td></tr>
</table>

Flow from the abnormality detection to the automatic degeneracy	Description	Parameter
(6) Automatic degradation	The automatic degradation is performed. If fencing fails in (4), this procedure is not performed.	-

-: No associated parameters

Note

If the fencing_command parameter is specified in the server configuration file of the database server, the fencing command is invoked on the database server if fencing is successful on the arbitration server. In that case, add the value of the fencing_command_timeout parameter in the server configuration file of the database server to the estimate.

Figure 2.1 When the Mirroring Controller on the primary server detects an operating system or server error

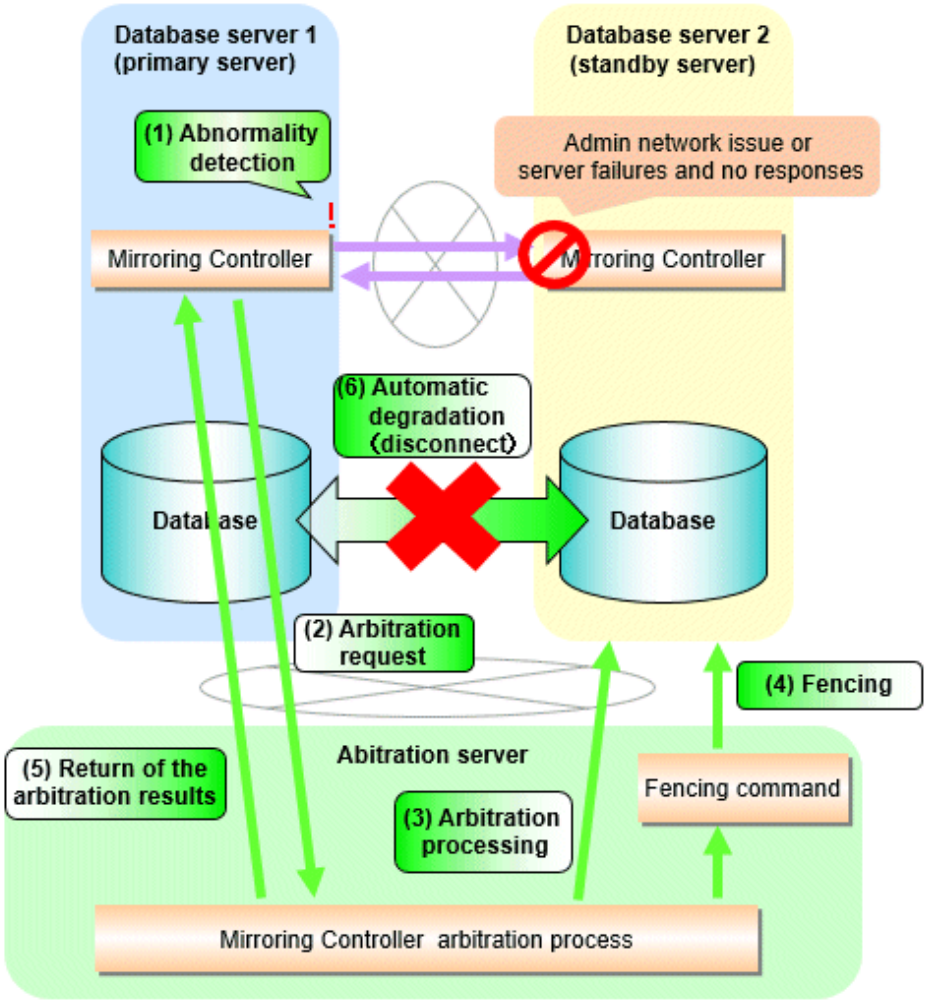
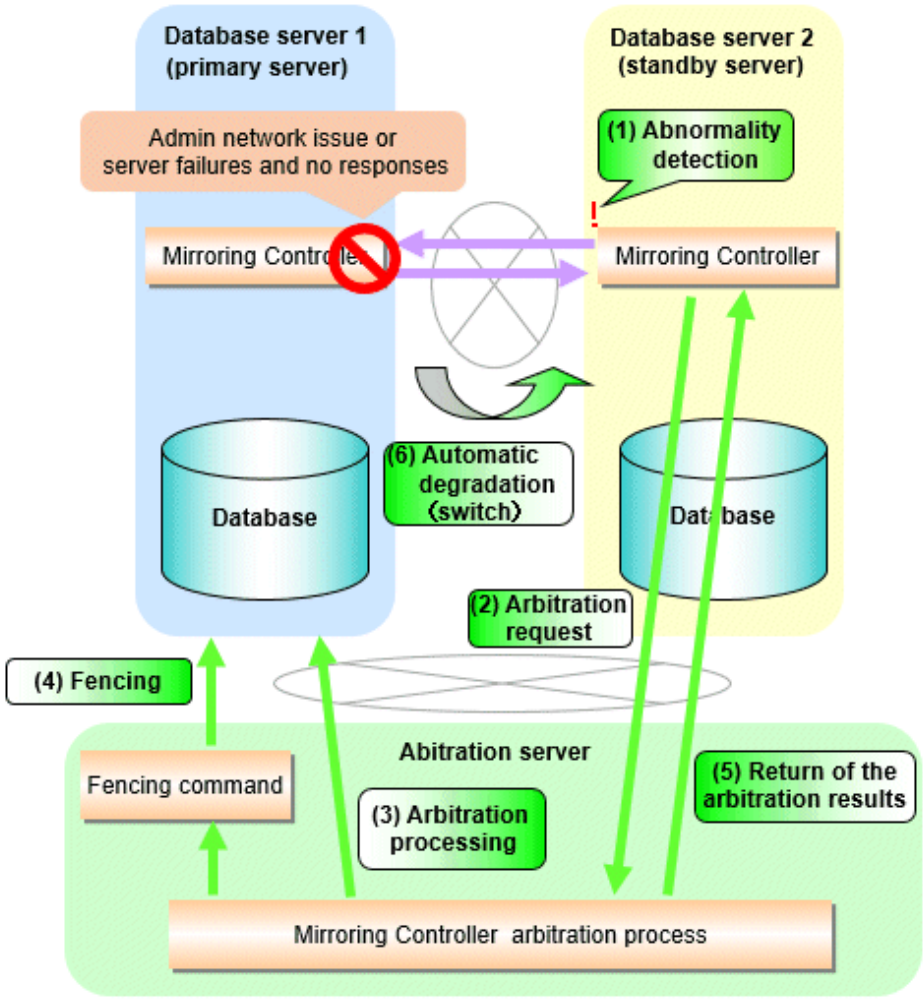


Figure 2.2 When the Mirroring Controller on the standby server detects an operating system or server error



2.11.4.1.2 Tuning Abnormality Monitoring for Operations that Perform Automatic Degeneration by Calling a User Exit that Determines Degeneration

In an operation that perform automatic degeneration by calling a user exit that determines degeneration, you can optimize the time from operating system or server abnormality detection to automatic degradation by editing the operating system or server abnormality monitoring parameters and parameters related to arbitration processing and fencing in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server.

Table 2.13 Parameters for the arbitration processing and fencing

Parameter	Description
Arbitration processing timeout (arbitration_command_timeout)	Take into account the time to execute the arbitration command(seconds).
Fencing timeout (fencing_command_timeout)	Take into account the time to execute the fencing command (seconds).

Flow from the abnormality detection to the automatic degeneracy

When performing automatic degradation by calling a user exit that determines degeneration, the flow from the abnormality detection in the operating system or server to the occurrence of automatic degeneracy and the parameters is shown below.

Flow from the abnormality detection to the automatic degeneracy	Description	Parameter
(1) Abnormality detection	Mirroring Controller detect the database server operating system or server errors.	Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server
(2) Arbitration processing	An arbitration command is executed to check the status of the other server's operating system or server.	arbitration_command_timeout in the server configuration file of the database server
(3) Fencing	If the operating system or server status of the other server is abnomal in (2), it fences the other server and isolates it from the cluster system. If the operating system or server status of the other server is nomal in (2), this process and (4) are not executed.	fencing_command_timeout in the server configuration file of the database server
(4) Automatic degradation	The automatic degradation is performed. If fencing fails in (3), this procedure is not performed.	-

-: No associated parameters

Figure 2.3 When the Mirroring Controller on the primary server detects an operating system or server error

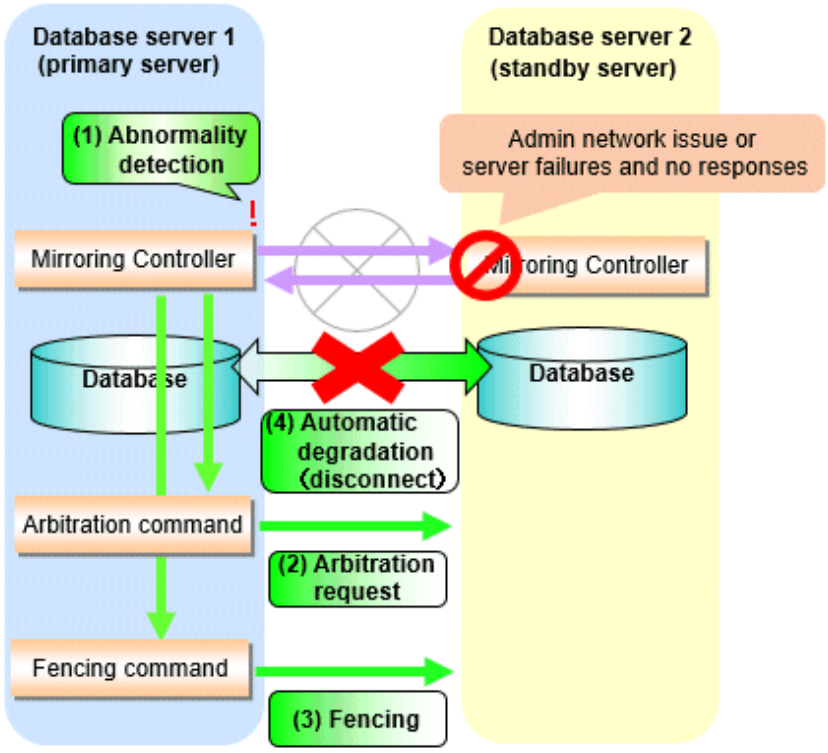
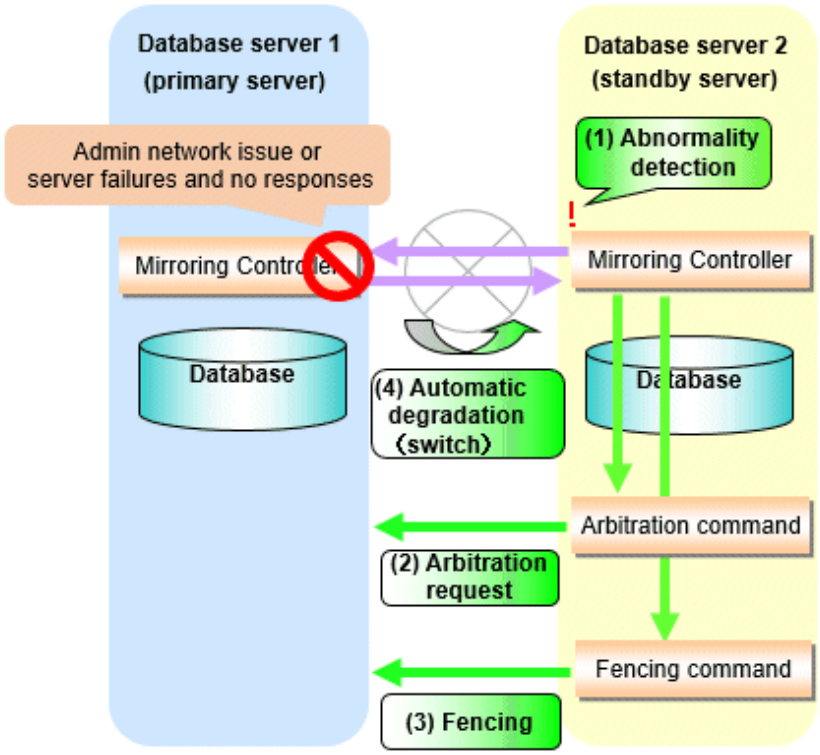


Figure 2.4 When the Mirroring Controller on the standby server detects an operating system or server error



2.11.4.1.3 Tuning Abnormality Monitoring for Operations that Notify Messages

In an operation that notify messages, you can optimize the abnormality detection time by editing the operating system or server abnormality monitoring parameters in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server. In addition, when the Mirroring Controller detects an error, it does not perform the arbitration processing, fencing, or automatic degradation, but only notification messages is performed.

2.11.4.1.4 Tuning Abnormality Monitoring for Operations that Perform Automatic Degenerate Unconditionally due to Heartbeat Abnormality

In an operation that perform automatic degenerate unconditionally due to heartbeat abnormality, you can optimize the time from operating system or server abnormality detection to automatic degradation by editing the operating system or server abnormality monitoring parameters in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server. In addition, when the Mirroring Controller detects an error, it does not perform the arbitration processing, fencing, or automatic degradation, but only automatic degenerate unconditionally is performed.

Note

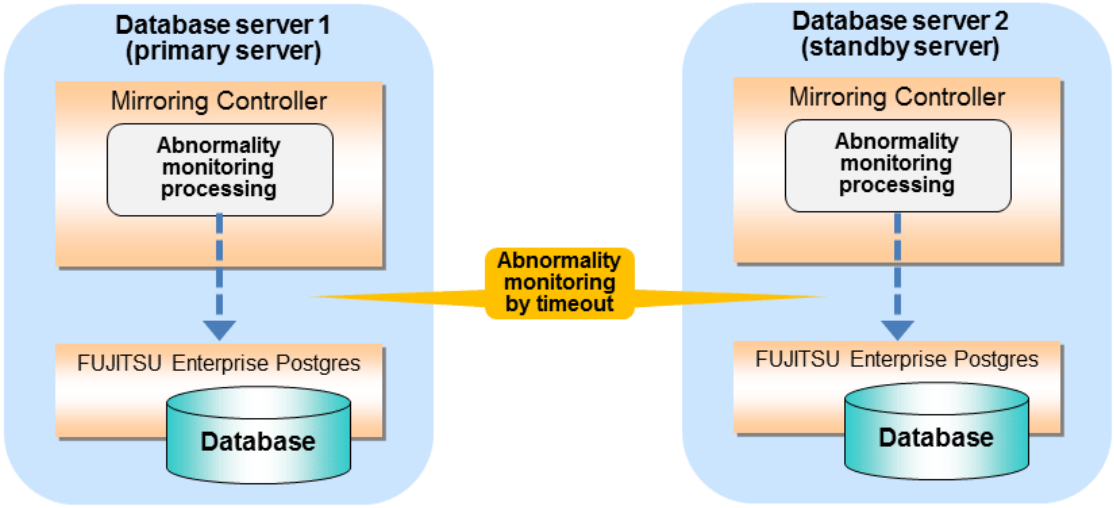
Refer to "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" for notes on the operation that perform automatic degenerate unconditionally due to heartbeat abnormality.

2.11.4.2 Tuning for Abnormality Monitoring of Darabase Processes

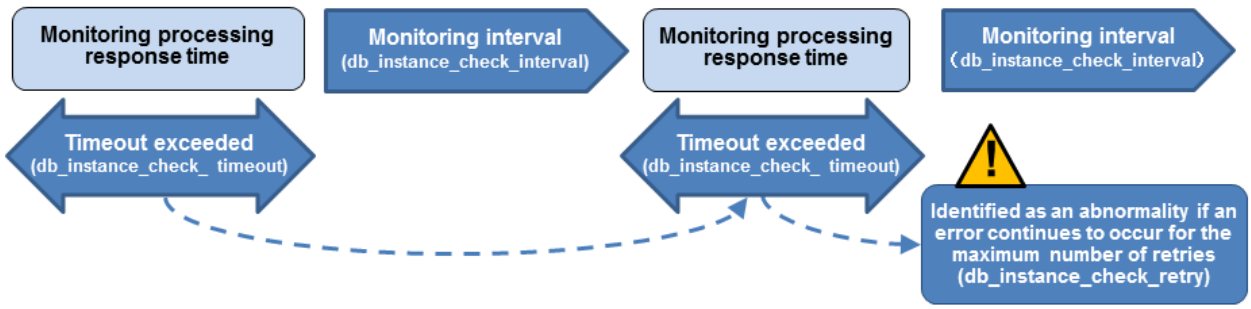
In an abnormality monitoring of database pocesses, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.14 Parameters for abnormality monitoring of database processes

Parameter	Description
Abnormality monitoring interval (db_instance_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Timeout for abnormality monitoring of database processes (db_instance_check_timeout)	Take into account the time during which a load is placed continuously on the database. For example, it is envisaged that this parameter will be used in situations such as when performing high-load batch jobs or when a large number of online jobs occur continuously and concurrently. (The default is the value set in heartbeat_timeout.) (seconds)
Abnormality monitoring retries (db_instance_check_retry)	This parameter can be set when needing a safety value for situations in which the value specified for db_instance_check_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is the value set in heartbeat_retry.) (number of times)



Flow of abnormality monitoring by timeout



The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = ( db_instance_check_timeout(seconds) +
db_instance_check_interval(milliseconds) / 1000 ) x ( db_instance_check_retry(number of times) + 1 )
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time = ( 1 + 800 / 1000 ) x ( 2 + 1 )
             = 5.4(seconds)
```

Note

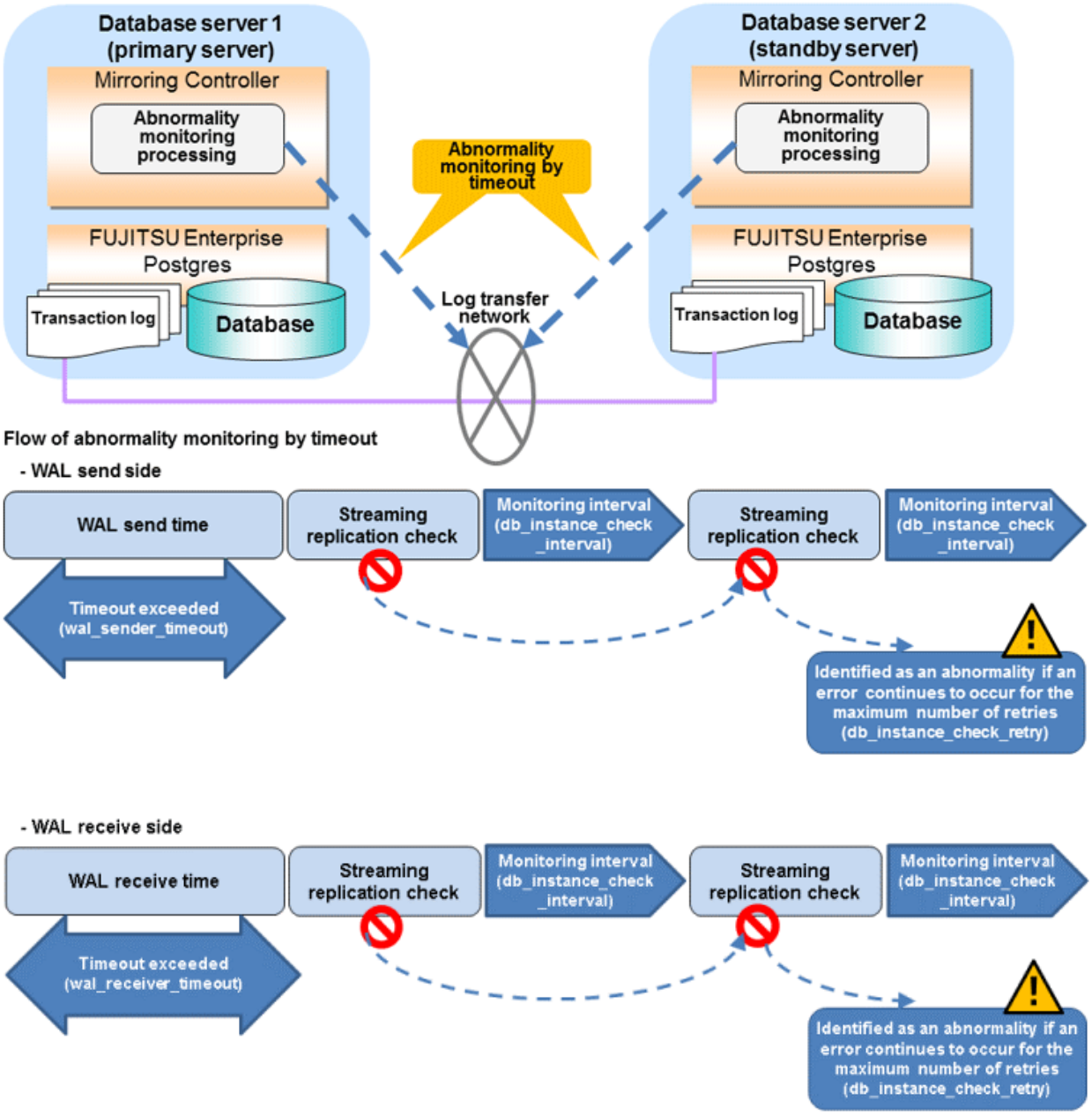
- If the db_instance_timeout_action parameter in *serverIdentifier*.conf is set to "message", and the db_instance_check_timeout parameter is set to a short value, a crash of the database process will be detected as "no response", and it may take time for automatic degradation to occur. Therefore, specify an appropriate timeout for db_instance_check_timeout.
- If a high load on the database and an event that prevents connection to an instance occur at the same time, it is judged as abnormal without retrying monitoring.

2.11.4.3 Tuning for Abnormality Monitoring of Streaming Replication

In an abnormality monitoring of streaming replication, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.15 Parameters for abnormality monitoring of streaming replication

Parameter	Description
Abnormality monitoring interval (db_instance_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Abnormality monitoring retries (db_instance_check_retry)	This parameter can be set when needing a safety value, such as when it is anticipated that a temporary log transfer LAN error may occur, but it does not normally need to be set. (The default is the value set in heartbeat_retry.) (number of times)
Timeout for abnormality monitoring of streaming replication (wal_sender_timeout and wal_receiver_timeout in postgresql.conf)	Take into account the capacity and load of the log transfer network and the time during which a load is placed continuously on the database. For example, if there is a succession of data update jobs that generate a high WAL volume, you must configure the settings to avoid misdetection. (The default is 60 seconds.)



The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = ( wal_sender_timeout(seconds) +
db_instance_check_interval(milliseconds) / 1000 x ( disk_check_retry(number of times) + 1 ) )  Or,
            = ( wal_receiver_timeout(seconds) + db_instance_check_interval(milliseconds) / 1000 x
( disk_check_retry(number of times) + 1 ) )
```

The abnormality detection time when the default value is used is shown below.

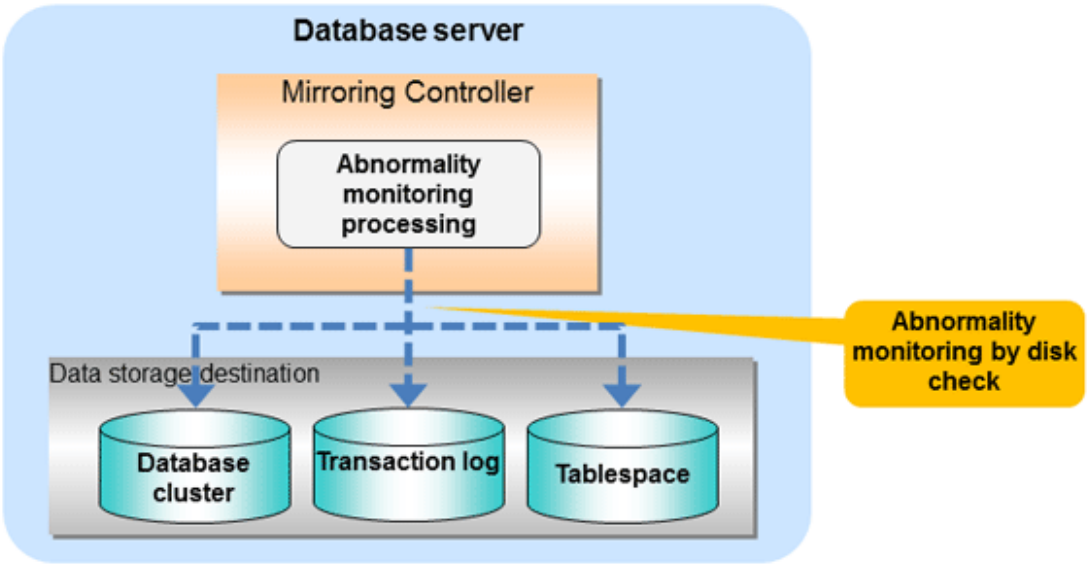
```
Abnormality detection time = 60 + (800 / 1000 x (2 + 1))
            = 62.4(seconds)
```

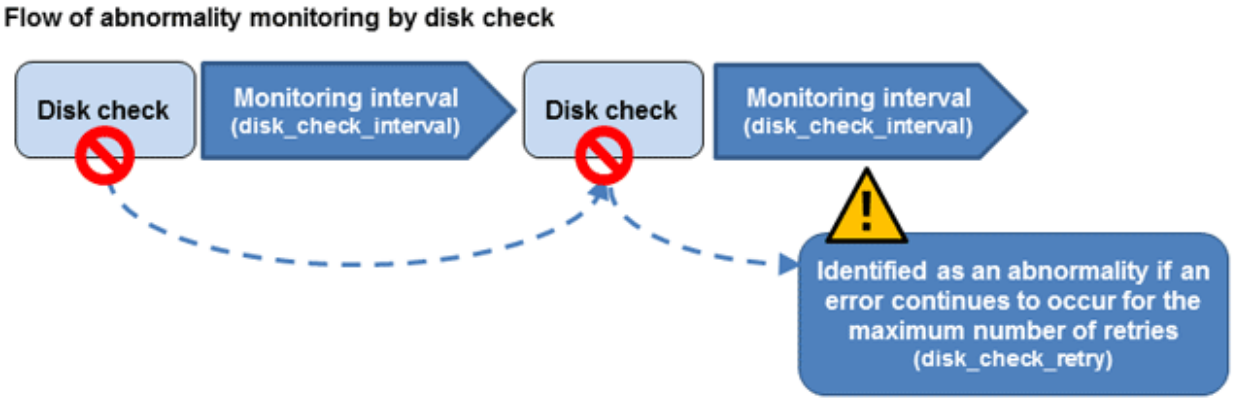
2.11.4.4 Tuning for Disk Abnormality Monitoring

In an abnormality monitoring of the disk, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.16 Parameters for disk abnormality monitoring

Parameter	Description
Abnormality monitoring interval (disk_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Abnormality monitoring retries (disk_check_retry)	This parameter can be set when needing a safety value, such as when it is anticipated that a temporary disk input/output error may occur, but normally it does not need to be set. (The default is the value set in heartbeat_retry.) (number of times)





The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = disk_check_interval (milliseconds) / 1000 x ( disk_check_retry(number of times) + 1 )
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time = 800 / 1000  x ( 2 + 1 )
            = 2.4(seconds)
```

Note

- The tuning described above impacts on the time taken from detection of a timeout until switching the primary server. Therefore, modify the values while taking into account the switch/disconnection time, using a design for which misdetection does not occur.
- Immediately selecting automatic degradation when a heartbeat abnormality occurs in operating system or server heartbeat monitoring risks causing split brain. Refer to "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" for details.

Information

Mirroring Controller uses connections to database instances and SQL access to monitor abnormality in some resources targeted for monitoring. The connection destination database names and connection user names used for abnormality monitoring conform to the parameters in the server configuration file. The application name is "mc_agent".

2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances

Multiplexed instances and Mirroring Controller can be started and stopped automatically in line with the starting and stopping of the operating system of the database server.

Note

To guarantee the startup sequence of Mirroring Controller on the primary and standby servers, first confirm that the primary server has started, and then start the standby servers in sequence.

The startup sequence of the Mirroring Controller process on the database server and the Mirroring Controller arbitration process on the arbitration server is not guaranteed. If the arbitration server cannot be started first, execute the mc_ctl command in start mode with the --async-connect-arbiter option specified to start the Mirroring Controller process.

If you start the Mirroring Controller and multiplexed instances, wait for time correction, network setup, and so on.

Perform the following procedure:

1. Create a unit file

   Copy the unit file sample stored in the directory below, and revise it to match the target instance.

   Sample file

   ```
   /installDir/share/mcoi.service.sample
   ```

   Example)

   In the following example, the installation directory is "/opt/fsepv<x>server64", and the instance name is "inst1". Note that "<x>" indicates the product version.

   ```
   # cp /opt/fsepv<x>server64/share/mcoi.service.sample /usr/lib/systemd/system/mcoi_inst1.service
   ```

   Revise the underlined portions of the options below in the unit file.

Section	Option	Specified value	Description
Unit	Description	FUJITSU Enterprise Postgres MirroringController *instanceName*	Specifies the feature overview. Specifies the name of the target instance. (*1)
Service	ExecStart	/bin/bash -c '*installDir*/bin/mc_std start *installDir*	Command to be executed when the service is started.

Section	Option	Specified value	Description
		MirroringControllerManagementDir' *mc_ctlOption*'	Specify the option you want to add when the mc_ctl command is executed without the -M option in the mc_ctl option. Note that the content specified in this mc_ctl option is carried over from the mc_std command to the mc_ctl command. (*2)
	ExecStop	/bin/bash -c '*installDir*/bin/mc_std stop *installDir* *MirroringControllerManagementDir*' *mc_ctlOption*'	Command to be executed when the service is stopped. Specify the option you want to add when the mc_ctl command is executed without the -M option in the mc_ctl option. However, to use the --mc-only option to stop only Mirroring Controller, you must use the --mc-only option at startup. Note that the content specified in this mc_ctl option is carried over from the mc_std command to the mc_ctl command.
	User	User	OS user account of the instance administrator user.
	Group	Group	Group to which the instance administrator user belongs.

*1: The instance name should be as nameThatIdentifiesTheInstance.
The naming conventions for identifying the instance are as follows:

- Up to 16 bytes
- The first character must be an ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

*2: When the arbitration server is used for automatic degradation, start the Mirroring Controller arbitration process on the arbitration server and then start the Mirroring Controller process on the database server. If the arbitration server cannot be started first, specify the --async-connect-arbiter option to start the Mirroring Controller process.

2. Enable automatic start and stop

   As the OS superuser, use the systemctl command to enable automatic start and stop.

   Example)

```
# systemctl enable mcoi_inst1.service
```

Note

If automatic start and stop of Mirroring Controller has been configured, to stop Mirroring Controller, do not use the mc_ctl command, but instead use the systemctl command as the OS superuser.

Example)

```
# systemctl stop mcoi_inst1.service
```

If the instance does not stop, refer to "Actions in Response to Failure to Stop an Instance" in the Operation Guide to stop the instance. Then, specify the -e option in the mc_ctl command to forcibly stop Mirroring Controller.

Example)

```
$ mc_ctl stop -M /mcdir/inst1 -e
```

If Mirroring Controller is stopped using the mc_ctl command, the message below is output to the system log, however there is no issue because automatic stop is executed by systemd.

Message

```
FATAL: failed to stop Mirroring Controller target server:"{0}" (MCA00043)
```

2.13 Setting Automatic Start and Stop of the Mirroring Controller Arbitration Process

You can automatically start or stop the Mirroring Controller arbitration process when the operating system on the arbitration server is started or stopped.

Linux

Note

If you start the Mirroring Controller arbitration process, wait for time correction, network setup, and so on.

Perform the following procedure:

1. Create a unit file.

   Copy the unit file sample stored in the directory below, and revise it to match the target instance.

   Sample file

   ```
   /installDir/share/mcarboi.service.sample
   ```

   Example)
   In the following example, the installation directory is "/opt/fsepv<x>assistant", and the identifier of the arbitration process is "arbiter1". Note that "<x>" indicates the product version.

   ```
   # cp /opt/fsepv<x>assistant/share/mcarboi.service.sample /usr/lib/systemd/system/
   mcarboi_arbiter1.service
   ```

   Revise the underlined portions of the options below in the unit file.

Section	Option	Specified value	Description
Unit	Description	FUJITSU Enterprise Postgres Mirroring Controller Arbiter <*arbitrationProcessId*>	Specifies the feature overview. Specifies the identifier of the targeted arbitration process. (*1)
Service	ExecStart	/bin/bash -c '*installDir*/bin/mc_arb_std start *installDir* *mirroringControllerArbitrationProcessMgmtDir* *mc_arbOption*'	Command to be executed when the service is started. Specify the option you want to add when the mc_arb command is executed without the -M option in the mc_arb option.

Section	Option	Specified value	Description
			Note that the content specified in this mc_arb option is carried over from the mc_arb_std command in "Specified value" to the mc_arb command.
	ExecStop	/bin/bash -c '*installDir*/bin/ mc_arb_std stop *installDir mirroringControllerArbitrationProcessMgmtDir mc_arbOption*'	Command to be executed when the service is stopped. Specify the option you want to add when the mc_arb command is executed without the -M option in the mc_arb option. Note that the content specified in this mc_arb option is carried over from the mc_arb_std command in "Specified value" to the mc_arb command.
	User	User	Specify the account of the operating system user.
	Group	Group	Specify the group to which the user belongs.

*1: The arbitration process identifier used here is a name for identifying the Mirroring Controller arbitration process.

The naming conventions for identifying the Mirroring Controller arbitration process are as follows:

- Up to 16 bytes
- The first character must be an ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

2. Enable automatic start and stop.

   As the operating system superuser, use the systemctl command to enable automatic start and stop.

   Example)

```
# systemctl enable mcarboi_arbiter1.service
```

Windows

You can configure the Windows service to perform automatic start and stop.

Configuring during setup

When registering the Mirroring Controller arbitration process as a Windows service in "2.3.1 Configuring the Arbitration Server", specify "auto" for the -S option of the register mode used with the mc_arb command.

Example)

```
> mc_arb register -M D:\mcdir\inst1 -P ******** -S auto
```

Changing the configuration after setup

Use the sc config command to change the configuration of the Windows service of the Mirroring Controller arbitration process.

Example)
The configuration of the registered service name "Mirroring_Controller_Arbiter1" is changed.

```
> sc config "Mirroring_Controller_Arbiter1" start= auto
```

See

Refer to sc command help for information on how to configure the service.

Information

You can check the registration status in the Windows service window or by using the sc qc command.

2.14 Backup Operation

This section explains the backup operation for database multiplexing mode.

2.14.1 Backing up Database Multiplexing Mode Information

When changing the Mirroring Controller settings, in addition to backing up the database, back up the configuration file in the Mirroring Controller management directory so that the Mirroring Controller settings are not lost.

When the arbitration server is used for automatic degradation, also back up the configuration file in the Mirroring Controller arbitration process management directory.

2.14.2 Database Backup Operation

Using database multiplexing mode is the same as obtaining the backup data on the standby server as a safeguard against a disk failure. Note that all server disks may be corrupted due to some cause.

As a safeguard against this type of case, execute the pgx_dmpall command on the primary server to create the backup data.

However, it is not definite as to which server runs as the primary server, so ensure that the pgx_dmpall command is executed periodically on all servers, so that the backup data will be obtained. For example, create a script to obtain the backup data, and set it in the operation management software.

Point

When the pgx_dmpall command is executed on the standby server, it will not match the statuses, however the error message shown below will be output and return the value "1".

If a script that ignores only this type of error is executed on all servers, the backup data of the primary server can be obtained.

Error message

```
ERROR:recovery is in progress (10095)
```

Note

- Consider the possibility that the server that runs as the primary server may be destroyed alongside the backup data, so it is recommended to promote another server to become the primary server, and then back up the data on the new primary server without waiting for the next scheduled backup.
- Specify the same backup directory name for the primary and standby servers. If different backup directory names are specified, and recovery is performed using the backup data of the other server, the recovery cannot be performed correctly.

See

- Period backups allow shorter recovery time and reduction in disk usage. Refer to "Backing Up the Database" in the Operation Guide for details on the backup operation.
- Refer to "Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode" for details on recovery based on the backup data that was obtained using the pgx_dmpall command.

Chapter 3 Operations in Database Multiplexing Mode

This chapter describes the periodic operations that are performed when running database multiplexing mode.

The periodic operations are the same as the operations on a single server.

See

Refer to "Periodic Operations" in the Operation Guide for information on the periodic operations.

3.1 Starting and Stopping the Mirroring Controller Arbitration Process

This section describes how to start and stop the Mirroring Controller arbitration process.

3.1.1 Starting the Mirroring Controller Arbitration Process

Linux

While the Mirroring Controller arbitration process is in a stopped state, execute the mc_arb command in start mode to start the Mirroring Controller arbitration process.

```
Example)
```

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Windows

The Mirroring Controller arbitration process can be started using one of the following options:

- Using the mc_arb command
- Starting the service on system startup

Using the mc_arb command

While the Mirroring Controller arbitration process is in a stopped state, execute the mc_arb command from the command prompt to start the Mirroring Controller arbitration process.

```
Example)
```

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

Starting the service on system startup

Specify automatic start when registering the Mirroring Controller arbitration process to the Windows service during setup of database multiplexing mode. Accordingly, the Mirroring Controller arbitration process service will start on startup of the operating system.

See

Refer to the Reference for information on how to specify the mc_arb command.

3.1.2 Stopping the Mirroring Controller Arbitration Process

Linux

While the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

Example)

```
$ mc_arb stop -M /mcarb_dir/arbiter1
```

Windows

The Mirroring Controller arbitration process can be stopped using one of the following options:

- Using the mc_arb command
- Stopping the service

Using the mc_arb command

While the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode from the command prompt to stop the Mirroring Controller arbitration process.

Example)

```
> mc_arb stop -M D:\mcarb_dir\arbiter1
```

Stopping the service

Select [Administrative Tools], then [Services] to open the [Services] window, and then select the Mirroring Controller service and click the [Stop] menu.

See

Refer to the Reference for information on how to specify the mc_arb command.

Note

- The arbitration server will be forcibly stopped when the service is stopped.
- Before shutting down the operating system on the arbitration server, either stop the Mirroring Controller on the primary server or standby server or shut down the operating system on the primary server or standby server.

3.2 Starting and Stopping Mirroring Controller

When database multiplexing mode is used, use the mc_ctl command to start and stop the instance and Mirroring Controller at the same time.

Do not start or stop the instance by itself.

Starting Mirroring Controller

While Mirroring Controller is in a stopped state, execute the mc_ctl command in start mode to start Mirroring Controller.

Enabling automatic switch/disconnection

Execute the mc_ctl command in start mode.

Example)

```
$ mc_ctl start -M /mcdir/inst1
```

When only the instance is started and stopped, the following will happen:

- When only the instance is started

  Features such as automatic switch and automatic disconnection will not work until Mirroring Controller is started.

- When only the instance is stopped

  Mirroring Controller determines that an error has occurred in the instance, and performs an unnecessary automatic switch.

  Automatic switch may also stop working correctly in some cases.

Disabling automatic switch/disconnection

Execute the mc_ctl command in start mode with the -F option specified.

Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

When only the instance is started and stopped, the following will happen:

- When only the instance is started

  Errors indicated in "1.1 What is Database Multiplexing Mode" will not be detected until Mirroring Controller is started.

- When only the instance is stopped

  Mirroring Controller determines that an error has occurred in the instance, and outputs an error to the system log.

Point

- To start the Mirroring Controller process only, execute the mc_ctl command in start mode with the --mc-only option specified.
- After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.
- When the arbitration server is used for automatic degradation, the Mirroring Controller process startup fails on the database server if the Mirroring Controller arbitration process has not been started on the arbitration server in advance. However, even if the Mirroring Controller arbitration process cannot be started in advance, the Mirroring Controller process can be started by specifying the --async-connect-arbiter option in the mc_ctl command.

Note

- When the arbitration server is used for automatic degradation, the database server must connect to the arbitration server, and as a result, Mirroring Controller startup may take longer.
- Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore, ensure that the admin network is connected before starting Mirroring Controller.

Stopping Mirroring Controller

While Mirroring Controller is running, execute the mc_ctl command in stop mode to stop Mirroring Controller process.

Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

Point

To stop the Mirroring Controller process only, execute the mc_ctl command in stop mode with the --mc-only option specified.

Note

To prevent an unintended automatic switch, before shutting down the operating system on the primary server, you must stop the Mirroring Controller, or shut down the operating system on the standby server.

See

Refer to the Reference for information on how to specify the mc_ctl command.

3.3 Checking the Database Multiplexing Mode Status

3.3.1 Checking the Status of the Database Server

This section describes how to check the status of the database server.

Check the multiplexed database status by executing the mc_ctl command in status mode.

Additionally, errors can be detected by monitoring the Mirroring Controller messages. If the status or messages are monitored periodically, you can react quickly following an automatic switch failure.

Checking the status of the multiplexing database

When the mc_ctl command is executed, the details of the multiplexing configuration, information about whether switch is possible following the error, and location and details of the error that caused the switch or disconnection are displayed.

After starting database multiplexing mode, execute the mc_ctl command in status mode to check the multiplexing status.

An example of the status displayed when the mc_ctl command is executed is shown below.

Example)

```
$ mc_ctl status -M /mcdir/inst1

mirroring status
----------------
switchable
server_id  host_role       host            host_status  db_proc_status       disk_status
-------------------------------------------------------------------------------------------------
----
server1    primary         192.0.2.100     normal       normal                 normal
server2    standby         192.0.2.110     normal       normal                 normal
```

Checking the status of connection to the Mirroring Controller arbitration process

When the arbitration server is used for automatic degradation, the status of the connection to the Mirroring Controller arbitration process can be checked by specifying the --arbiter option. If the output status is "online", it indicates that an arbitration request can be made from the database server to the arbitration server. When the arbitration server is used for automatic degradation, regularly execute the command in status mode with the --arbiter option specified and check that the output status is "online".

Example)
The mc_ctl command is executed with the --arbiter option specified, and the status is output.

```
$ mc_ctl status --arbiter -M /mcdir/inst1
```

```
arbiter_id   host            status
-------------------------------------
arbiter      192.0.3.120     online
```

Checking the status of data synchronization

Additionally, by referencing the pg_stat_replication statistics view on the primary server, the data synchronization status can be confirmed. However, when creating the monitoring program, note that the content of pg_stat_replication may be changed in the future.

The following example shows that the locations of the transaction log after it is sent and received (sent_lsn, replay_lsn) match, and that they are fully synchronized.

Example)

```
postgres=# select * from pg_stat_replication;
-[ RECORD 1 ]----+-----------------------------
pid              | 10651
usesysid         | 10
usename          | fsep
application_name | standby
client_addr      | 192.0.2.210
client_hostname  |
client_port      | 55098
backend_start    | 2020-03-23 11:17:49.628793+09
backend_xmin     |
state            | streaming
sent_lsn         | 0/3000060
write_lsn        | 0/3000060
flush_lsn        | 0/3000060
replay_lsn       | 0/3000060
write_lag        |
flush_lag        |
replay_lag       |
sync_priority    | 1
sync_state       | sync
reply_time       | 2020-03-23 11:23:27.703366+09
```

- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on retaining application compatibility.
- Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for details on pg_stat_replication.

3.3.2 Checking the Status of the Arbitration Server

This section describes how to check the status of the arbitration server.

The status of the connection between the Mirroring Controller arbitration process and primary server/standby server can be checked by executing the mc_arb command in status mode.

The example below executes the mc_arb command, and shows the status.

Linux

Example)

```
$ mc_arb status -M /mcarb_dir/arbiter1

server_id    host            status
--------------------------------------
```

```
server1      192.0.3.100     online
server2      192.0.3.110     online
```

Windows

Example)

```
> mc_arb status -M D:\mcarb_dir\arbiter1

server_id    host            status
-------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

3.4 Manually Switching the Primary Server

The primary server cannot be switched automatically in the following case:

- If automatic switch/disconnection is disabled
- If output of messages is selected for heartbeat abnormalities during heartbeat monitoring of the operating system or server and the operating system/server crashes or becomes unresponsive

In this case, to manually switch the primary server, execute the mc_ctl command in switch mode on either the primary server or the standby server.

Example)

```
$ mc_ctl switch -M /mcdir/inst1
```

Point

If automatic switch/disconnection is enabled, it is possible to perform switch of primary server at any time.

3.5 Manually Disconnecting the Standby Server

The procedure to perform disconnection of the standby server differs depending on whether the automatic switch/disconnection is enabled or disabled.

If automatic switch/disconnection is enabled

Execute the mc_ctl command in stop mode on the standby server.

Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

If automatic switch/disconnection is disabled

1. Execute the mc_ctl command in stop mode on the standby server.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

2. Comment out the synchronous_standby_names parameter in the postgresql.conf file on the primary server.
3. Execute the pg_ctl command in reload mode on the primary server.

   Example)

   ```
   $ pg_ctl reload -D /database/inst1
   ```

Point

If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

3.6 Action Required when a Heartbeat Abnormality is Detected

The message below is output when a heartbeat abnormality is detected during heartbeat monitoring of operating systems or servers:

```
detected an error on the monitored object "server(server identifier name)": no response:ping timeout
(MCA00019)
```

If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, automatic switch/disconnection is not performed when a heartbeat abnormality is detected. Therefore, user action will be necessary.

This section explains the action required when the heartbeat_error_action parameter is set to "message" and a heartbeat abnormality is detected.

1. Identify the cause of the heartbeat abnormality. The possible causes are below:
   - The remote operating system or server crashed or is unresponsive
   - An admin network issue occurred
2. Address the cause identified in step 1.
   - The remote operating system or server crashed or is unresponsive

     Manually perform switch or disconnection using the mc_ctl command.
   - An admin network issue occurred

     Refer to "Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode", and recover the database multiplexing system.

3.7 Monitoring Mirroring Controller Messages

The messages that are output by Mirroring Controller are output to both the database server and the arbitration server. If the automatic switch fails, for example, an important message related to the continuation of the operation may be output, so ensure that the system log messages are monitored.

If the arbitration server is used for automatic degradation, monitor messages on both the database server and the arbitration server.

Message output destination on the database server

Messages are output to the system log.

Message output destination on the arbitration server

Linux

Messages are output to the system log.

Windows

Messages are output to the event log.

Point

- To monitor message types considered to be important, an operating system setting must be configured beforehand. Refer to the operating system manuals, check if the message is of a message type that is monitored to be output to the system log, and configure the setting if required.

- If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - automatic switch/disconnection is not performed. Therefore users need to monitor the messages. Refer to "3.6 Action Required when a Heartbeat Abnormality is Detected" for details.

Display format on the database server

```
programName[processId]: messageType:messageText (messageNumber)
```

Specify the program name in the syslog_ident parameter of the serverIdentifier.*conf* file of the database server.

The message types output by Mirroring Controller, their severity, and their corresponding value in the system log are shown in the table below.

Table 3.1 Message type, severity, and corresponding value in the system log

Message type	Severity	Meaning	System log
INFO	Information	Provides information that does not fall under LOG or NOTICE.	INFO
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)	
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	NOTICE
WARNING	Warning	Provides a warning, for example it will soon be impossible to maintain the multiplexing state.	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR
FATAL		Reports that an abnormality was detected in multiplexed database systems requiring recovery of the system, and also the content and cause of the abnormality.	CRIT
PANIC		Reports that an abnormality was detected in all multiplexed database systems requiring immediate recovery of the system, and also the content and cause of the abnormality.	ALERT

The message severity has the following meanings:

- Information

  Informational status. A message that was reported by the system is displayed. No action is required.

- Notice

  Informational status, but a message that should be noted is displayed. If necessary, take the actions described in the "Action" section of the message.

- Warning

  No error has occurred, but the user is requested to check, and take action. Take the actions described in the "Action" section of the message.

- Error

  An error has occurred. Take the actions described in the "Action" section of the message.

Display format on the arbitration server

Linux

```
programName[processId]: messageType: messageText (messageNumber)
```

Specify the program name in the syslog_ident parameter of the arbitration.conf file of the arbitration server.

Windows

```
eventSourceName[processId]: messageType: messageText (messageNumber)
```

Specify the event source name in the event_source parameter of the arbitration.conf file of the arbitration server.

The message types output by Mirroring Controller, their severity, and their corresponding value in the output destination log are shown in the table below.

Table 3.2 Message type, severity, and corresponding value in the output destination log

Message type	Severity	Meaning	System log (Linux)	Event log (Windows)
INFO	Information	Provides information not categorized as LOG or NOTICE.	INFO	INFORMATION
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)		
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	NOTICE	
WARNING	Warning	Provides a warning, for example it will soon be impossible to perform the arbitration process.	WARNING	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR	ERROR
FATAL		Reports that an abnormality was detected in the arbitration server requiring recovery of the system, and also the content and cause of the abnormality.	CRIT	
PANIC		Reports that an abnormality was detected in the arbitration server requiring immediate recovery of the system, and also the content and cause of the abnormality.	ALERT	

The message severity has the following meanings:

- Information

  Informational status. A message that was reported by the system is displayed. No action is required.

- Notice

  Informational status, but a message that should be noted is displayed. If necessary, take the actions described in the "Action" section of the message.

- Warning

  No error has occurred, but the user is requested to check, and take action. Take the actions described in the "Action" section of the message.

- Error

  An error has occurred. Take the actions described in the "Action" section of the message.

3.8 Server Maintenance

To perform maintenance tasks such as periodic server inspections and the application of updates for software products including the operating system, you must perform a planned stop of the server, and then perform the maintenance.

3.8.1 Rolling Updates

In database multiplexing mode, rolling updates, that perform the maintenance for the servers that comprise the cluster system, can be performed while jobs continue.

First, perform the maintenance for the standby server, and then switch the standby server to the primary server. Then, perform the maintenance for the original primary server that was switched to the standby server. This enables maintenance to be performed while jobs continue.

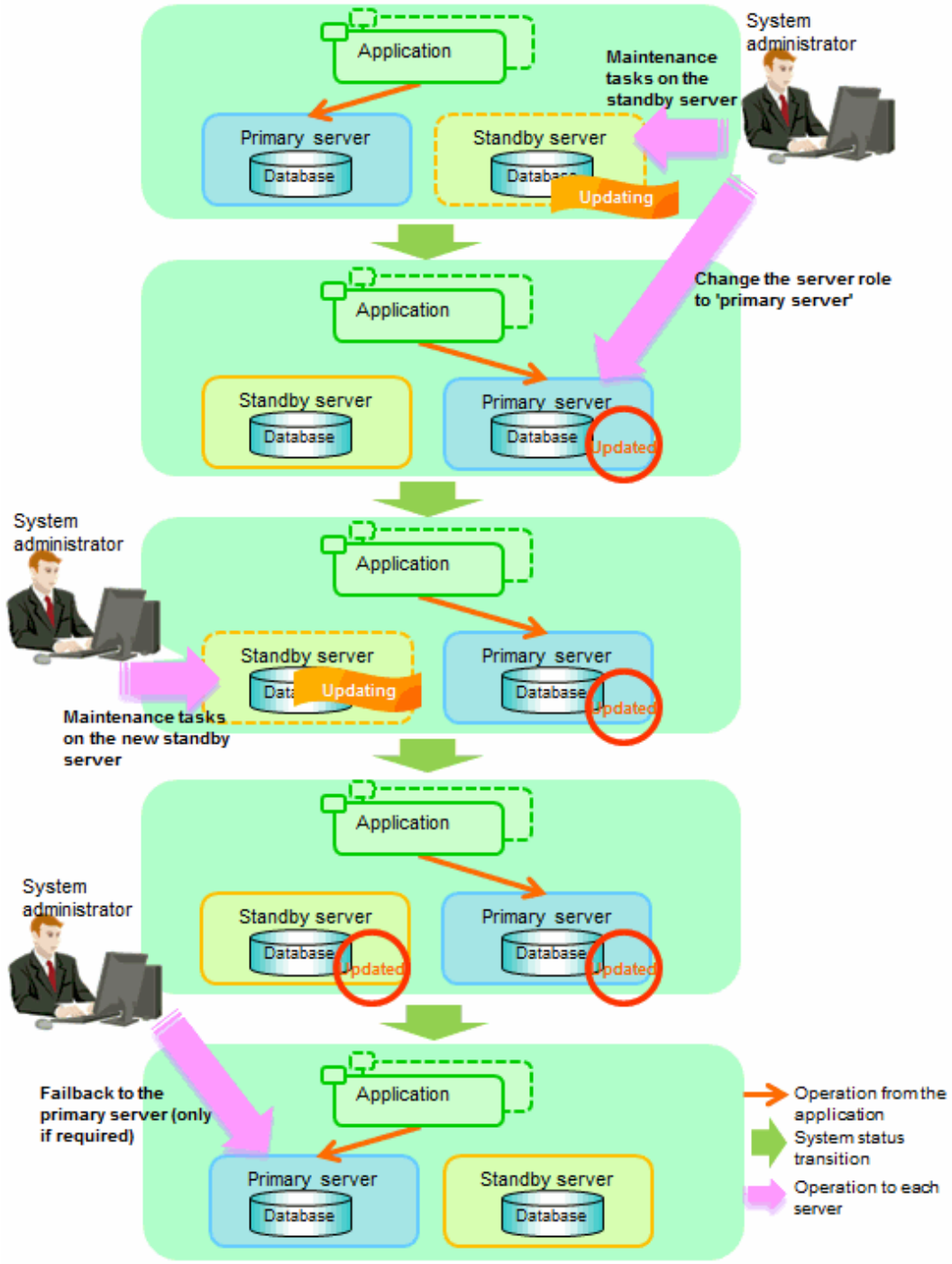
Note that arbitration server maintenance can be performed without affecting database server operation, so it is not necessary to consider rolling update.

See

If the downtime due to the maintenance of the standby server is expected to be long, refer to "Standby server downtime" in "3.9.1 Changes Required when the Standby Server is Stopped".

The flow of a rolling update is shown below.

Figure 3.1 Performing a Rolling Update



Perform the following procedure as shown in the above figure:

Standby server maintenance tasks

1. To perform the maintenance on the standby server, stop Mirroring Controller.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

2. Ensure that Mirroring Controller has completely stopped.

   If the multiplexed instances and Mirroring Controller have been configured on the standby server to start and stop automatically when the operating system of the database server is started or stopped, cancel the setting to start and stop automatically.

   Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for information on how to configure the multiplexed instances and Mirroring Controller to start and stop automatically when the operating system of the database server start and stops.

   As the OS superuser, execute the systemctl command to disable automatic start and stop.

   The example below disables automatic start and stop of "mcoi_inst1.service".

   ```
   Example)
   ```

   ```
   # systemctl disable mcoi_inst1.service
   ```

3. Perform maintenance tasks.

4. Create a copy of the primary server instance on the standby server.

   Execute the pg_basebackup command to create data in the standby server by synchronizing with the primary server.

   ```
   Example)
   ```

   ```
   $ pg_basebackup -D /database/inst1 -X fetch --waldir=/transaction/inst1 --progress --verbose -R
   --dbname='application_name=standbyServerName' -h primaryServerHostName -p
   primaryServerPortNumber
   ```

   The procedure for copying the primary server instance to the standby server is the same as the procedure for setting up the standby server.

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

5. Check the settings for automatic start and stop of the multiplexed instances and Mirroring Controller.

   If the multiplexed instances and Mirroring Controller were configured in step 2 to not start and stop automatically when the operating system of the database server starts and stops, then change the settings back. This step can be skipped if automatic start and stop are not required.

   As the OS superuser, execute the systemctl command to enable automatic start and stop.

   The example below disables automatic start and stop of "mcoi_inst1.service".

   ```
   Example)
   ```

   ```
   # systemctl enable mcoi_inst1.service
   ```

6. Start (rebuild) Mirroring Controller on the standby server.

   This operation is required when determining the maintenance tasks on the standby server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   ```
   Example)
   ```

   ```
   $ mc_ctl start -M /mcdir/inst1
   ```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

Switching to the primary server

To perform the maintenance on the primary server, execute the mc_ctl command in the switch mode on the primary server or the standby server.

Example)

```
$ mc_ctl switch -M /mcdir/inst1
```

When the switch is complete, the synchronous_standby_names parameter in the postgresql.conf file of the new primary server will be commented as follows:

Example)

```
#synchronous_standby_names = 'primary'
```

New standby server maintenance tasks

1. Stop the Mirroring Controller.

   On the new standby server (the primary server before the switch), execute the mc_ctl command in stop mode.

   If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

2. Ensure that Mirroring Controller has completely stopped.

   If the multiplexed instances and Mirroring Controller have been configured on the new standby server to start and stop automatically when the operating system of the database server is started or stopped, cancel the setting to start and stop automatically now.

   See

   Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for information on how to configure the multiplexed instances and Mirroring Controller to start and stop automatically when the operating system of the database server starts and stops.

   As the OS superuser, execute the systemctl command to disable automatic start and stop.

   The example below disables automatic start and stop of "mcoi_inst1.service".

   Example)

   ```
   # systemctl disable mcoi_inst1.service
   ```

3. Perform the maintenance on the new standby server that was stopped.
4. Create a copy of the new primary server instance on the new standby server.

   Execute the pg_basebackup command to create data in the new standby server by synchronizing with the new primary server.

   Example)

```
$ pg_basebackup -D /database/inst1 -X fetch --waldir=/transaction/inst1 --progress --verbose -R
--dbname='application_name=standbyServerName' -h primaryServerHostName -p
primaryServerPortNumber
```

See

The procedure for copying the primary server instance to the standby server is the same as the procedure for setting up the standby server.

Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

5. Check the settings for automatic start and stop of the multiplexed instances and Mirroring Controller.

   If the multiplexed instances and Mirroring Controller were configured in step 2 to not start and stop automatically when the operating system of the database server starts and stops, then change the settings back. This step can be skipped if automatic start and stop are not required.

   As the OS superuser, execute the systemctl command to enable automatic start and stop.

   The example below disables automatic start and stop of "mcoi_inst1.service".

   Example)

```
# systemctl enable mcoi_inst1.service
```

6. After the maintenance is complete, edit the following parameters in the postgresql.conf file of the standby server as required.

   Copying an instance results in the value of the synchronous_standby_names parameter becoming the specified value on the primary server. Therefore, correct it to the specified value on the standby server. If the parameter was commented out, then you must uncomment it.

7. On the standby server, start (rebuild) Mirroring Controller.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
$ mc_ctl start -M /mcdir/inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

Failback of the Primary Server

Revert the primary server and standby server to the original server configuration. Do this to execute the main job on the previous primary server. Refer to "4.1.1.3 Failback of the Primary Server" for details.

Note

Obtain a backup as soon as this task is complete.

3.8.2 Stopping for Maintenance

Perform this procedure to stop all servers for periodic inspections, for example. On the server on which Mirroring Controller is running, execute the mc_ctl command in stop mode to stop the instance and Mirroring Controller.

If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

After that, on the server where the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

Stopping Mirroring Controller

```
Example)
```

```
$ mc_ctl stop -M /mcdir/inst1 -a
```

Stopping the Mirroring Controller arbitration process

Linux

```
Example)
```

```
$ mc_arb stop -M /mcarb_dir/arbiter1
```

Windows

```
Example)
```

```
> mc_arb stop -M D:\mcarb_dir\arbiter1
```

3.8.3 Arbitration Server Maintenance

Arbitration server maintenance can be performed without affecting database server operation.

Follow the procedure below to perform arbitration server maintenance.

1. Execute the mc_arb command in stop mode to forcibly stop the Mirroring Controller arbitration process.

   Linux

   ```
   Example)
   ```

   ```
   $ mc_arb stop -M /mcarb_dir/arbiter1 -e
   ```

   Windows

   ```
   Example)
   ```

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1 -e
   ```

2. Perform maintenance tasks.
3. Execute the mc_arb command in start mode to restart the Mirroring Controller arbitration process.

Linux

Example)

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Windows

Example)

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

4. Execute the mc_arb command in status mode to check that the arbitration server is connected to the database server.

   The example below executes the mc_arb command, and shows the status.

   Linux

   Example)

```
$ mc_arb status -M /mcarb_dir/arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

   Windows

   Example)

```
> mc_arb status -M D:\mcarb_dir\arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

5. Check the command output.

   Items to be checked

   Check that the output status is "online" on both lines.

3.9 Changes in Operation

The following changes in operation may be required:

- Changes required when the standby server is stopped
- Changing from single server mode to database multiplexing mode
- Changing from database multiplexing mode to single server mode
- Changing to database multiplexing mode when the arbitration server is used for automatic degradation
- Changing parameters
- Uninstalling in the database multiplexing mode

3.9.1 Changes Required when the Standby Server is Stopped

Operation when the standby server is stopped

Before performing maintenance for the primary server instance when the standby server has been stopped, stop Mirroring Controller on the primary server, comment out the synchronous_standby_names parameter in the postgresql.conf file of the primary server, and then execute the pg_ctl command in reload mode.

If this operation is not performed, operations performed on the primary server for the instance will remain in a wait state.

See

Refer to "pg_ctl" in Reference for information on the command.

Standby server downtime

If you specified the synchronous_standby_names parameter of the postgresql.conf file and then the standby server instance is stopped, consider the points below.

- The wal_sender_timeout parameter in the postgresql.conf file

  If the standby server is stopped after the timeout set in this parameter was exceeded, an error stating that the transaction log could not be received may be output to the primary server system log, and all transaction logs that should be transferred to the standby server are accumulated.

- The wal_keep_size parameter in the postgresql.conf file

  If a transaction log that exceeds the value set in this parameter was generated while the standby server was stopped, the transaction log may be deleted.

  Additionally, setting this parameter requires consideration regarding stabilization of the database multiplexing mode. Refer to "2.11.1 Tuning to Stabilize the Database Multiplexing Mode" for details.

Note

The standby server must be rebuilt if the pending transaction log to be transferred to the standby server is lost when the standby server is started after the maintenance task is complete.

Take the action advised in the recovery operation that starts from "4.1.1.1.3 Identify cause of error and perform recovery" through to "4.1.1.2 Rebuild the Standby Server".

3.9.2 Changing from Single Server Mode to Database Multiplexing Mode

The procedure for switching single server mode to database multiplexing mode for the purposes of high reliability and load distribution of the system is explained below.

This procedure is equivalent to the setup procedure explained in "Chapter 2 Setting Up Database Multiplexing Mode".

Note

If the data storage destination directory name is not comprised of ASCII characters

Stop the application job and then migrate to a directory with a name that uses only ASCII characters:

1. Stop the database instance on the primary server.
2. Change the name of the data storage destination directory to one that uses only ASCII characters.

See

When encrypting the storage data, refer to "Database Multiplexing Mode" in the Operation Guide, and then perform the setup for encryption on the primary and standby servers.

1. Install on the arbitration server

   Perform this step only if the arbitration server is used for automatic degradation.

   Install the Server Assistant on the server where the Mirroring Controller arbitration process is started.

   Refer to "Installation" in the Installation and Setup Guide for Server Assistant for information on how to install the Server Assistant.

2. Install on the standby server

   Install FUJITSU Enterprise Postgres on the server to be started as the standby server.

   Refer to "Installation" in the Installation and Setup Guide for Server for information on how to install FUJITSU Enterprise Postgres.

   Use ASCII characters in the data storage destination directory.

3. Stop the application jobs

   Stop the application jobs to be connected to the primary server.

4. Change the primary server settings

   To allow connections from the server to be started as the standby server, configure the settings in step 2 and thereafter of "2.4.2 Creating, Setting, and Registering the Primary Server Instance" on the primary server.

5. Set up the arbitration server

   Refer to "2.3 Setting Up the Arbitration Server" for details.

   Perform this step only if the arbitration server is used for automatic degradation.

6. Set up database multiplexing mode on the primary server

   Refer to "2.4.1 Setting Up Database Multiplexing Mode on the Primary Server" for details.

7. Set up database multiplexing mode on the standby server

   Refer to "2.5.1 Setting Up Database Multiplexing Mode on the Standby Server" for details.

8. Create the standby server instance and start it

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance" for details.

After the above steps are completed, refer to the remaining explanations in "Chapter 2 Setting Up Database Multiplexing Mode" and ensure that the required settings and operations are completed.

3.9.3 Changing from Database Multiplexing Mode to Single Server Mode

The procedure for stopping database multiplexing mode and changing to single server mode is explained below.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

The tasks on the arbitration server are required only if the arbitration server is used for automatic degradation.

Tasks on the database server

1. Determine the server for which the instance is to be stopped, and switch this server

   Determine the server that is to be excluded as the database multiplexing mode target, and for which the instance is to be stopped.

   If the server for which the instance is to be stopped is the primary server, execute the mc_ctl command in the switch mode to switch the standby server to the primary server.

   The standby server after the switch is complete will be the server for which the instance is to be stopped.

   If the server for which the instance is to be stopped is the standby server, there is no need to perform the switch operation.

   Example)

   ```
   $ mc_ctl switch -M /mcdir/inst1
   ```

2. Stop Mirroring Controller and the instance, and delete the file resources

   On the server that was determined in step 1, execute the mc_ctl command in stop mode to stop Mirroring Controller and the instance.

If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

Then, delete the following file resources:

- Data storage destination directory
- Mirroring Controller management directory

Example)

```
$ rm -rf /database/inst1
$ rm -rf /mcdir/inst1
```

See

Refer to "Security-Related Notes" in the Operation Guide for details on deleting the data securely.

3. Stop the application jobs

   Stop the application jobs to be connected to the primary server.

4. Stop Mirroring Controller and the instance on the primary server

   Execute the mc_ctl command in stop mode on the primary server.

   If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

5. Delete the database multiplexing mode settings that were configured for the primary server instance.

   Reset the postgresql.conf file parameters to their values before the database multiplexing operation was set.

   Delete the file resources from the Mirroring Controller management directory.

   If the backup operation was performed, delete the following resources:

   - Mirroring Controller management directory backup data obtained in database multiplexing mode
   - Instance backup data obtained in database multiplexing mode

   Additionally, if the primary_conninfo parameter is set in the postgresql.auto.conf file, execute the ALTER SYSTEM RESET statement to delete the setting.

   Example)
   An example execution of the psql command is shown below.

   ```
   postgres=# ALTER SYSTEM RESET primary_conninfo;
   ```

   After these actions are performed, ensure that the backup data is collected when starting the single operation.

See

- Refer to "Security-Related Notes" in the Operation Guide for details on deleting the data securely.
- Refer to "2.14 Backup Operation" for details on the backup operation.

- Refer to "Appendix A Parameters" for details on the postgresql.conf file parameters.

Point

In the above procedure, if the postgresql.conf file of the single primary server can be changed by reloading the file, the operation mode can be changed without stopping the application job.

In that case, execute the mc_ctl command in stop mode with the --mc-only option specified to stop only Mirroring Controller in relation to stopping the primary server.

Tasks on the arbitration server

Linux

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example)

   ```
   $ mc_arb stop -M /mcarb_dir/arbiter1
   ```

2. Delete the Mirroring Controller arbitration process management directory.

   Example)

   ```
   $ rm -rf /mcarb_dir/arbiter1
   ```

Windows

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example)

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1
   ```

2. Unregister the Mirroring Controller arbitration process from the Windows service.

   Execute the mc_arb command in unregister mode to unregister the Mirroring Controller arbitration process from the Windows service.

   Example)

   ```
   > mc_arb unregister -M D:\mcarb_dir\arbiter1
   ```

3. Delete registrations related to the event log

   If error logs are output to the event log in "2.2.2.1 Preparing to Output Error Logs to the Event Log (Windows)", delete the registered event source name for each instance.

   Example)

   ```
   > regsvr32 /u /i:"Mirroring Controller arbtier1" "c:\Program Files\Fujitsu
   \fsepv<x>assistant64\lib\mcarbevent.dll"
   ```

   Note that "<*x*>" indicates the product version.

4. Delete the Mirroring Controller arbitration process management directory.

   Example)

   ```
   > rmdir /S /Q D:\mcarb_dir\arbiter1
   ```

3.9.4 Changing to Database Multiplexing Mode when the Arbitration Server is Used for Automatic Degradation

This section provides the procedure to change to database multiplexing mode using the Mirroring Controller only on the database server when the arbitration server is used for automatic degradation.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

Tasks on the arbitration server

1. Set up the arbitration server.

   Refer to "2.3 Setting Up the Arbitration Server" for information on how to set up the arbitration server.

Tasks on the database server

1. On the server where Mirroring Controller is running, execute the mc_ctl command in stop mode to stop Mirroring Controller on the primary server and standby server.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1 -a --mc-only
   ```

2. Edit the network.conf file of the primary server and standby server to add the information of the arbitration server.

   Refer to "A.3 Network Configuration File" for details.

   The definition example of the network.conf file of the primary server is shown below:

   Example)

   The IDs of the primary server and standby server are set to "server1" and "server2", and their port numbers are set to "27540" and "27541". The ID of the server of the Mirroring Controller arbitration process is set to "arbiter", and its port number is set to "27541".

   ```
   server1 192.0.2.100,192.0.3.100 27540,27541 server
   server2 192.0.2.110,192.0.3.110 27540,27541 server
   arbiter 192.0.3.120 27541 arbiter
   ```

   Note

   - Ensure that the port numbers set for the primary server, standby server, and arbitration server do not conflict with other software. Also do not configure the same segment for the admin network and arbitration network.
   - If the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:
     - IP address or host name of the database server used as the admin network
     - IP address or host name of the database server used as the arbitration network
     - Port number of the database server used as the admin network
     - Port number of the database server used as the arbitration network
   - If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf.

3. Edit the *serverIdentifier*.conf file of the primary server and standby server to add parameters required for the operation where the arbitration server is used for automatic degradation.

   Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the parameters required when the arbitration server is used for automatic degradation.

4. On the primary server and standby server, execute the mc_ctl command in start mode to start the Mirroring Controller process.

   Example)

```
$ mc_ctl start -M /mcdir/inst1 --mc-only
```

Common tasks

1. Check the connection status from the database server or arbitration server.

   Refer to "2.8 Checking the Connection Status" for details.

3.9.5 Changing Parameters

Stop Mirroring Controller before editing the Mirroring Controller server configuration file and network configuration file.

If the Mirroring Controller process crashes or becomes unresponsive, restart is performed automatically by the Mirroring Controller monitoring process, and the configuration file is reloaded. Therefore, if the configuration file was being edited, unintended behavior will occur.

3.9.6 Uninstalling in Database Multiplexing Mode

This section explains how to uninstall FUJITSU Enterprise Postgres on a server using database multiplexing mode.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

The tasks on the arbitration server are required only if the arbitration server is used for automatic degradation.

Tasks on the database server

1. Stop the multiplexed instances and Mirroring Controller

   Refer to "3.2 Starting and Stopping Mirroring Controller" for information on how to stop the instance.

2. Uninstall FUJITSU Enterprise Postgres

   Refer to "Uninstallation" in the Installation and Setup Guide for Server for information on how to uninstall FUJITSU Enterprise Postgres.

Tasks on the arbitration server

Refer to "Uninstallation" in the Installation and Setup Guide for Server Assistant, and uninstall the Server Assistant.

Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode

This chapter describes the action required if an error occurs in database multiplexing mode.

In database multiplexing mode, when an error is detected, the switch or disconnection of the standby server is performed automatically, so that only the primary server starts degrading. In this case, the recovery tasks will be required for the standby server on which the switch or disconnection was performed.

Other possible cases are as follows:

- When automatic switch fails
- When automatic disconnection fails
- When all servers or instances were stopped

4.1 Action Required when Server Degradation Occurs

If the server has started degrading, the recovery tasks will vary depending on whether the cause was the switch (failover or switchover), or the disconnection.

Execute the mc_ctl command in status mode, or refer to the system log, and check if the cause of the server degradation was the switch or the disconnection.

In the example below, the mc_ctl command is executed in status mode.

If a switch has occurred, "switched" (the switch is complete and the server is in a degrading state) is displayed for "mirroring status".

Example)

```
$ mc_ctl status -M /mcdir/inst1
mirroring status
----------------
switched

   :
```

If a disconnection has occurred, "not-switchable" (disconnection was performed so the server cannot be switched) is displayed for "mirroring status".

Example)

```
$ mc_ctl status -M /mcdir/inst1
mirroring status
----------------
not-switchable

  :
```

Note

If Mirroring Controller detects any errors on the server on which operations are continuing during recovery to database multiplexing mode from a degrading operation state, perform the procedure in "4.1.3 Addressing Errors During Degrading Operation", and then recover to database multiplexing mode.

4.1.1 Operations when the Server has Started Degrading after a Switch has Occurred

This section explains the operations when the server has started degrading after a switch has occurred.

Note

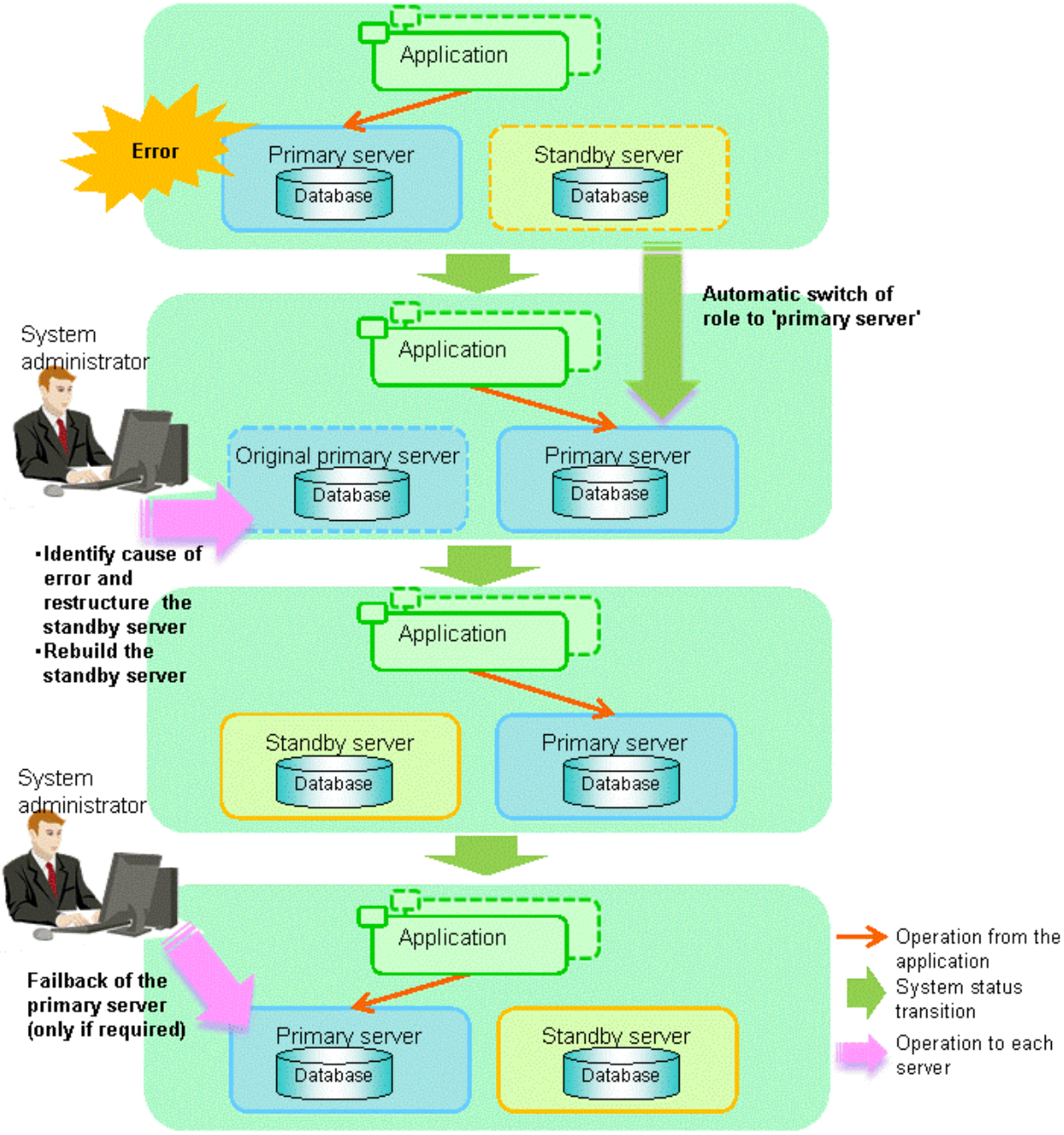
- After a switch has occurred as a result of an abnormality on the primary server, the database will not have a multiplexed configuration until the standby server is rebuilt. Remove the cause of the error as quickly as possible, and then rebuild the standby server.
- If the reference job was executed on the standby server, and the servers are switched because an error occurred on the primary server, the load is concentrated on the new primary server. Accordingly, pause the reference job on the original standby server, rebuild the original primary server as the new standby server, and then resume the reference job for the new standby server.
- If the instance on the new primary server is stopped before the original primary server where the error occurred is rebuilt as the new standby server, a split brain occurs at startup from the instance on the original primary server. Therefore, start the instance on the new primary server before rebuilding the standby server.

If the switch occurred and the server has started degrading, perform the following operations to recover the standby server and revert it to its original state:

- Identify Cause of Error and Restore the Standby Server
- Rebuild the Standby Server
- Failback of the Primary Server (only if required)

The flow of these operations is shown in the figure below.

Figure 4.1 Flow of operations



4.1.1.1 Identify Cause of Error and Restore the Standby Server

Perform the recovery according to the following procedure:

1. Stop Mirroring Controller
2. Recovery of the Mirroring Controller management directory
3. Identify cause of error and perform recovery

4.1.1.1.1 Stop Mirroring Controller

Execute the mc_ctl command in stop mode for the original primary server on which the error occurred.

If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

This also stops the instance that is required to perform the recovery.

Note

If the instance does not stop, refer to "Actions in Response to Failure to Stop an Instance" in the Operation Guide, and then stop the instance.

Then, specify the -e option in the above command to forcibly stop Mirroring Controller.

4.1.1.1.2 Recovery of the Mirroring Controller management directory

Copy the files in the Mirroring Controller management directory from the backup data, and then perform the recovery.

4.1.1.1.3 Identify cause of error and perform recovery

Refer to the system log of the primary server and the standby server to identify the cause of the error, and then perform recovery.

The following commands can be used to recover a standby server. Select depending on the recovery and the situation.

- pg_basebackup

  Creates a copy of all resources of the primary server instance.

- pg_rewind

  Creates a copy of only the updated files on the new primary server. For this reason, if this command is used to incorporate a new standby server, recovery time can be shortened. To use this command to build the original primary server as a new standby server, at least one of the following must be met:

  a. Checksums were enabled when an instance was created, or

  b. The wal_log_hints parameter of postgresql.conf was enabled when an instance was started.

  Additionally, full_page_writes must be enabled, which is its default value.

See

- Refer to "pg_basebackup" in "Reference" in the PostgreSQL Documentation for information on the pg_basebackup command.
- Refer to "pg_rewind" in "Reference" in the PostgreSQL Documentation for information on the pg_rewind command.

The example below executes the pg_rewind command to perform recovery by synchronizing data on the original primary server with the new primary server.

1. Wait for the application of unapplied update transaction logs on the new primary server.

   Execute the SQL below on the new primary server, and wait until the result is false.

   ```
   # select pg_is_in_recovery();
   ```

   Example)

   ```
   $ psql -h hostNameOfNewPrimaryServer -p portNumOfNewPrimaryServer -d dbName -c "select
   pg_is_in_recovery();"
   ```

   Any database can be connected to.

Note

If the pg_rewind command is executed immediately after promotion of the new primary server, the processing in steps 1 and 2 is required. If update-type SQL can be executed on the new primary server and checkpoint processing is executed after promotion, the processing in steps 1 and 2 will not be necessary.

2. Update the timeline ID.

   Execute checkpoint processing, and update the timeline ID.

```
$ psql -h hostNameOfNewPrimaryServer -p portNumOfNewPrimaryServer -d dbName -c "checkpoint;"
```

   Any database can be connected to.

3. Create a copy of the new primary server instance in the original primary server (new standby server).

   Execute the pg_rewind command to synchronize the new standby server data with the new primary server.

   Example)

```
$ pg_rewind -D /database/inst1 -R --source-server='user=userName host=newPrimaryServerHostName
port=newPrimaryServerPortNumber dbname=dbName application_name=newStandbyServerName'
```

Note

- Use the pg_rewind command with the -R option to create a standby.signal file. If you do not create the standby.signal file, the Mirroring Controller cannot be started as a standby server.
- If using a method that requires password authentication for connections to the primary server, you will need to ensure that authentication is performed automatically. If the -R option is specified for the pg_rewind command and the password parameter is specified for the --dbname option, the pg_rewind command will set the password in the primary_conninfo parameter in postgresql.auto.conf file, enabling connections to be performed automatically.

  If a password is not set in the primary_conninfo parameter in postgresql.auto.conf file, it will be necessary to create a .pgpass file in the home directory of the instance administrator user, and specify a password for the replication database.
- If you need to set a connection string other than host, port and application_name, include it in the setting of the primary_conninfo parameter.
- The primary_conninfo parameter should not be set in the postgresql.conf file, but only in the postgresql.auto.conf file using the pg_rewind command.

4. Specify parameters in the postgresql.conf file of the original primary server (new standby server).

   Set the parameters required for the standby server in postgresql.conf.

   Refer to "Table 2.5 Parameters" for information on the parameters to set in postgresql.conf.

See

- Refer to "Hot Standby" in the PostgreSQL Documentation for details on the standby.signal file.
- Refer to "Setting Up a Standby Server" in the PostgreSQL Documentation for details on the primary_conninfo.

Note

A new timeline is branched for the new primary server due to promotion, so 'latest' needs to be specified for the recovery_target_timeline parameter so that the old primary server (new standby server) follows the new primary server.

4.1.1.2 Rebuild the Standby Server

The starting of the recovered original primary server as the standby server is referred to as the "standby server rebuild".

On the original primary server, start Mirroring Controller and the instance.

Enabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode.

Example)

```
$ mc_ctl start -M /mcdir/inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.1.3 Failback of the Primary Server

To revert the primary server and standby server to the original server configuration after rebuilding the standby server, perform failback for the primary server.

Do this to execute the main job on the previous primary server.

Perform the following procedure:

1. Failback of the primary server

   Execute the mc_ctl command in switch mode on the primary server or the standby server.

   Example)

   ```
   $ mc_ctl switch -M /mcdir/inst1
   ```

   After executing the mc_ctl command in switch mode, the status will be as follows:

   Example)

   ```
   $ mc_ctl status -M /mcdir/inst1
   mirroring status
   ----------------
   switched
   server_id  host_role                  host         host_status  db_proc_status       disk_status
   ------------------------------------------------------------------------------------------------
   server1    primary                   192.0.2.100 normal        abnormal(postmaster) normal
   server2    none(inactivated primary) 192.0.2.110 normal        abnormal(postmaster) normal
   ```

2. Stop the original primary server

   On the original primary server, execute the mc_ctl command in stop mode to stop Mirroring Controller and the instance.

   If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

   Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

3. Create a copy of the new primary server instance in the original primary server (new standby server)

   Execute the pg_basebackup command to create data in the new standby server by synchronizing with the new primary server.

   Example)

```
$ pg_basebackup -D /database/inst1 -X fetch --waldir=/transaction/inst1 --progress --verbose -R
--dbname='application_name=standbyServerName' -h primaryServerHostName -p
primaryServerPortNumber
```

See

The procedure for copying the new primary server instance to the new standby server is the same as the procedure for setting up the new standby server.

Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

4. Rebuild the standby server

   On the standby server, start Mirroring Controller and the instance.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
$ mc_ctl start -M /mcdir/inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.2 Operations when the Server has Started Degrading after a Disconnection has Occurred

This section explains the operations when the server has started degrading after a disconnection has occurred.

Note

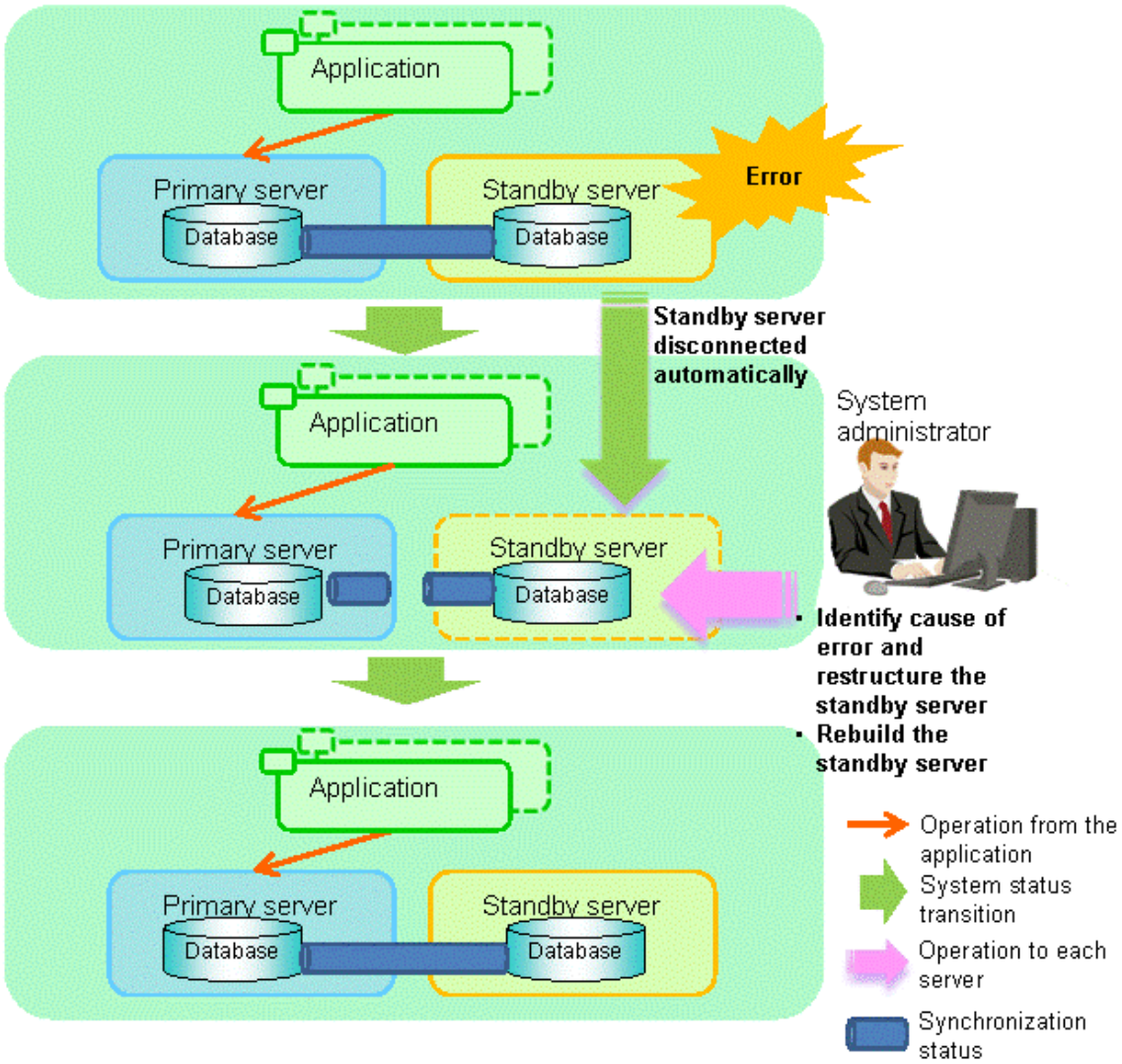
After a disconnection has occurred as a result of an abnormality on the standby server, the database will not have a multiplexed configuration until the standby server is rebuilt. Remove the cause of the error as quickly as possible, and then rebuild the standby server.

If the disconnection occurred and the server has started degrading, perform the following operations to recover the standby server and revert it to its original state:

- Identify Cause of Error and Restore the Standby Server
- Rebuild the Standby Server

The flow of these operations is shown in the figure below.

Figure 4.2 Flow of operations



4.1.2.1 Identify Cause of Error and Restore the Standby Server

Perform the recovery according to the following procedure:

1. Stop Mirroring Controller
2. Recovery of the Mirroring Controller management directory
3. Identify cause of error and perform recovery

4.1.2.1.1 Stop Mirroring Controller

Execute the mc_ctl command in stop mode for the standby server on which the error occurred.

If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Example)

```
$ mc_ctl stop -M /mcdir/inst1
```

This also stops the instance that is required to perform the recovery.

Note

If the instance does not stop, refer to "Actions in Response to Failure to Stop an Instance" in the Operation Guide, and then stop the instance.

Then, specify the -e option in the above command to forcibly stop Mirroring Controller.

4.1.2.1.2 Recovery of the Mirroring Controller management directory

Copy the files in the Mirroring Controller management directory from the backup data, and then perform the recovery.

4.1.2.1.3 Identify cause of error and perform recovery

Refer to the system logs of the primary server and the standby server to identify the cause of the error, and then perform recovery.

Execute the pg_basebackup command to perform recovery by synchronizing data in the primary server with the standby server.

```
Example)
```

```
$ pg_basebackup -D /database/inst1 -X fetch --waldir=/transaction/inst1 --progress --verbose -R --
dbname='application_name=standbyServerName' -h primaryServerHostName -p primaryServerPortNumber
```

See

This recovery procedure is the same as the procedure for setting up the standby server.

Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

4.1.2.2 Rebuild the Standby Server

Start the Mirroring Controller and the instance of the standby server, and rebuild the standby server.

Enabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode.

```
Example)
```

```
$ mc_ctl start -M /mcdir/inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

```
Example)
```

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.3 Addressing Errors During Degrading Operation

This section explains how to address errors that may occur on the server on which operation is continuing during degrading operation triggered by a switch or disconnection.

If needing to recover from backup data

If it is necessary to recover the database using backup data due to data becoming corrupted from disk failure or user operation error, refer to the following for information on recovery to database multiplexing mode:

- Action Required when All Database Servers or Instances Stopped
- Recovering from an Incorrect User Operation

If a temporary error occurs

If a temporary error occurs, such as due to a high load on the server or insufficient system resources, remove the cause of the error and restart Mirroring Controller, and then refer to the following for details on recovery to database multiplexing mode:

- Operations when the Server has Started Degrading after a Switch has Occurred
- Operations when the Server has Started Degrading after a Disconnection has Occurred

See

Refer to "3.2 Starting and Stopping Mirroring Controller" for information on restarting Mirroring Controller.

4.2 Action Required when Automatic Switch Fails

If the system behavior is unstable, for example there are insufficient temporary system resources, the Mirroring Controller automatic switch may fail.

Perform the switch manually using one of the following methods:

- Refer to the procedures in "3.4 Manually Switching the Primary Server".
- In the standby server, execute the mc_ctl command in switch mode with the -force option specified to forcibly perform the switch.

  Example)

```
$ mc_ctl switch -M /mcdir/inst1 --force
```

Point

- Even if connection cannot be established between database servers, it is possible to fence the primary server and forcibly switch by executing the mc_ctl command in switch mode with the --force option specified.
- The primary server is not fenced in the cases below, so stop Mirroring Controller and instances of the primary server database in advance:
  - The --no-fencing option is specified when performing forced switch.
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message" and the fencing command is not configured to be used (the fencing_command parameter is omitted in *serverIdentifier*.conf).
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "fallback".

See

Recovery to database multiplexing mode

Refer to "4.1.1.2 Rebuild the Standby Server" and "4.1.1.3 Failback of the Primary Server" for information on recovery to database multiplexing mode.

4.3 Action Required when Automatic Disconnection Fails

If the system behavior is unstable, for example there are insufficient system resources such as available memory or free disk space, automatic disconnection using Mirroring Controller may not be possible.

Perform the disconnection manually using one of the following methods:

- Refer to the procedures in "3.5 Manually Disconnecting the Standby Server".
- In the primary server, execute the mc_ctl command in detach mode to perform forced disconnection.

  Example)

```
$ mc_ctl detach -M /mcdir/inst1
```

Point

- Even if connection cannot be established between database servers, it is possible to fence the standby server and forcibly disconnect by executing the mc_ctl command in detach mode.
- In the cases below, stop Mirroring Controller and instances of the standby server database in advance so that the standby server is not fenced:
  - The --no-fencing option is specified when performing forced disconnection.
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message" and the fencing command is not configured to be used (the fencing_command parameter is omitted in *serverIdentifier.conf*).
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "fallback".

See

Recovery to database multiplexing mode

Refer to "4.1.2.2 Rebuild the Standby Server" for information on recovery to database multiplexing mode.

4.4 Action Required when All Database Servers or Instances Stopped

This section explains what happens when all database servers or instances on the database server have stopped, so jobs cannot continue.

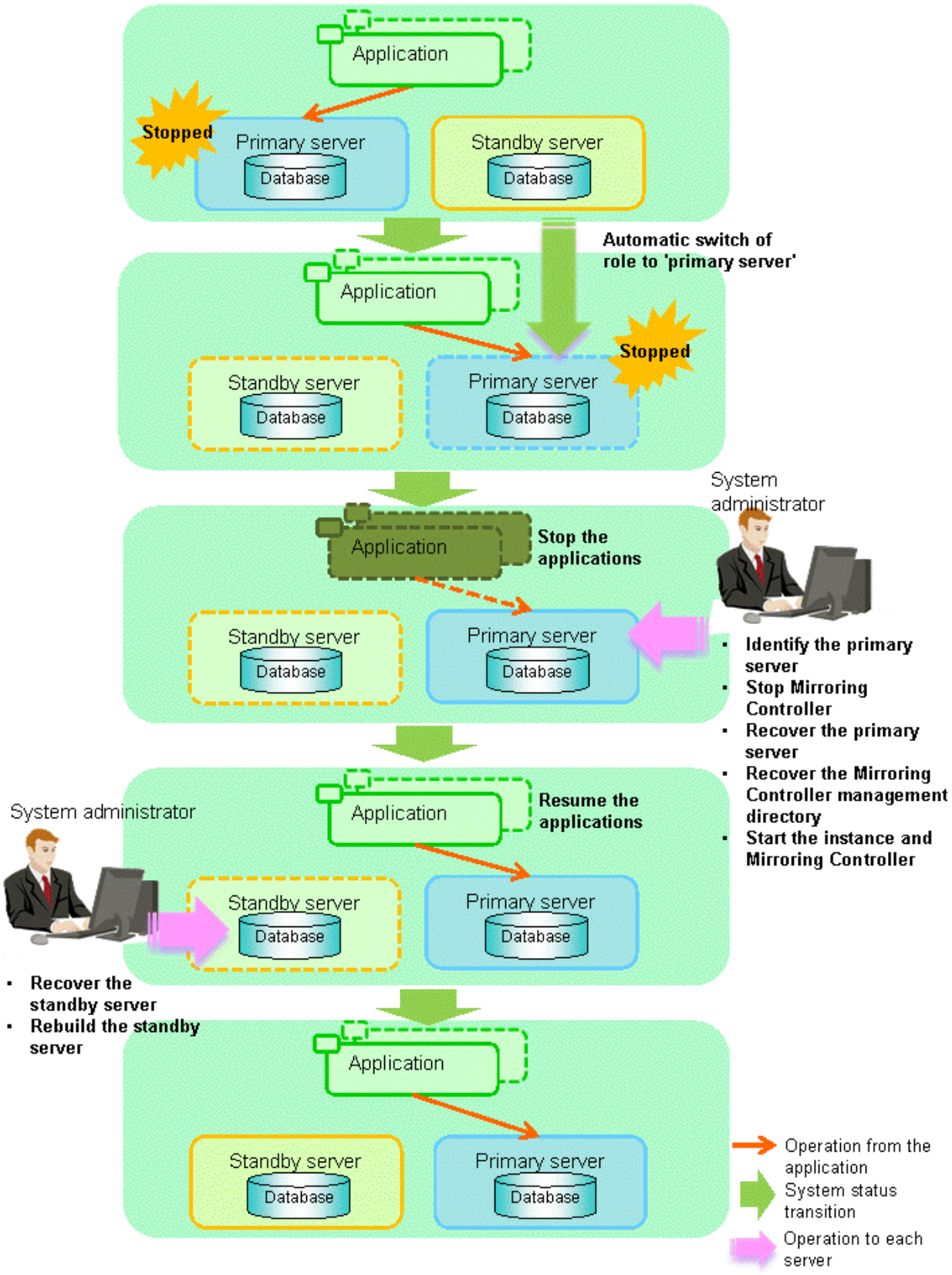
See

Recovery to database multiplexing mode

Refer to "4.1.1.2 Rebuild the Standby Server" and "4.1.1.3 Failback of the Primary Server" for information on recovery to database multiplexing mode.

The flow of these recovery operations is shown in the figure below.

Figure 4.3 Flow of operations



Perform the following procedure:

1. Stop the applications

   Stop the applications from running.

2. Identify the primary server

   Use one of the following methods to identify the primary server that was running before the servers or instances stopped:

   - Refer to the system log on each server and identify the server where the following message was output.

     Message:

     ```
     MirroringControllerOpen[30017]: LOG:  promotion processing completed (MCA00062)
     ```

   - On each server, execute the mc_ctl command in status mode to search the servers for which "none(inactivated primary)" is displayed.

3. Stop Mirroring Controller on the primary server

   Execute the mc_ctl command in stop mode on the primary server.

   If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

   Note

   Forcibly stopping Mirroring Controller

   If Mirroring Controller does not stop, specify the -e option in the stop mode of the mc_ctl command and then execute the command.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1 -e
   ```

4. Recover the primary server

   First, refer to "Actions when an Error Occurs" in the Operation Guide, and then identify the cause of the error and perform recovery.

   Next, recover the primary server using the recovery method that uses the pgx_rcvall command based on the backup data.

   If the backup operation was performed using the pgx_dmpall command based on the instructions in "2.14.2 Database Backup Operation", perform the following procedure for the recovery:

   a. Perform the following operations on both the primary server and the standby server, and check the server containing the backup data and the archive log that show the latest date.

      - Execute the pgx_rcvall command with the -l option specified and identify the backup data that shows the latest date.
      - Identify the archive log that shows the latest date, as shown below.

        Example)

        ```
        $ ls -ltr backupDataStorageDir/*_wal
        ```

   b. If the latest backup data exists on the standby server, copy (*1) the backup data and overwrite (*2) it to each backup storage destination directory on the primary server.

   c. If the latest archive log and transaction log file exist on the standby server, copy (*1) the archive log and overwrite (*2) it to the backup storage destination directory on the primary server.

   d. Execute the pgx_rcvall command on the primary server, specifying the backup storage destination directory of the primary server.

Note

*1: The backup data may contain a symbolic link, so copy the backup data so that the symbolic link is not converted to an ordinary file (with the tar command, for example).

*2: If you can save a copy of the backup storage destination directory, do so without overwriting it.

See

Refer to "Actions when an Error Occurs" in the Operation Guide for information on the pgx_rcvall command.

5. Recover the Mirroring Controller management directory

   Copy the files in the Mirroring Controller management directory from the backup data, and then perform the recovery.

6. Start the primary server instance and Mirroring Controller

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

   ```
   $ mc_ctl start -M /mcdir/inst1
   ```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

   ```
   $ mc_ctl start -M /mcdir/inst1 -F
   ```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

7. Resume applications

   Resume the applications.

8. Stop Mirroring Controller on the standby server

   Execute the mc_ctl command in stop mode on the standby server.

   If automatic start and stop of Mirroring Controller has been configured using systemd, do not use the mc_ctl command, but instead use the systemctl command. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

   Example)

   ```
   $ mc_ctl stop -M /mcdir/inst1
   ```

9. Recover the standby server

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then recover (set up) the standby server from the primary server.

10. Rebuild the standby server

    On the standby server, start Mirroring Controller and the instance.

Enabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode.

Example)

```
$ mc_ctl start -M /mcdir/inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.5 Recovering from an Incorrect User Operation

This section describes how to recover an instance when data has been corrupted due to incorrect user operation.

For example, when data has been corrupted due to incorrect user operation, such as data being unintentionally changed or deleted by an application or command, it is necessary to restore the original data on the primary server and resynchronize with the standby server.

Use the following procedure to perform recovery.

1. Identify the primary server

   Execute the mc_ctl command in status mode on each server, and search for a server for which "primary" or "none(inactivated primary)" is displayed.

2. Stop the applications and commands that caused the incorrect operation to occur

   Stop applications and commands that are running on the primary server. This will minimize the impact caused by the incorrect data.

   Also, if any applications used for reference by the standby server are running, stop them too.

3. Stop the instance and Mirroring Controller

   Stop the instance and Mirroring Controller on both the primary server and standby server.

   Example)

   ```
   $ mc_ctl stop -a -M /mcdir/inst1
   ```

4. Recover the database on the primary server

   Recover the database using the recovery method in which the pgx_rcvall command uses the backup data to recover the database to a restore point prior to the time when the incorrect operation was performed.

   See

   Refer to "Recovering from an Incorrect User Operation" in the Operation Guide for information on using the pgx_rcvall command to recover the database to a restore point, and then perform only the database recovery procedure while the instance is in a stop state.

5. Start the instance and Mirroring Controller

   Start the instance and Mirroring Controller on the primary server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

Example)

```
$ mc_ctl start -M /mcdir/inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

Example)

```
$ mc_ctl start -M /mcdir/inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

6. Build the new standby server

   Refer to "2.5 Setting Up the Standby Server" for information on building (setting up) a standby server from the primary server.

Chapter 5 Managing Mirroring Controller Using WebAdmin

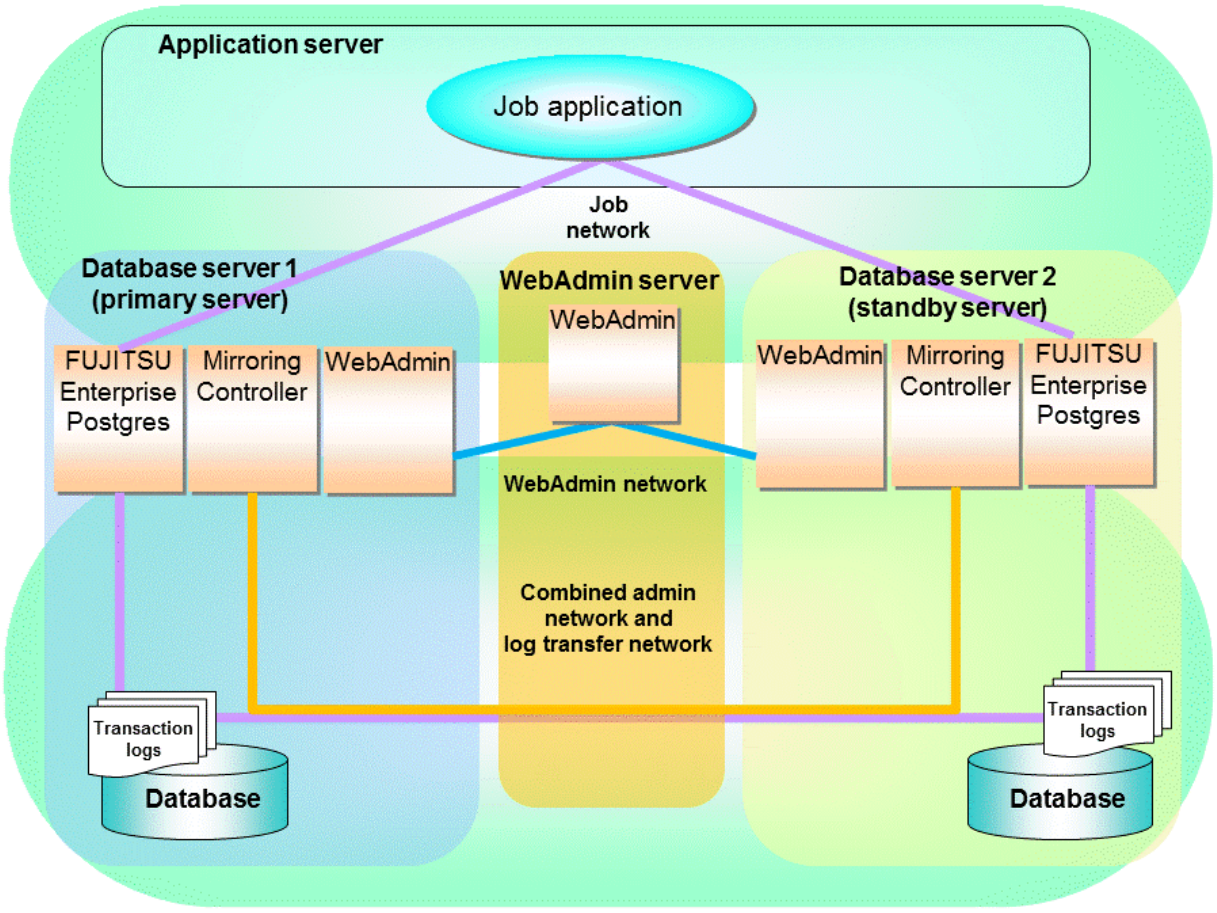
This chapter describes how to set up and manage Mirroring Controller in a streaming replication cluster using WebAdmin.

Mirroring Controller can be used to monitor a streaming replication cluster and perform automatic switching or disconnect synchronous replication when there is an error.

WebAdmin can be used to set up Mirroring Controller in an existing replication cluster. Mirroring Controller can be set up for either synchronous standby instances or asynchronous standby instances.

The configuration of the database multiplexing system built using WebAdmin is shown below:

Figure 5.1 Configuration of database multiplexing operation system using WebAdmin



Point

- If Mirroring Controller is set up to the replication cluster using WebAdmin, the network with the host name (or IP address) specified in [Host name] will be used as the admin network and the log transfer network.
- To use a network other than the job network as the log transfer network, before building the replication cluster specify a host name other than the job network one in [Host name].

Note

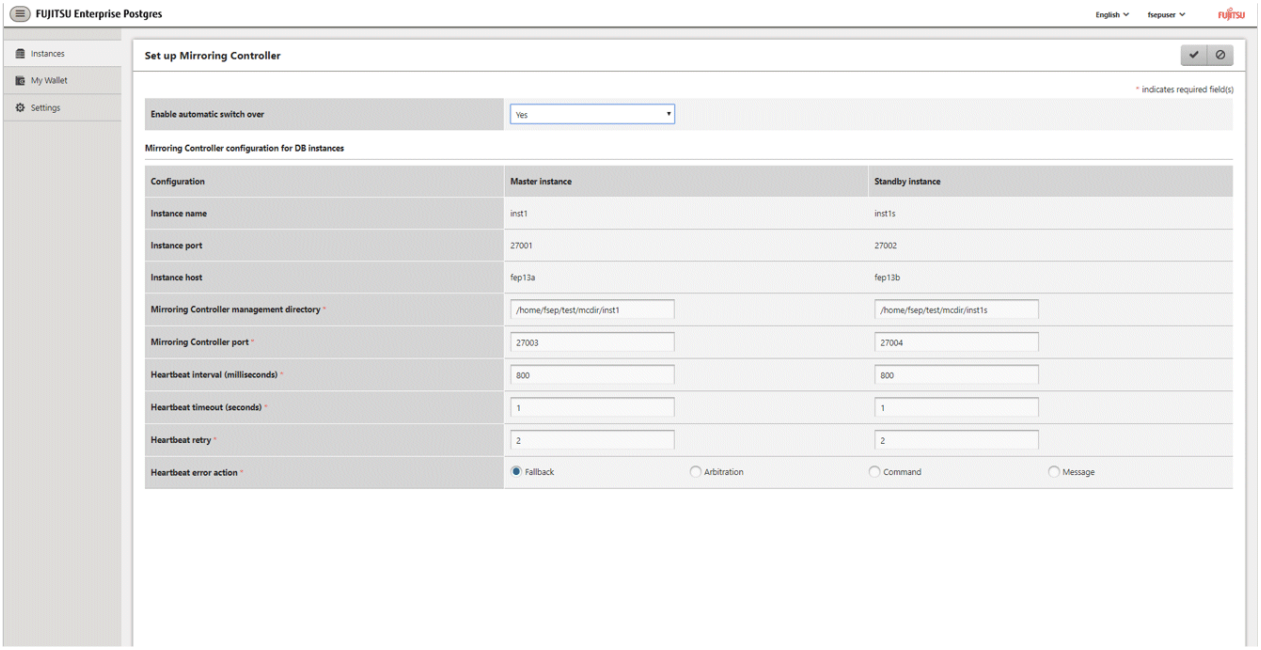
If you set up the arbitration server using WebAdmin, install WebAdmin on the arbitration server.

5.1 Mirroring Controller Setup

Perform the following procedure to set up Mirroring Controller in a streaming replication cluster.

1. In the [Instances] tab, select the standby instance on which Mirroring Controller needs to be set up.
2. Click .
3. Enter the information for the Mirroring Controller to be set up.

   In the example below, Mirroring Controller is being set up for the replication cluster having master instance "inst1" and standby instance "inst1s".



   The instance name, host address and port of the master and standby instances are displayed for easy reference.

   Enter the following items on master instance and on standby instance fields for Mirroring Controller setup, as shown in the above screenshot:

   - [Enable automatic switch over]: Toggles the automatic switch/disconnection functionality. Select "Yes". The default is "No".
   - [Mirroring Controller management directory]: Directory where the Mirroring Controller configuration files will be stored. When the [Mirroring Controller management directory] is entered, WebAdmin will search the Mirroring Controller configuration files in the entered directory based on the [Data storage path] of the corresponding DB instance. If Mirroring Controller configuration files are found, the Mirroring Controller fields will be auto filled.
   - [Mirroring Controller port]: Port number of Mirroring Controller. Note that if the Windows firewall feature is enabled, you must enable the port number of Mirroring Controller. Refer to "E.2 Windows Firewall Settings" for details.
   - [Heartbeat interval (milliseconds)]: Number of milliseconds between two consecutive heartbeat checks. The default is "800".
   - [Heartbeat timeout (seconds)]: Number of seconds for the heartbeat timeout. The default is "1".
   - [Heartbeat retry]: Number of retries for heartbeat monitoring, before failover occurs. The default is "2".
   - [Heartbeat error action]: Operation when a heartbeat abnormality is detected. The default is "Fallback".

     When using FUJITSU Enterprise Postgres 10, 11 and 12 instances created with previous versions, the instances will be in compatibility mode, and the "Fallback" is preselected and cannot be changed in the [Heartbeat error action] for Mirroring Controller setup.

     When setting up Mirroring Controller for FUJITSU Enterprise Postgres 9.5 and 9.6 instances, the [Heartbeat error action] is not supported and therefore is not displayed.

When the [Heartbeat error action] is set to "Arbitration", the following extra items are displayed:

- [Arbitration network IP address]: IP address of the arbitration network.
- [Mirroring Controller Arbitration port]: Port number of Mirroring Controller for communicating with the arbitration server.

The [Arbitration server configuration] section is also displayed with the following items. The [Arbitration server configuration] will not be auto filled.

- [Location]: Location of the arbitration server. "Local" or "Remote" can be selected depending on your configuration.

  If the arbitration server and WebAdmin server are located on the same server, you can select "Local" and the following items are displayed:

  - [Arbitration management directory]: Directory where the arbitration server configuration files will be stored.
  - [Arbitration server host or IP address]: Host name or IP address of the arbitration server.
  - [Arbitration process port]: Port number for the arbitration process.
  - [Fencing command]: Full path of the fencing command that fences a database server when an abnormality is detected.

  If "Remote" is set for the item, the items below are displayed in addition to the above items.

  - In the [Arbitration server configuration] section, [Operating system credential] is displayed where you can enter the following information:

    [User name]: User name to access the arbitration server.

    [Password]: Password to access the arbitration server.

  - In the [Remote WebAdmin for Arbitration server] section, the following items are displayed:

    [Remote WebAdmin address]: IP address of the remote WebAdmin installed on the arbitration server.

    [Remote WebAdmin port]: Port number for the WebAdmin installed on the arbitration server.

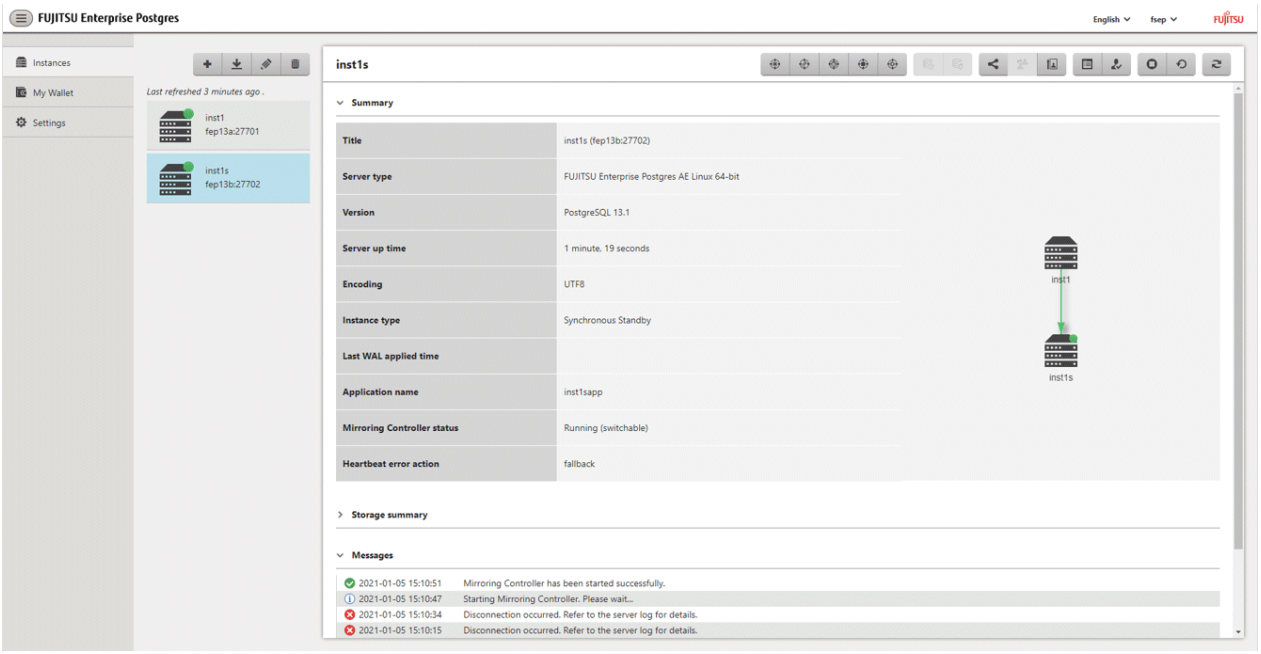
When the [Heartbeat error action] is set to "Command", the following extra items are displayed:

- [Arbitration command]: Full path of the arbitration command to be executed when an abnormality is detected.
- [Fencing command]: Full path of the fencing command that fences a database server when an abnormality is detected.

4. Click to set up Mirroring Controller.

5. Upon successful completion, Mirroring Controller will be started on master and standby instances.

   In the [Instances] tab, select standby instance. The page below is displayed, in which you can check the Mirroring Controller status. In the example below, standby instance "inst1s" is used.



After the Mirroring Controller has been set up, ([Edit Mirroring Controller] button) and ([Mirroring Controller Configuration] button) are available. These buttons are displayed only when FUJITSU Enterprise Postgres 10 or later instances are created with FUJITSU Enterprise Postgres WebAdmin 13.

For FUJITSU Enterprise Postgres 9.5 and 9.6 instances, the [Heartbeat error action] will not be displayed.

When the [Heartbeat error action] is "Arbitration", the following information is displayed: whether the arbitration status is "online" or "offline", the arbitration server IP address and the arbitration process port.

Note

Operating system credential (User name, Password) should not contain hazardous characters. Refer to "Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters".

5.2 Edit Mirroring Controller Setup

Settings made in "5.1 Mirroring Controller Setup" can be updated in either the master instance or a standby instance using WebAdmin.

Perform the following procedure to edit Mirroring Controller configuration:

1. In the [Instances] tab, select the instance for which the Mirroring Controller configuration is to be edited.
2. Click .
3. Enter the information for the Mirroring Controller to be updated. Refer to "5.1 Mirroring Controller Setup".
4. Click to update the Mirroring Controller.
5. Upon successful completion, Mirroring Controller will be started on master and standby instances.

Editing and saving the [Edit Mirroring Controller] page will reset all other settings that are not listed on this page to default values.

5.3 Mirroring Controller Configuration

The information related to Mirroring Controller monitoring and control (refer to "A.4.1 Server Configuration File for the Database Servers") and the information related to arbitration and control of the Mirroring Controller arbitration process (refer to "A.4.2 Arbitration Configuration File") can be set using WebAdmin. You can view and update the configuration on either the master instance or the standby instance.

Perform the following procedure:

1. In the [Instances] tab, select the instance for the Mirroring Controller configuration you want to view.
2. Click to view the Mirroring Controller configuration.
3. Click to show the editing page for the Mirroring Controller configuration. The Mirroring Controller configurations defined during [Mirroring Controller Setup] are read-only on this page. Refer to "5.1 Mirroring Controller Setup".

   Additionally, refer to the "Appendix A Parameters" for information about the settings and the corresponding parameter names.

   The items common to all [Heartbeat error action] are:

   - Target DB
   - Core file path
   - Syslog facility
   - Syslog identity
   - Remote call timeout (milliseconds)
   - Agent alive timeout (seconds)
   - DB instance check interval (milliseconds)
   - DB instance check timeout (seconds)
   - DB instance check retry
   - DB instance timeout action
   - Disk check interval (milliseconds)
   - Disk check retry
   - Tablespace directory error action
   - Post-switch command
   - Post-promote command
     (Post-promote command is replaced in FUJITSU Enterprise Postgres 12. The Post-promote command is still valid and will be displayed when it is used in the server configuration file of Mirroring Controller.)
   - Post-attach command
   - Pre-detach command
   - State transition command timeout (seconds)
   - Check synchronous standby names validation

   When the [Heartbeat error action] is set to "Arbitration", the following extra items are displayed:

   - Arbitration timeout (seconds)
   - Arbiter alive interval (milliseconds)
   - Arbiter alive retry
   - Arbiter alive timeout (seconds)
   - Arbiter connect interval (milliseconds)

- Arbiter connect timeout (seconds)
- Fencing command
- Fencing command timeout (seconds)
- Shutdown detached synchronous standby

When the [Heartbeat error action] is set to "Arbitration", the [Arbitration server configuration] section is displayed with the following items:

- Core file path
- Syslog facility
- Syslog identity
- Fencing command timeout (seconds)
- Heartbeat interval (milliseconds)
- Heartbeat timeout (seconds)
- Heartbeat retry

When the [Heartbeat error action] is set to "Command", the following extra items are available:

- Fencing command timeout (seconds)
- Arbitration command timeout (seconds)
- Shutdown detached synchronous standby

When the [Heartbeat error action] is set to "Message", the following extra items are available:

- Fencing command
- Fencing command timeout (seconds)

In addition, the following configurations are provided:

- DB instance JDBC connection SSL parameters
- DB instance libpq connection SSL parameters

4. Click to update the Mirroring Controller configurations.

5.4 Stopping Mirroring Controller

Mirroring Controller can be stopped either in master instance or in standby instance using WebAdmin.

Perform the following procedure to stop Mirroring Controller.

1. In the [Instances] tab, select the instance where to stop Mirroring Controller.
2. Click .
3. In the confirmation dialog box, click [Yes].

Mirroring Controller will be stopped on the selected instance. The Mirroring Controller status will be updated, and a confirmation message entry will be displayed in the [Message] section.

5.5 Starting Mirroring Controller

Mirroring Controller can be started either in master instance or in standby instance using WebAdmin.

Perform the following procedure to start Mirroring Controller.

1. In the [Instances] tab, select the instance where to start Mirroring Controller.
2. Click .
3. In the confirmation dialog box, select the desired failover mode, and then click [Yes].

Mirroring Controller will be started on the selected instance. The Mirroring Controller status will be updated, and a confirmation message entry will be displayed in the [Message] section.

5.6 Disabling Failover Mode

Disabling failover mode in Mirroring Controller disables automatic switch/disconnection between master and standby instances.

Perform the following procedure to disable failover mode.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Failover mode will be disabled in Mirroring Controller. The Mirroring Controller status will be updated and a confirmation message entry will be displayed in the [Message] section.

5.7 Enabling Failover Mode

Enabling failover mode in Mirroring Controller enables automatic switch/disconnection between master and standby instances.

Perform the following procedure to enable failover.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Failover mode will be enabled in Mirroring Controller. The Mirroring Controller status will be updated and a confirmation message entry will be displayed in the [Message] section.

5.8 Deleting Mirroring Controller Setup

Deleting Mirroring Controller setup removes its setup from master and standby instances.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Mirroring Controller setup will be removed from the cluster. The cluster status will be updated and a confirmation message entry will be displayed in the [Message] section.

For the instances in FUJITSU Enterprise Postgres 12 or later, WebAdmin does not delete the Mirroring Controller management directory and the configuration files.

5.9 Status Update after Failover

When Mirroring Controller performs a failover, standby instance will be promoted to standalone instance. The Mirroring Controller setup will be removed from both standby and master instances.

The following scenario describes one of the ways in which failover can be triggered, and the results achieved by the use of Mirroring Controller in WebAdmin.

1. In the [Instances] tab, select the master instance "inst1".
2. Click .
3. In the confirmation dialog box, the warning "This instance is being monitored by Mirroring Controller. Stopping the instance may result in cluster failover." is displayed.
4. Choose the stop mode and click [Yes].

   In the server, the following takes place:

   a. The master instance is stopped.
   b. Failover is triggered in Mirroring Controller.
   c. The Mirroring Controller setup is removed from both master and standby instances
   d. Standby instance is promoted to standalone.
5. When the instance is refreshed in WebAdmin, the latest status of the instances will be displayed.

When failover is performed, the Mirroring Controller setup is removed from both master and standby instances. Therefore, to manage the Mirroring Controller using WebAdmin again, create the standby instance and set up Mirroring Controller.

Refer to "Creating a Standby Instance" in the Operation Guide for details.

Refer to "5.1 Mirroring Controller Setup" for details.

5.10 Action Required when an Error Occurs in the Combined Admin Network and Log Transfer Network

Communication errors may temporarily occur in the network used as the admin network and log transfer network due to reasons such as high load on the server or insufficient system resources. Because of this, there is a risk of causing a split-brain situation by mistake even though the server has no issues.

Split brain is a phenomenon in which both servers temporarily operate as primary servers, causing data updates to be performed on both servers.

How to detect split brain using WebAdmin

If the conditions below are met, split brain may occur. Refer to "Split-brain detection method" and "How to recover from a split-brain" in "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" and take the actions described.

1. A standby instance is selected in the [Instances] tab, and
2. "Standalone" is displayed in [Instance type], and
3. A master instance is selected in the [Instances] tab, and
4. "Standalone" is displayed in [Instance type].

The admin network is important because Mirroring Controllers use it to confirm the status of each server.

The log transfer network is also important to maintain the data freshness.

Therefore, use network configurations resistant to faults for these networks by using the network redundancy channel bonding feature provided by the operating system or network driver vendor.

5.11 Performing Automatic Degradation Using the Arbitration Server

If database multiplexing is performed using WebAdmin, it is also possible to perform automatic degradation using the arbitration server. In such cases, it is necessary to perform tasks on the database server and the arbitration server after setting up Mirroring Controller in WebAdmin.

Tasks on the arbitration server

Perform setup of the arbitration server using Mirroring Controller commands.

1. Set up the arbitration server.

   Refer to "2.3 Setting Up the Arbitration Server" in "Chapter 2 Setting Up Database Multiplexing Mode" for information on how to set up the arbitration server.

Tasks on the database server

Change some of the settings after setting up Mirroring Controller in WebAdmin.

1. Set up Mirroring Controller in WebAdmin.

   Refer to "5.1 Mirroring Controller Setup" for details.

2. Use WebAdmin to stop Mirroring Controller on the master and standby instances.

   Refer to "5.4 Stopping Mirroring Controller" for details.

3. Edit the network configuration file of the master and standby instances, and add the arbitration server information.

   The network configuration file is network.conf, which exists in the Mirroring Controller management directory specified during Mirroring Controller setup. Refer to "A.3 Network Configuration File" for details.

   A definition example of network.conf is shown below.

   ```
   Example:
   The port number of the database server to be used as the arbitration network is set to "27541".
   The ID of the server of the Mirroring Controller arbitration process is set to "arbiter", and its
   port number is set to "27541".
   ```

   ```
   dbsvm27500 192.0.2.100,192.0.3.100 27540,27541 server
   dbsvs27500 192.0.2.110,192.0.3.110 27540,27541 server
   arbiter 192.0.3.120 27541 arbiter
   ```

   Note

   - Ensure that the port numbers set for the database server and the arbitration server do not conflict with other software. In addition, do not configure the same segment for the admin network and the arbitration network.
   - If the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:
     - IP address or host name of the database server used as the admin network
     - IP address or host name of the database server used as the arbitration network
     - Port number of the database server used as the admin network
     - Port number of the database server used as the arbitration network

- If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf of the arbitration server.
- WebAdmin also support editing mirroring controller configuration via Use WebAdmin to edit Mirroring Controller configurations.
  Refer to "5.2 Edit Mirroring Controller Setup" for detailes.

4. Edit the server configuration file of the master and standby instances, and add the parameters required for automatic degradation using the arbitration server.

   The server configuration file is *instanceName*.conf or *instancePort*.conf, which exists in the Mirroring Controller management directory specified during Mirroring Controller setup.

   To perform automatic degradation using the arbitration server, set the heartbeat_error_action parameter to "arbitration".

   Refer to "A.4.1 Server Configuration File for the Database Servers" for information on other parameters.

5. Use WebAdmin to start Mirroring Controller on the master and standby instances.

   Refer to "5.5 Starting Mirroring Controller" for details.

Common tasks

1. Use the Mirroring Controller command to check the connection status from the database server or the arbitration server.

   Refer to "2.8 Checking the Connection Status" for information on how to check the connection status.

Appendix A Parameters

This appendix describes the configuration files and parameters required by the database multiplexing mode.

See

Refer to "Server Configuration" in the PostgreSQL Documentation for information on the postgresql.conf file.

A.1 Parameters Set on the Primary Server

The content for the parameters set in the postgresql.conf file of the primary server is shown in the table below.

Table A.1 postgresql.conf file

Parameter	Value set	Explanation
wal_level	replica or logical	Specify the output level for the transaction log. Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*standbyServerName*'	Use single quotation marks (') to enclose the name that will identify the standby server. Any name can be specified. Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	Specify whether queries can be run on the standby server. Specify "on".
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the primary server may be deleted. Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WAL save size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that the receiver process (walreceiver) of the transaction log is in an abnormal state on the primary server. The specified value must be larger than the value set for the wal_receiver_status_interval parameter set in the postgresql.conf file of the standby server.

Parameter	Value set	Explanation
		By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
archive_mode	on	Specify the archive log mode.
archive_command	'*installDir*/bin/pgx_walcopy.cmd "%p" "*backupDataStorageDestinationDirectory*/archived_wal/%f"'	Specify the command and storage destination to save the transaction log.
backup_destination	Backup data storage destination directory	Specify the name of directory where to store the backup data. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers, so that the backup data of other servers can be used to perform recovery.
listen_addresses	Primary server IP address, host name, or "*"	Specify the IP address or host name of the primary server. Specify the IP address or corresponding host name that will be used to connect to the log transfer network. The content specified is also used to allow connections from client applications. To receive the connection and the transaction log from any client or standby server, specify "*". Refer to "Connections and Authentication" in the PostgreSQL Documentation for details.
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections value	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally. However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to

Parameter	Value set	Explanation
		prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is "on" or "remote_apply" to prevent data loss caused by operating system or server down immediately after a switch or switch.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

*1: Number of simultaneous executions of the mc_ctl command in the status mode.

A.2 Parameters Set on the Standby Server

This section explains the content of the file and parameters set on the standby server. After editing postgresql.conf file, start the instance.

The content for the parameters specified in postgresql.conf file is shown in the table below.

Table A.2 postgresql.conf file

Parameter	Value set	Explanation
wal_level	replica or logical	Specify the output level for the transaction log. Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*primaryServerName*'	Use single quotation marks (') to enclose the name that will identify the primary server. Any name can be specified. This name will be required to rebuild the original primary server as the new standby server after the primary server was switched. Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	Specify whether queries can be run on the standby server. Specify "on".
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the standby server may be deleted by the primary server.

Parameter	Value set	Explanation
		Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WALsave size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that the receiver process (walreceiver) of the transaction log is in an abnormal state on the primary server. The specified value must be larger than the value set for the wal_receiver_status_interval parameter set in the postgresql.conf file of the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
backup_destination	Backup data storage destination directory	Specify the name of the backup data storage directory. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers so that the backup data of other servers can be used to perform recovery.
archive_mode	on	Specify the archive log mode.
archive_command	'*installDir*/bin/pgx_walcopy.cmd "%p" "*backupDataStorageDestinationDirectory*/archived_wal/%f"'	Specify the command and storage destination to save the transaction log.
listen_addresses	Standby server IP address, host name, or "*"	Specify the IP address or host name of the standby server. Specify the IP address or corresponding host name that will be used to connect to the log transfer network. The content specified is also used to allow connections from client applications. To receive the connection and the transaction log from any client or standby server, specify "*". Refer to "Connections and Authentication" in the PostgreSQL Documentation for details.

Parameter	Value set	Explanation
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections value	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally. However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is "on" or "remote_apply" to prevent data loss caused by operating system or server down immediately after a switch or switch.
primary_conninfo	'*streamingReplicationConnectionDestinationInfo*'	Use single quotation marks (') to enclose the connection destination information of the streaming replication. The default value of this parameter is automatically set to postgresql.auto.conf in the procedure to run pg _ basebackup for instance setup.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

A.3 Network Configuration File

This section explains the network configuration file (network.conf) to be defined individually for the database servers and the arbitration server. Define the same content on the primary server and standby server.

For database multiplexing mode, define the network configuration for the following in network.conf.

- Integration between Mirroring Controller processes
- Integration between a Mirroring Controller process and the Mirroring Controller arbitration process

Items to be defined in network.conf

Format:

```
serverIdentifier hostName[,hostName] portNum[,portNum] [serverType]
Or,
serverIdentifier ipAddr[,ipAddr] portNum[,portNum] [serverType]
```

Specify the server identifier, IP address or host name, port number, and server type, using a space as the delimiter.

The items are explained in the table below.

Table A.3 network.conf file

Item	Description
serverIdentifier	Specify any identifier for the server. The maximum length is 64 bytes. Use ASCII characters excluding spaces and number signs (#) to specify this parameter.
ipAddrOrHostName	Specify the IP address or its corresponding host name that will connect to the admin network that performs communication between the database servers, and to the arbitration network that performs communication between a database server and the arbitration server. When specifying two IP addresses or host names delimited by a comma, do not insert a space after the comma. Use ASCII characters excluding spaces to specify the host name.
portNum	A port number cannot be specified if it exceeds the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. Note that the value specified in this parameter must also be set in the services file. When specifying two port numbers delimited by a comma, do not insert a space after the comma.
serverType	Specify "server" for a database server ("server" can be omitted), or "arbiter" for the arbitration server.

Content to be defined on the database servers

This section explains the network.conf content to be defined on the database servers.

The content to be defined depends on the operation settings at the time a heartbeat abnormality is detected.

When automatic degradation by the arbitration server is selected

- Specify definitions related to the admin network and arbitration network.
- Specify the IP address or host name and port number according to the server type (database server or arbitration server) as shown in the table below.

Server type	IP address or host name		Port number	
	First	Second	First	Second
server	IP address or host name used as the admin network	IP address or host name used as the arbitration network (*1)	Port number used as the admin network	Port number used as the arbitration network (*1)
arbiter	IP address or host name of the arbitration server Specify the same value as that specified in the my_address parameter of arbitration.conf on the arbitration server.	Not required	Port number on the arbitration server Specify the same value as that specified in the port parameter of arbitration.conf on the arbitration server.	Not required

*1: This value can be omitted from definitions not related to the local server. If it is omitted, network.conf must be created on both the primary server and standby server.

Example)

IPv4

```
server1 192.0.2.100,192.0.3.100 27540,27541 server
server2 192.0.2.110,192.0.3.110 27540,27541 server
arbiter 192.0.3.120 27541 arbiter
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea7:559f,2001:258:8404:1217:250:56ff:fea8:559f
27540,27541 server
server2 2001:258:8404:1217:250:56ff:fea7:55a0,2001:258:8404:1217:250:56ff:fea8:55a0
27540,27541 server
arbiter 2001:258:8404:1217:250:56ff:fea8:55a0 27541 arbiter
```

When operation other than automatic degradation by the arbitration server is selected

- Specify definitions related to the admin network.
- Define the same content on the primary server and standby server.
- Define lines for database servers only.
- Specify only one IP address or host name and port number.

IP address or host name		Port number	
First	Second	First	Second
IP address or host name to be used as the admin network	Not required	Port number used as the admin network	Not required

Example)

The literal space represents a space.

IPv4

```
server1 192.0.2.100 27540
server2 192.0.2.110 27540
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea7:559f 27540
server2 2001:258:8404:1217:250:56ff:fea7:55a0 27540
```

Content to be defined on the arbitration server

This section explains the network.conf content to be defined on the arbitration server.

- Specify definitions related to the arbitration network.
- Define lines for database servers only.
- For the IP address or host name, specify the same value as the second IP address or host name specified in the database server line in network.conf of the database server.

- For the port number, specify the same value as the second port number specified in the database server line in network.conf of the database server.

Example)

The literal space represents a space.

IPv4

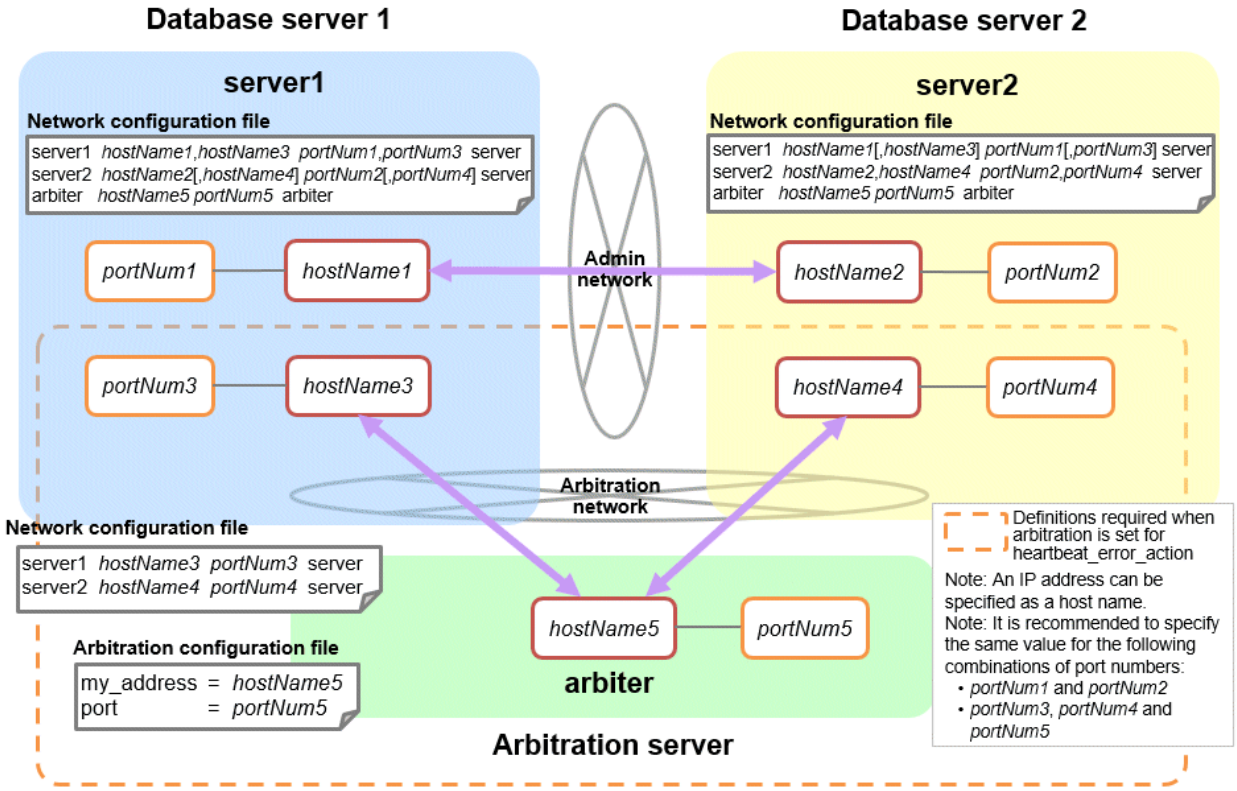
```
server1 192.0.3.100 27541
server2 192.0.3.110 27541
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea8:559f 27541
server2 2001:258:8404:1217:250:56ff:fea8:55a0 27541
```

Relationship between network-related definitions

Refer to the diagram below for the relationship between the host names and IP addresses or port numbers specified in the network configuration file (network.conf) and arbitration configuration file (arbitration.conf).



A.4 Server Configuration File

A.4.1 Server Configuration File for the Database Servers

Define the information related to Mirroring Controller monitoring and control in the serverIdentifier.conf file. The maximum length of the server identifier is 64 bytes. Use ASCII characters excluding spaces to specify this parameter.

If the primary server and standby server environments are different, define content that is different, according to the environment.

Table A.4 serverIdentifier.conf file

Parameter	Value set	Explanation
db_instance	'*dataStorageDestinationDir*' [Example] db_instance = '/database1/inst1'	Specify using single quotation marks (') to enclose the data storage destination directory used to identify the monitoring target instance. Use ASCII characters to specify this parameter.
target_db	postgres or template1	Specify the name of the database to be connected to the database instance. The default is "postgres".
db_instance_username	'*usernameToConnectToDbInstance*'	Specify the username to connect to the database instance. Use ASCII characters to specify this parameter. Specify this parameter if the database administrator user is different from the operating system user who starts Mirroring Controller. Enclose the username of the database superuser in single quotation marks ('). The maximum length of the username is 63 bytes. The default is the operating system user who starts Mirroring Controller.
db_instance_password	'*passwordOfInstanceAdminUser*'	Specify the password used when Mirroring Controller connects to a database instance, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. If password authentication is performed, you must specify this parameter in the settings used when Mirroring Controller connects to a database instance. If you specify this parameter when password authentication is not performed, the parameter will be ignored. If the specified value of this parameter includes ' or \, write \' or \\, respectively.
enable_hash_in_password	on or off	Specify on to treat the # in the db_instance_password specification as a password character, or off to treat it as a comment. The default is "off".
core_file_path	*'coreFileOutputDir'*	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. If this parameter is omitted, it will be assumed that the Mirroring Controller management directory was specified.
syslog_facility	Specify LOCAL0, LOCAL1, LOCAL2, LOCAL3, LOCAL4, LOCAL5, LOCAL6, or LOCAL7.	When the import of logs to the syslog is enabled, the value of this parameter will be used for "facility" of the syslog. The default is "LOCAL0".
syslog_ident (*1)	'*programName*'	Specify using single quotation marks (') to enclose the program name used to identify the Mirroring Controller message in the system log.

Parameter	Value set	Explanation
		Use ASCII characters excluding spaces to specify this parameter. The default is 'MirroringControllerOpen'.
remote_call_timeout	Admin communication timeout	Specify the timeout value (milliseconds) of the Mirroring Controller agent process for communication between servers. Specify a value between 0 and 2147483647 to be less than the operation system TCP connection timeout (*2). The value 0 indicates that there is no timeout limit. The default is 70000 milliseconds (70 seconds).
agent_alive_timeout	Timeout for Mirroring Controller process heartbeat monitoring (seconds)	If there is no response for at least the number of seconds specified, the Mirroring Controller process is restarted. Specify 0 or a value between 2 and 2147483647. The value 0 indicates that there is no timeout limit. The default is 0 seconds.
heartbeat_error_action	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring	arbitration: Perform automatic degradation using the arbitration server. command: Call a user exit to determine degradation, and perform automatic degradation if required. message: Notify messages. fallback: Perform automatic degradation unconditionally. The default is "arbitration". Set the same value on the primary server and standby server.
heartbeat_interval	Interval time for abnormality monitoring during heartbeat monitoring of the operating system or server (milliseconds)	Abnormality monitoring of the operating system or server is performed at the interval specified in heartbeat_interval. If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout. Specify a value between 1 and 2147483647. The specified value is used as the default for db_instance_check_interval and disk_check_interval. The default is 800 milliseconds.
heartbeat_timeout	Timeout for abnormality monitoring during heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout.

Parameter	Value set	Explanation
		Specify a value between 1 and 2147483647. The specified value is used as the default for db_instance_check_timeout. The default is 1 second.
heartbeat_retry	Number of retries for abnormality monitoring during heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout. Specify a value between 0 and 2147483647. The specified value is used as the default for db_instance_check_retry and disk_check_retry. The default is 2 times.
db_instance_check_interval	Database process heartbeat monitoring interval (milliseconds)	Heartbeat monitoring of the database process is performed at the interval specified in db_instance_check_interval. This parameter setting is also used for abnormality monitoring of streaming replication. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_interval.
db_instance_check_timeout	Database process heartbeat monitoring timeout (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_timeout.
db_instance_check_retry	Number of retries for database process heartbeat monitoring (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. However, if it detects that the database process is down, it will immediately switch or disconnect regardless of the setting of this parameter. This parameter setting is also used for abnormality monitoring of streaming replication. Specify a value between 0 and 2147483647. The default number of retries is the value set for heartbeat_retry.
db_instance_timeout_action	none, message, or failover	Specify the behavior for no-response monitoring of the instance.

Parameter	Value set	Explanation
		none: Do not perform no-response monitoring. message: Notify messages if an error is detected during no-response monitoring. failover: Perform automatic degradation if an error is detected during no-response monitoring. The default is "failover".
disk_check_interval	Interval time for disk abnormality monitoring (milliseconds)	Abnormality monitoring of disk failure is performed at the interval specified in disk_check_interval. If the file cannot be created, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_interval.
disk_check_retry	Number of retries for disk abnormality monitoring (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. Specify a value between 0 and 2147483647. The default number of retries is the value set for heartbeat_retry.
tablespace_directory_error_action	message or failover	Specify the behavior to be implemented if an error is detected in the tablespace storage directory. message: Notify messages. failover: Perform automatic degradation. The default is "failover".
arbiter_alive_interval	Interval time for monitoring connection to the Mirroring Controller arbitration process (milliseconds)	A heartbeat is sent to the Mirroring Controller arbitration process at the specified interval. Specify a value between 1 and 2147483647. The default is 16000 milliseconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_alive_timeout	Timeout for monitoring connection to the Mirroring Controller arbitration process (seconds)	If the heartbeat does not respond within the specified number of seconds, the Mirroring Controller arbitration process is determined to have been disconnected, a message is output, and reconnection is attempted. Specify a value between 1 and 2147483647. The default is 20 seconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_alive_retry	Number of retries for monitoring connection to the Mirroring Controller arbitration process (number of times)	Specify the number of heartbeat retries to be performed if an error is detected in the heartbeat to the Mirroring Controller arbitration process. If the heartbeat does not respond within the specified number of retries, the

Parameter	Value set	Explanation
		Mirroring Controller arbitration process is determined to have been disconnected. Specify a value between 0 and 2147483647. The default is 0 times. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_connect_interval	Attempt interval for connection to the Mirroring Controller arbitration process (milliseconds)	Reconnection is attempted at the specified interval if connection fails at startup of the Mirroring Controller process or if the Mirroring Controller arbitration process is disconnected. Specify a value between 1 and 2147483647. The default is 16000 milliseconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_connect_timeout	Timeout for connection to the Mirroring Controller arbitration process (seconds)	If reconnection at startup of the Mirroring Controller process or after disconnection of the Mirroring Controller arbitration process does not succeed within the specified number of seconds, connection to the Mirroring Controller arbitration process is determined to have failed and reconnection is attempted. Specify a value between 1 and 2147483647. The default is 20 seconds. This parameter does not need to be set for operation that does not use the arbitration server.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/mc/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes. This parameter must be specified when "command" is set for heartbeat_error_action.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
arbitration_timeout	Arbitration processing timeout in the Mirroring Controller arbitration process (seconds)	The specified value must be at least equal to the value of fencing_command_timeout in the arbitration configuration file, which is the heartbeat monitoring time of the operating system or server. If there is no response for at least the number of seconds specified, the primary server will not be switched and the standby server will not be disconnected. Therefore, perform degradation manually. If the heartbeat_interval, heartbeat_timeout, and heartbeat_retry values are specified in arbitration.conf for

Parameter	Value set	Explanation
		the arbitration server, use the arbitration server values to design arbitration_timeout. Specify a value between 1 and 2147483647. The default is 30 seconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbitration_command	'*arbitrationCmdFilePath*' [Setting example] arbitration_command = '/mc/arbitration_dir/execute_arbitration_command.sh'	Specify the full path of the arbitration command to be executed when an abnormality is detected during heartbeat monitoring of the operating system or server. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes. This parameter must be specified when "command" is set for heartbeat_error_action.
arbitration_command_timeout	Arbitration command timeout (seconds)	If the arbitration command does not respond within the specified number of seconds, it is determined that execution of the arbitration command has failed and a signal (SIGTERM) is sent to the arbitration command execution process. Specify a value between 1 and 2147483647. The default is 30 seconds. This parameter can be specified only when "command" is set for heartbeat_error_action.
shutdown_detached_synchronous_standby	on or off	Specify whether to forcibly stop the instance on the standby server when the standby server is disconnected. on: Stop the instance. off: Do not stop the instance. If "on" is specified and the pre-detach command was created, the pre-detach command is executed and then the instance is stopped. The default is "off".
post_switch_command	'*postSwitchCmdFilePath*' [Setting example] post_switch_command = '/mc/status_change/execute_post_switch.sh'	Specify the full path of the command to be called by Mirroring Controller after a new primary server is promoted during a failover of the primary server. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
post_attach_command	'*postAttachCmdFilePath*' [Setting example] post_attach_command = '/mc/status_change/execute_post_attach.sh'	Specify the full path of the command to be called by Mirroring Controller after the standby server is attached to the cluster system. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
pre_detach_command	'*preDetachCmdFilePath*' [Setting example] pre_detach_command = '/mc/status_change/execute_pre_detach.sh'	Specify the full path of the command to be called by Mirroring Controller before the standby server is disconnected from the cluster system. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.

Parameter	Value set	Explanation
status_change_command_timeout	State transition command timeout (seconds)	Specify the timeout value of the post-switch command, post-attach command, and pre-detach command. If the command does not respond within the specified number of seconds, a signal (SIGTERM) is sent to the execution process of the status change command. Specify a timeout between 1 and 2147483647. The default is 20 seconds.
check_synchronous_standby_names_validation	on or off	Specify whether Mirroring Controller is to periodically check during operations whether the synchronous_standby_names parameter in postgresql.conf was changed by an incorrect user operation. However, it is not recommended to enable this parameter, because performing this check causes Mirroring Controller to use the CPU of the database server redundantly and execute SQL statements at high frequency. This parameter is compatible with operations in FUJITSU Enterprise Postgres 9.6 or earlier. The default is "off".
db_instance_ext_pq_conninfo	*'libpqConnectionSSLParmToConnectToDbinstance'*	Specify, in key-value form, the connection parameter for libpq that Mirroring Controller adds when connecting to a database. The connection parameters you can specify are those related to SSL. Use ASCII characters to specify this parameter. The connection parameter specified in this parameter must also be specified in the db_instance_ext_jdbc_conninfo.
db_instance_ext_jdbc_conninfo	*'JDBCConnectionSSLParmToConnectToDbinstance'*	Specify, in URI form, the connection parameter for JDBC that Mirroring Controller adds when connecting to a database. The connection parameters you can specify are those related to SSL. Use ASCII characters to specify this parameter. The connection parameter specified in this parameter must also be specified in the db_instance_ext_pq_conninfo.

*1: By specifying the syslog_ident parameter of the postgresql.conf file, the Mirroring Controller output content can be referenced transparently, so log reference is easy.

*2: The operating system TCP connection timeout period is determined by the kernel parameter tcp_syn_retries. The remote_call_timeout parameter must be set to a value that is shorter than the timeout period for the operating system TCP connection timeout, so change either parameter as necessary.

The availability of some parameters depends on the value set for the heartbeat_error_action parameter that sets the operation to be performed if heartbeat monitoring of the operating system or server detects a heartbeat abnormality.

Table A.5 Parameter availability depending on the value set for the heartbeat_error_action parameter

Parameter	Value set			
	arbitration	command	message	fallback
arbiter_alive_interval	Y	N	N	N
arbiter_alive_timeout	Y	N	N	N
arbiter_alive_retry	Y	N	N	N
arbiter_connect_interval	Y	N	N	N

Parameter	Value set			
	arbitration	command	message	fallback
arbiter_connect_timeout	Y	N	N	N
arbitration_timeout	Y	N	N	N
arbitration_command	N	R	N	N
arbitration_command_timeout	N	Y	N	N
fencing_command	Y	R	Y	N
fencing_command_timeout	Y	Y	Y	N
shutdown_detached_synchronous_standby	Y	Y	N	N

R: Required

Y: Can be specified

N: Cannot be specified

A.4.2 Arbitration Configuration File

In arbitration.conf, define the information related to arbitration and control of the Mirroring Controller arbitration process.

Linux

Table A.6 arbitration.conf file (Linux)

Parameter	Value set	Description
port	Port number of the Mirroring Controller arbitration process	The specified value must not exceed the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. For the port number of the arbitration server to be specified in network.conf on the database server, specify the same value as the port number specified in this parameter.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	For the IP address or host name of the arbitration server to be specified in network.conf on the database server, specify the same value as the IP address or host name specified in this parameter. IPv4 and IPv6 addresses can be specified. Specify the IP address or host name, enclosed in single quotation marks (').
core_file_path	'*coreFileOutputDir*'	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. If this parameter is omitted, it will be assumed that the Mirroring Controller arbitration process management directory was specified.
syslog_facility	Specify LOCAL0, LOCAL1, LOCAL2, LOCAL3, LOCAL4, LOCAL5, LOCAL6, or LOCAL7.	When the import of logs to the syslog is enabled, the value of this parameter will be used for "facility" of the syslog. The default is "LOCAL0".

Parameter	Value set	Description
syslog_ident	'*programName*'	Specify using single quotation marks (') to enclose the program name used to identify the Mirroring Controller arbitration process message in the system log. Use ASCII characters excluding spaces to specify this parameter. The default is 'MirroringControllerArbiter'.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/arbiter/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
heartbeat_interval(*1)	Interval time for heartbeat monitoring of the operating system or server (milliseconds)	The heartbeat monitoring of the database server is checked at the specified interval and arbitration is performed. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_timeout	Timeout for heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server or standby server to be fenced. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_retry	Number of retries for heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server or standby server to be fenced. If an error is detected in succession more than the specified number of times, fencing will be performed. Specify a value between 0 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server.

Parameter	Value set	Description
		Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.

*1:Refer to "2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring" for information on the tuning parameters for operating system or server abnormality monitoring when using an arbitration server.

Windows

Table A.7 arbitration.conf file (Windows)

Parameter	Value set	Description
port	Port number of the Mirroring Controller arbitration process	The specified value must not exceed the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. For the port number of the arbitration server to be specified in network.conf on the database server, specify the same value as the port number specified in this parameter.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	For the IP address or host name of the arbitration server to be specified in network.conf on the database server, specify the same value as the IP address or host name specified in this parameter. IPv4 and IPv6 addresses can be specified. Specify the IP address or host name, enclosed in single quotation marks (').
core_file_path	'*coreFileOutputDir*'	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters, and specify "\\" as the path delimiter. If this parameter is omitted, it will be assumed that the Mirroring Controller arbitration process management directory was specified.
service_name	'*registeredServiceNameOfMirroringControllerArbitrationProcess*'	Specify the Mirroring Controller arbitration process service name to be registered as a Windows service, enclosed in single quotation marks ('). Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter. The service name is up to 124 bytes. The default is 'MirroringControllerArbiter'.
event_source	*'eventSourceName'*	Specify the event source name to be used to identify the Mirroring Controller arbitration process message in the event log, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. The maximum length of the event source name is 255 bytes. The default is 'MirroringControllerArbiter'.

Parameter	Value set	Description
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\arbiter\ \fencing_dir\\execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes. Any multibyte characters must use the same encoding as the operating system.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
heartbeat_interval(*1)	Interval time for heartbeat monitoring of the operating system or server (milliseconds)	The heartbeat monitoring of the database server is checked at the specified interval and arbitration is performed. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_timeout	Timeout for heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server or standby server to be fenced. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_retry	Number of retries for heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server or standby server to be fenced. If an error is detected in succession more than the specified number of times, fencing will be performed. Specify a value between 0 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to

Parameter	Value set	Description
		the admin network and the reduction in the time it takes to degrade.

*1:Refer to "2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring" for information on the tuning parameters for operating system or server abnormality monitoring when using an arbitration server.

Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server

The primary server and standby server can be pseudo-configured on the same server for system testing, for example. Out of consideration for performance and reliability, do not use this type of configuration for any other purposes. For this reason, do not use this type of configuration in a production environment.

Note that the setup and operations is the same as if the primary and standby servers are built on different servers.

This appendix provides supplementary information explaining how to configure the primary server and standby server on the same server.

Note

Even if automatic degradation by an arbitration server is set when the primary server and standby server are configured on the same server, there will be no effect of it.

B.1 Backup Data Storage Destination Directory

It is not a problem if the same backup data storage destination directory is used on the primary server and standby server.

B.2 How to Execute the mc_ctl Command

When executing the mc_ctl command, specify the server identifier in the --local-server option in order to identify the operation destination server.

Below is an example of starting Mirroring Controller of the server "server1" defined in the network.conf file. For mc_ctl command operations using another mode, also specify the --local-server option.

Define two server identifiers for the same IP address with different port numbers in the network.conf file.

```
Example)
```

```
server1 192.0.2.100 27540
server2 192.0.2.100 27541
```

Ensure that the port numbers of both primary server and standby server do not conflict with any other software.

Enabling automatic switch/disconnection

Start Mirroring Controller of the server "server1":

```
Example)
```

```
$ mc_ctl start -M /mcdir/inst1 --local-server server1
```

Stop Mirroring Controller of the server "server1":

```
Example)
```

```
$ mc_ctl stop -M /mcdir/inst1 --local-server server1
```

Disabling automatic switch/disconnection

Start Mirroring Controller of the server "server1":

```
Example)
```

```
$ mc_ctl start -M /mcdir/inst1 -F --local-server server1
```

Stop Mirroring Controller of the server "server1":

Example)

```
$ mc_ctl stop -M /mcdir/inst1 --local-server server1
```

Note

Add the --local-server option to the mc_ctl option specification for ExecStart and ExecStop of the unit file for systemd.

Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Appendix C User Commands

This appendix describes three categories of commands:

- Fencing command
- Arbitration command
- State transition commands

This appendix describes each category of user command.

C.1 Fencing Command

Format

The syntax for calling the fencing command from the Mirroring Controller process or the Mirroring Controller arbitration process is described below.

Fencing command of the database server

```
fencingCmd executionMode mcDegradationOper cmdServerId targetServerId primarycenter
```

Fencing command of the arbitration server

```
fencingCmd executionMode mcDegradationOper targetServerId
```

Input

Fencing command of the database server

Execution mode

monitor: Detect issues via automatic monitoring of the Mirroring Controller process

command: Mirroring Controller command execution (switch mode or detach mode of the mc_ctl command)

Degradation operation to be performed by Mirroring Controller

switch: Switch

detach: Disconnect

cmdServerId

ID of the database server that called the command

targetServerId

ID of the database server to be fenced

primarycenter

Fixed value

Fencing command of the arbitration server

Execution mode

monitor: Detect issues via automatic monitoring of the Mirroring Controller process

command: Mirroring Controller command execution (switch mode or detach mode of the mc_ctl command)

Degradation operation to be performed by Mirroring Controller

switch: Switch

detach: Disconnect

targetServerId

ID of the database server to be fenced

Output

Return value

0: Mirroring Controller will continue the degradation process.

Other than 0: Mirroring Controller will cancel the degradation process.

Description

Identifies the database server targeted for fencing based on the input server identifier, and implements the process that isolates it from the cluster system.

Notes

- The command is executed by the operating system user who started Mirroring Controller or the Mirroring Controller arbitration process. Therefore, if the command is to be executed by a specific operating system user, change the executing user of the command accordingly.
- The operating system user who started Mirroring Controller or the Mirroring Controller arbitration process must have execution privileges to the command. Otherwise, the degradation process will be canceled.
- From a security point of view, set the access privileges as necessary so that the fencing command is not overwritten and unauthorized operations are not performed by unintended operating system users.
- If the fencing command returns a value other than 0, Mirroring Controller will cancel the degradation process, so it is necessary for the user to check the status of the server, and switch or disconnect it manually.
- Before executing the fencing command, check if the server is already fenced, to avoid the command terminating abnormally.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the degradation process.

Information

The fencing command can be implemented by simply stopping the operating system or server. For example, if stopping the power for the database server, it is possible to use a utility to control the hardware control board in environments equipped with boards compatible with IPMI hardware standard.

Linux

Below is a sample script of a fencing command that powers off the database server using the IPMI tool.

Sample shell script

```
/installDir/share/mcarb_execute_fencing.sh.sample
```

Windows

Below is a sample script of a fencing command that powers off the database server using IPMIUTIL.

Sample shell script

```
installDir\share\mcarb_execute_fencing.bat.sample
```

C.2 Arbitration Command

Format

The syntax for calling the arbitration command from the Mirroring Controller process is described below.

```
arbitrationCmd cmdServerId targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

targetServerId

ID of the database server to arbitrate

primarycenter

Fixed value

Output

Return value

0: The database server to arbitrate has an issue, and Mirroring Controller will continue the degradation process.

Other than 0: The database server to arbitrate is normal, and Mirroring Controller will cancel the degradation process.

Description

Identifies the database server to arbitrate based on the input server identifier, and checks the status of the server.

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called, and the degradation process will be canceled.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the degradation process.

C.3 State Transition Commands

State transition commands include the three types of user commands below. Any of the commands can be implemented by Mirroring Controller in conjunction with database server status transitions.

- Post-switch command
- Pre-detach command
- Post-attach command

C.3.1 Post-switch Command

Format

The syntax for calling the post-switch command from the Mirroring Controller process is described below.

```
postswitchCmd serverIdentifier primarycenter
```

Input

serverIdentifier

ID of the database server (new primary server) that was switched

primarycenter

Fixed value

Output

Return value

None

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

C.3.2 Pre-detach Command

Format

The syntax for calling the pre-detach command from the Mirroring Controller process is described below.

```
predetachCmd cmdServerId serverRole targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

Server role

Role of the database server that called the command

primary: Primary

standby: Standby

targetServerId

ID of the standby server to be disconnected from the cluster system

primarycenter

Fixed value

Output

Return value

None

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called, however, Mirroring Controller will output an error message and continue the process.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

C.3.3 Post-attach Command

Format

The syntax for calling the post-attach command from the Mirroring Controller process is described below.

```
postattachCmd cmdServerId serverRole targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

Server role

Role of the database server that called the command

primary: Primary

standby: Standby

targetServerId

ID of the standby server to be attached to the cluster system

primarycenter

Fixed value

Output

Return value

None

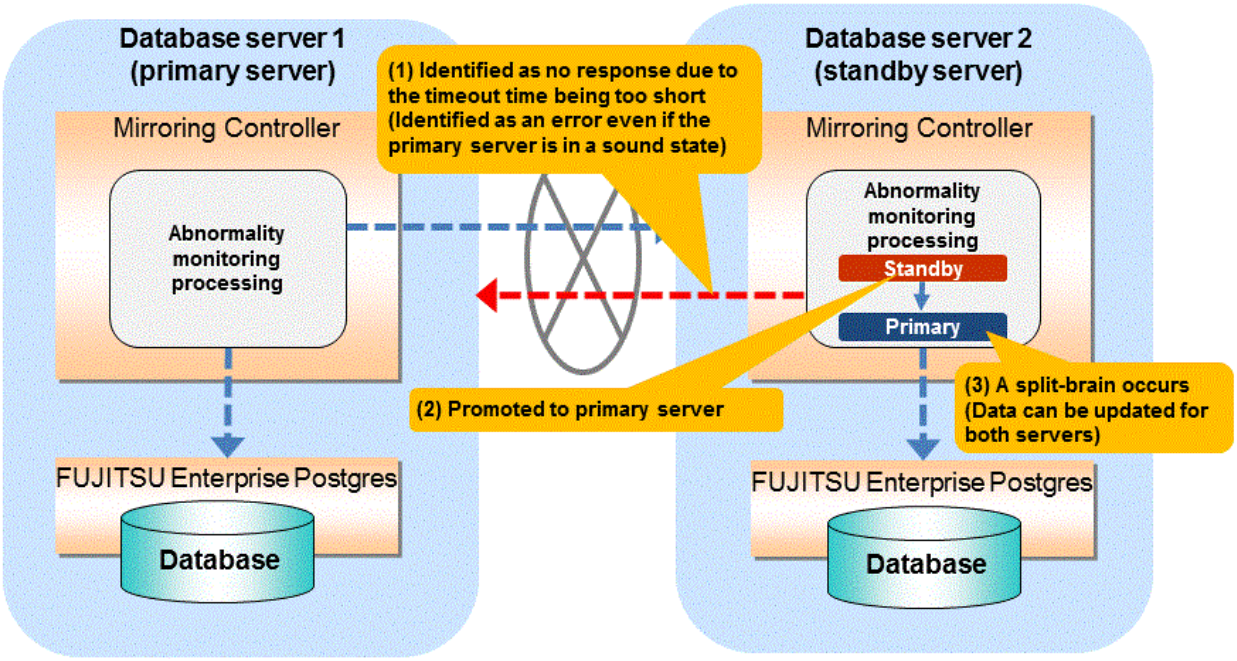
Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

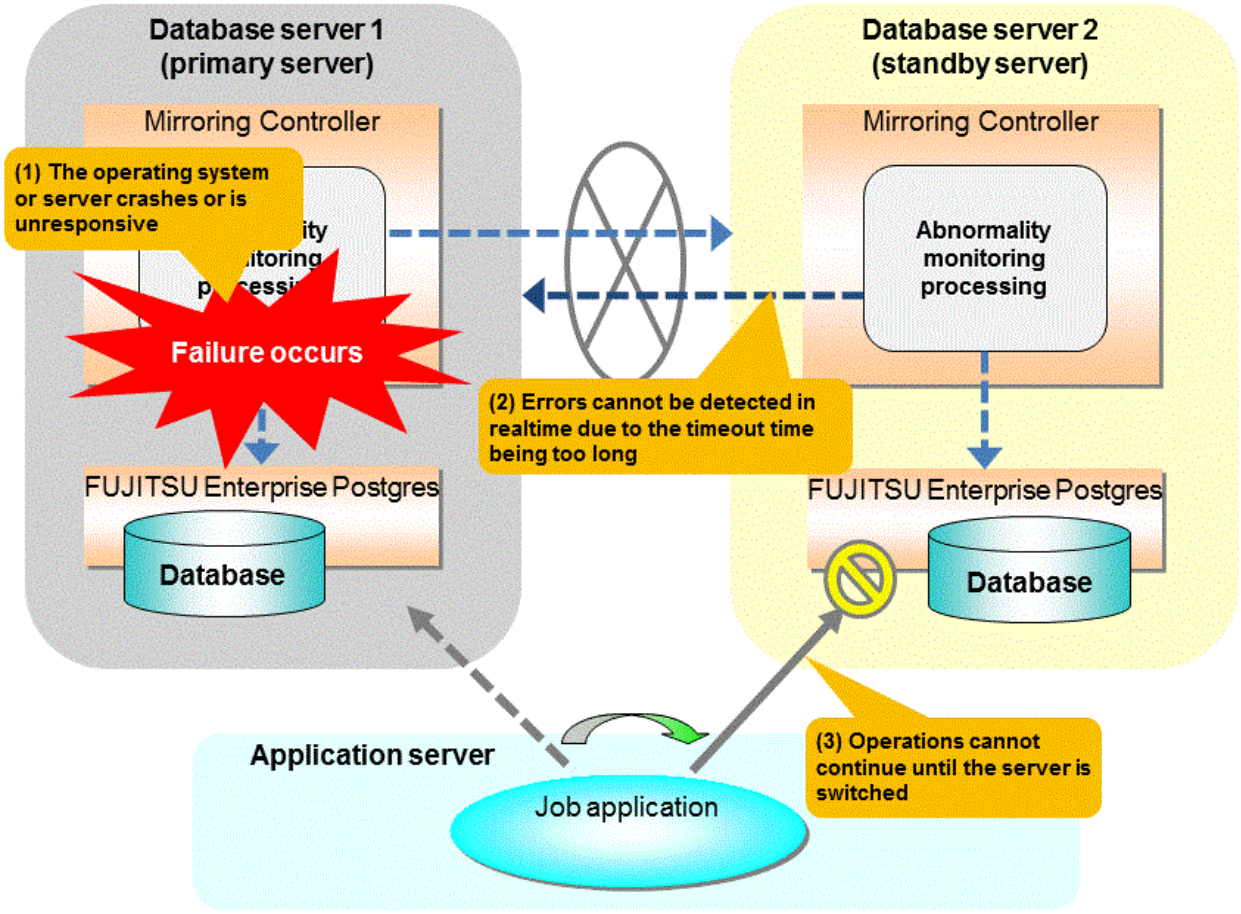
Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality

The type of issue below occurs if automatic degradation is performed unconditionally after an issue is detected during heartbeat monitoring of an operating system or server, and heartbeat monitoring was not properly tuned.

● If the timeout time is too short



● If the timeout time is too long



Notes on monitoring when the operating system or server crashes or is unresponsive

As illustrated in the diagram above, timeout is used to monitor whether the operating system or server crashes or is unresponsive. Therefore, if tuning has not been performed correctly, there is a risk of a split-brain mistakenly occurring even if the server is in a sound state.

Split-brain is a phenomenon in which both servers temporarily operate as primary servers, causing data updates to be performed on both servers.

Split-brain detection method

It can be confirmed that split-brain occurs under the following conditions:

1. When the mc_ctl command is executed in status mode on both servers, the "host_role" of both servers is output as "primary", and
2. The following message is output to the system log of one of the servers:

```
promotion processing completed (MCA00062)
```

How to recover from a split-brain

Use the procedure described below. Note that the new primary server is the server that was confirmed in step 2 of the aforementioned detection method.

1. Stop all applications that are running on the old and new primary servers.
2. Investigate and recover the database.
   Investigate the update results that have not been reflected to the new primary server from the database of the old primary server, and apply to the new primary server as necessary.
3. Stop the old primary server instance and the Mirroring Controller.

4. Resume the applications that were stopped in step 1.

5. Recover the old primary server.
   While referring to "2.5 Setting Up the Standby Server", build (set up) the old primary server as the new standby server, from the new primary server.

Appendix E Supplementary Procedure on Configuring for Operation in Database Multiplexing Mode

This appendix explains a supplementary procedure on the configuration required for operation in database multiplexing mode.

E.1 Security Policy Settings

This section explains how to configure the security settings to enable an operating system user account designated as an instance administrator user to log on as a service.

1. Displaying the [Local Security Policy] window

   In Windows, select [Administrative Tools], and then click [Local Security Policy].

2. Setting up security

   1. In the [Local Security Policy] window, select [Security Settings], select [Local Policies], and then click [User Rights Assignment].
   2. Under [Policy] in the [User Rights Assignment] window, double-click [Log on as a service].
   3. In the [Log on as a service Properties] window, set the following:
      a. Select the [Local Security Setting] tab.
      b. On the [Local Security Setting] tab, click [Add User or Group].
      c. In the [Select Users or Groups] window, enter the operating system user account of the instance administrator user in [Enter the object names to select].
      d. Click [OK].
   4. In the [Log on as a service Properties] window, click [OK].
   5. From the [Local Security Policy] tree, click [Local Policies], and then double-click [Security Options].
   6. Scroll down and double-click [User Account Control: Behavior of the elevation prompt for administrators in Admin Approval Mode].
   7. From the drop-down menu, select the "Elevate without prompting" in the [Local Security Setting] tab.
   8. Click [OK].

E.2 Windows Firewall Settings

This section explains how to enable the port number used by Mirroring Controller, if the Windows firewall feature is enabled.

Windows Server(R) 2019:

1. In the [Windows Defender Firewall] window, click [Advanced settings] on the left side of the window.
2. In the [Windows Defender Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
3. Click [New Rule] on the right side of the window.
4. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
5. Select [TCP] and [Specific local ports], then specify the port number defined in the network definition file, and then click [Next].
6. Select [Allow the connection], and then click [Next].
7. Select the profiles for which this rule applies, and then click [Next].
8. In [Name], specify the desired name, and then click [Finish].
9. In the [Windows Defender Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

Other than above:

1. In the [Windows Firewall] window, click [Advanced settings] on the left side of the window.
2. In the [Windows Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
3. Click [New Rule] on the right side of the window.
4. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
5. Select [TCP] and [Specific local ports], then specify the port number defined in the network definition file, and then click [Next].
6. Select [Allow the connection], and then click [Next].
7. Select the profiles for which this rule applies, and then click [Next].
8. In [Name], specify the desired name, and then click [Finish].
9. In the [Windows Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix G Collecting Failure Investigation Data

If the cause of an error that occurs while building the environment or during operations is unclear, data must be collected for initial investigation.

This appendix describes how to collect data for initial investigation.

Use FJQSS (Information Collection Tool) to collect data for initial investigation.

See

Refer to the FJQSS manual for information on how to use FJQSS.

Note

Using a database server to collect data

- When using FJQSS to collect data for initial investigation, you must set the following environment variables:
  - Environment variable required for collecting data from the database

    Refer to "Collecting Failure Investigation Data" in the Operation Guide.
  - MCCONTROLDIR
  - Set the Mirroring Controller management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller management directory.

Using an arbitration server to collect data

Linux

- When using FJQSS to collect data for initial investigation, you must set the following environment variables:
  - ARBCONTROLDIR

    Set the Mirroring Controller arbitration process management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller arbitration server management directory.
  - ARBUSER

    Specify the operating system user who started the Mirroring Controller arbitration process.
  - FSEP_SA_HOME

    Set the Server Assistant installation directory.

Windows

- When using FJQSS to collect data for initial investigation, a window will be displayed for you to set the following environment variables:
  - ARBCONTROLDIR

    Set the Mirroring Controller arbitration process management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller arbitration server management directory.

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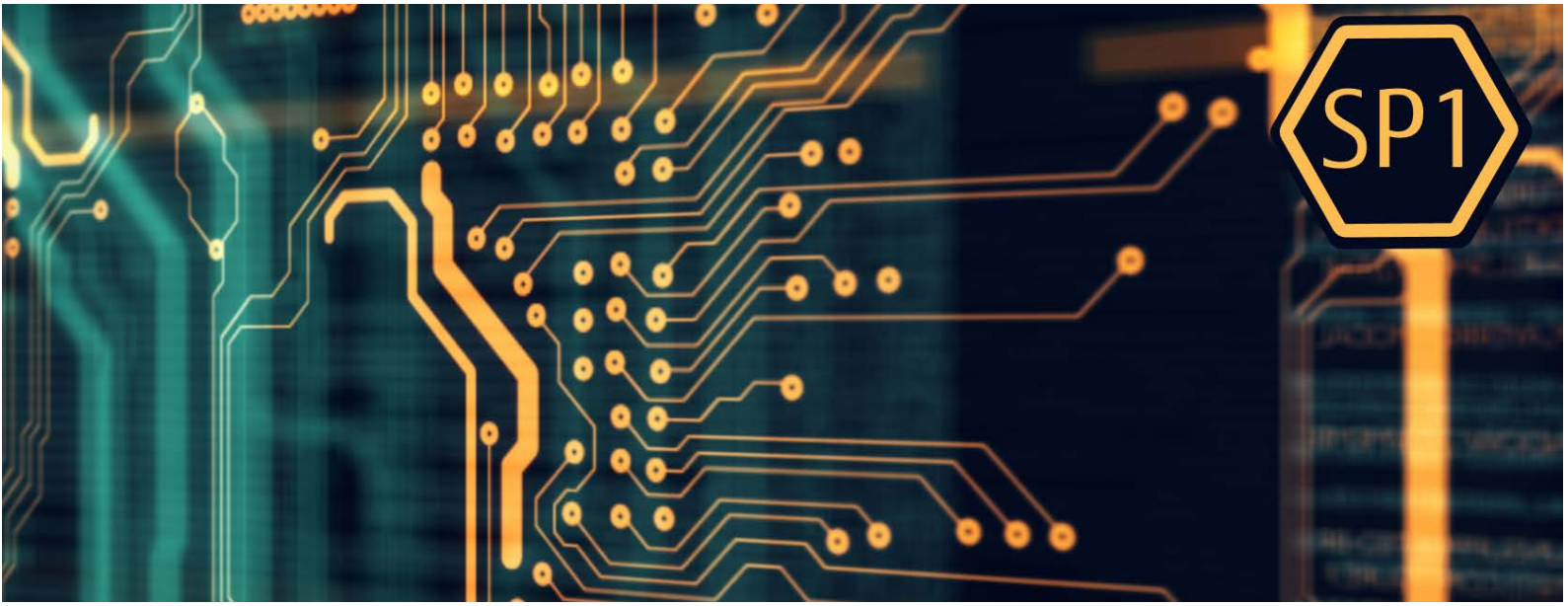

Cluster Operation Guide

Database Multiplexing

(Windows)

Windows

B1WS-1440-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document describes the tasks required for using the database multiplexing feature of FUJITSU Enterprise Postgres.

Intended readers

This document is intended for those who set up and use the database multiplexing feature.

Readers of this document are also assumed to have general knowledge of:

- PostgreSQL
- SQL
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Database Multiplexing Mode

Provides an overview of database multiplexing mode.

Chapter 2 Setting Up Database Multiplexing Mode

Describes how to set up database multiplexing mode.

Chapter 3 Operations in Database Multiplexing Mode

Explains periodic database multiplexing mode.

Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode

Explains the action required when an error occurs during a database multiplexing mode.

Chapter 5 Managing Mirroring Controller Using WebAdmin

Explains how to set up and manage Mirroring Controller in a streaming replication cluster using WebAdmin.

Appendix A Parameters

Explains the configuration files and parameters required for database multiplexing mode.

Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server

Explains supplementary information on building the primary server and standby server on the same server.

Appendix C User Commands

Explains the user commands.

Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality

Provides notes when performing automatic degradation unconditionally after a heartbeat abnormality is detected during heartbeat monitoring of an operating system or server.

Appendix E Supplementary Procedure on Configuring for Operation in Database Multiplexing Mode

Explains supplementary procedure on the configuration required for operation in database multiplexing mode.

Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters

Explains characters not allowed in WebAdmin.

Appendix G Collecting Failure Investigation Data

Explains how to collect data for initial investigation.

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Chapter 1 Overview of Database Multiplexing Mode

This chapter provides an overview of database multiplexing mode.

Point

In this and subsequent chapters, the word "Mirroring Controller" may be used in the process or management directory name or explanation.

1.1 What is Database Multiplexing Mode

Database multiplexing mode is an operation mode (log shipping mode) based on PostgreSQL streaming replication. Other software such as cluster software is not required.

This mode replicates the database on all servers that comprise the cluster system. It achieves this by transferring the updated transaction logs of the database from the server that receives the updates (primary server) to another server (standby server), and then reflecting them on the standby server. The client driver automatically distinguishes between the primary and standby servers, so applications can be connected transparently regardless of the physical server.

It consists of a feature that detects faults in the elements that are essential for the continuity of the database operation (such as the database process, disk, and network), as well as simplified switchover and standby server disconnection features. Furthermore, referencing can be performed on the standby server. The database will be copied in synchronous mode.

Note

If using WebAdmin or Mirroring Controller, FUJITSU Enterprise Postgres supports cluster systems comprising one primary server and one standby server.

- Although it is possible to connect an asynchronous standby server to the cluster system as an additional server, the standby server is not targeted for monitoring by Mirroring Controller.
- A synchronous standby server cannot be connected to the cluster system as an additional server.

See

The streaming replication feature is not described in this manual.

Refer to "High Availability, Load Balancing, and Replication" in the PostgreSQL Documentation for information on the streaming replication feature.

Figure 1.1 Failover from the primary server to the standby server

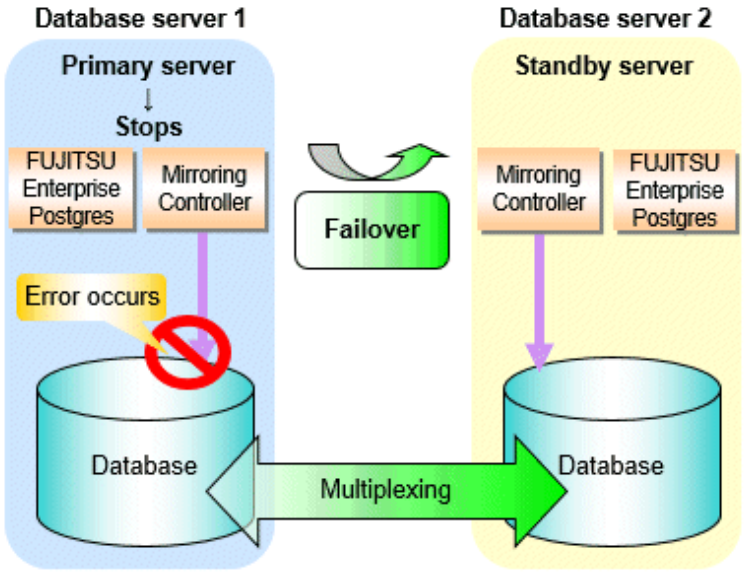
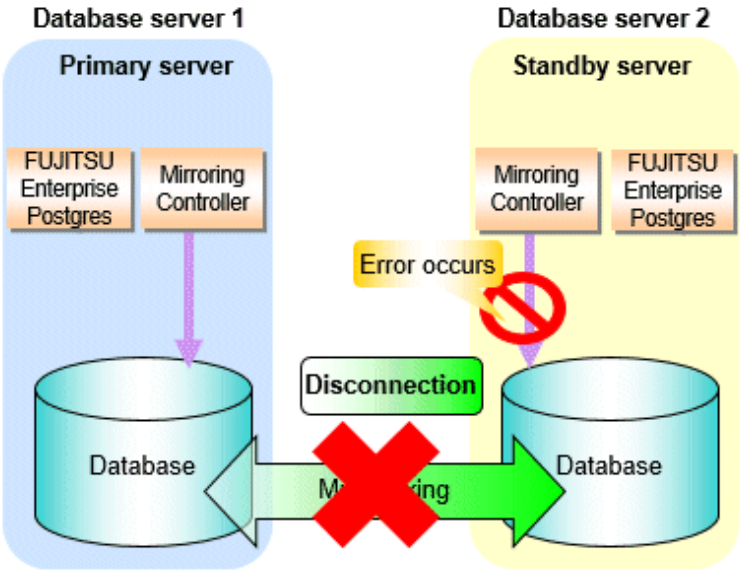


Figure 1.2 Standby server disconnection



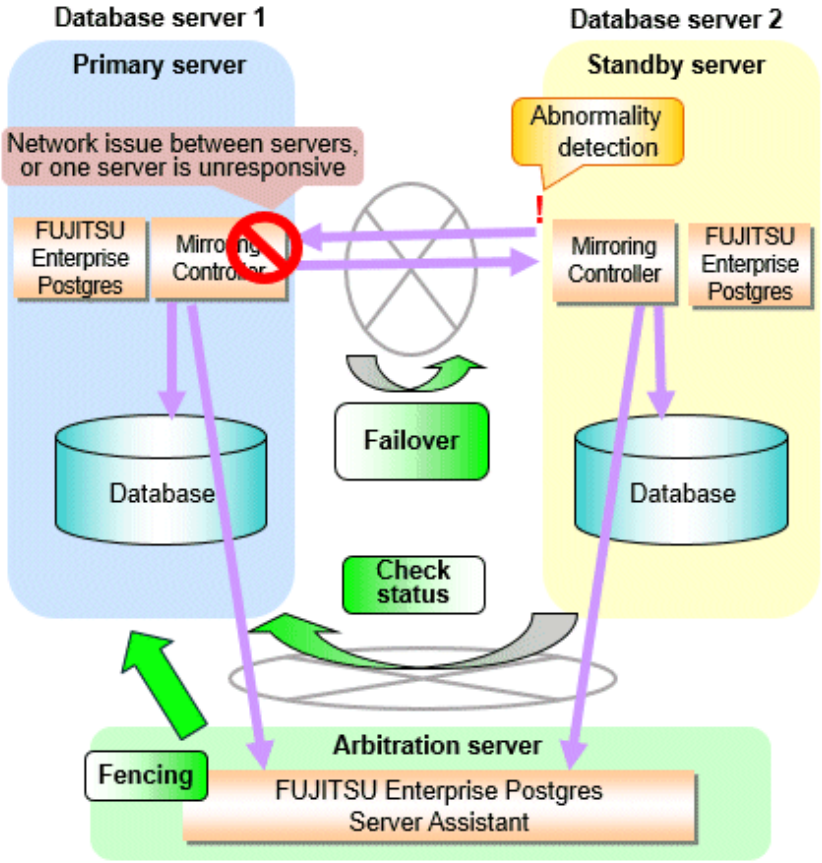
Database degradation using the arbitration server

FUJITSU Enterprise Postgres provides the Server Assistant that objectively determines the status of database servers as a third party, and if necessary, isolates affected databases if the database servers are unable to accurately ascertain their mutual statuses in database multiplexing mode, such as due to a network error between database servers, or server instability. Database degradation can be performed by using the server (arbitration server) on which the Server Assistant is installed.

For database degradation using the arbitration server, if the database servers are unable to check their mutual statuses (due to a network error between database servers or server instability), then the database server queries the arbitration server for the status of the other database server. If it is determined based on the heartbeat result that the status is unstable, the applicable database server will be isolated from the cluster system (fencing). The arbitration server periodically heartbeats the database server so that it can respond immediately to queries from the database server. The fencing process can be customized according to the environment where Mirroring Controller is used.

Additionally, the database servers are always performing their heartbeats for the arbitration server so that it can perform check requests any time.

Figure 1.3 Database degradation using the arbitration server



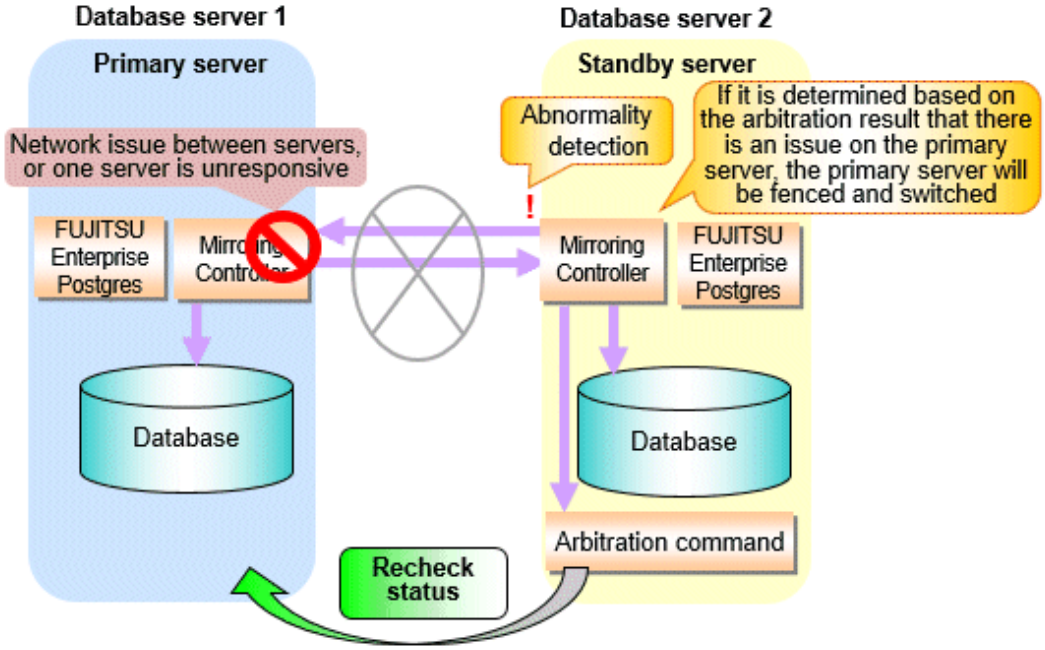
Note

Install the arbitration server on a different physical server to that of the database server. Refer to "1.2 System Configuration for Database Multiplexing Mode" for information on the system configuration when using the arbitration server.

Database degradation using the arbitration command

The arbitration command is a user command that performs arbitration processing in lieu of the arbitration server. If an arbitration server cannot be deployed, arbitration of the database server can be performed using the arbitration command.

Figure 1.4 Database degradation using the arbitration command



See

Refer to "2.6 Creating a User Exit for a Database Server" or "Appendix C User Commands" for information on user commands.

1.1.1 Monitoring Using Database Multiplexing Mode

In database multiplexing mode, perform the monitoring below.

- Operating system or server failures, and no-response state

  By generating a heartbeat between Mirroring Controller on each server, operating system or server errors are detected and acknowledged between the relevant servers.

  The optimal operating method for environments where database multiplexing mode is performed can be selected from the following:

  - Use the arbitration server to perform automatic degradation (switch/disconnect)

    This is the default method.

    The arbitration server objectively determines the status of database servers, then isolates and degrades from the cluster system the ones with an unstable status.

    Refer to "Database degradation using the arbitration server" for details.

  - Call the user exit (user command) that will perform the degradation decision, and perform automatic degradation

    If the arbitration server cannot be installed, select if arbitration processing can be performed by the user instead.

    Mirroring Controller queries the user exit on whether to degrade. The user exit determines the status of the database server, and notifies Mirroring Controller whether to perform degradation.

    Refer to "Database degradation using the arbitration command" for details.

  - Notification messages

    Use this method if using a two-database server configuration.

    Mirroring Controller outputs messages to the event log when an abnormality is detected. This ensures that a split brain will not occur due to a heartbeat abnormality - however, automatic switching will not be performed if the primary server operating system or server fails or becomes unresponsive.

  - Perform automatic degradation unconditionally after a heartbeat abnormality

    This method is handled as in FUJITSU Enterprise Postgres 9.6 or earlier versions.

    This method is not recommended, because Mirroring Controller unconditionally will perform automatic degradation after heartbeat abnormalities.

- Database process failures, and no-response state

  Mirroring Controller periodically accesses the database processes and checks the status. A process error is detected by monitoring whether an access timeout occurs.

- Disk failure

  Mirroring Controller periodically creates files on the data storage destination disk below. A disk error is detected when an I/O error occurs.

  - Data storage destination disk
  - Transaction log storage destination disk
  - Tablespace storage destination disk

  Failures that can be detected are those that physically affect the entire system, such as disk header or device power failures.

- Streaming replication issue

  Mirroring Controller detects streaming replication issues (log transfer network and WAL send/receive processes) by periodically accessing the PostgreSQL system views.

- Mirroring Controller process failure and no response

  In order to continue the monitoring process on Mirroring Controller, Mirroring Controller process failures and no responses are also monitored.

  The Mirroring Controller monitoring process detects Mirroring Controller process failures and no responses by periodically querying the Mirroring Controller process. If an issue is detected, Mirroring Controller is automatically restarted by the Mirroring Controller monitoring process.

Point

- If output of messages is selected as the operation to be performed when a heartbeat abnormality is detected during heartbeat monitoring of the operating system or server, automatic degradation will not be performed.
  However, if an issue in the WAL send process is detected on the primary server, then the standby server will be disconnected, and as a result an automatic disconnection may be performed even if the standby server operating system or server fails or becomes unresponsive.
- You can select in the parameters if the primary server will be switched if a database process is unresponsive or if tablespace storage destination disk failure is detected. Refer to "Appendix A Parameters" for details.
- If the standby server was disconnected, Mirroring Controller will automatically comment out the synchronous_standby_names parameter in the postgresql.conf file of the primary server. Accordingly, you can prevent the application processing for the primary server being stopped.

Note

If the role of primary server was switched to another server and then starts degrading, the original primary server will not become the standby server automatically. Remove the cause of the error, and then change the role of the original primary server to the server currently acting as standby server. Refer to "4.1 Action Required when Server Degradation Occurs" for details.

1.1.2 Referencing on the Standby Server

1.1.2.1 If Prioritizing the Main Job on the Primary Server

If a reference job is performed on the standby server and the primary server is switched, this may impact the main job from the point of view of load and conflict. This is because, on the new primary server (that is, the original standby server), both the main job that was being executed on the original primary server and the reference job that was being continued on the original standby server will be processed.

Therefore, to degrade the reference job (so that the impact on the main job is reduced), you can select the user exit below to disconnect the reference job that was performed on the original standby server.

- Post-switch command

Note

If continuing with the referencing job after switching the primary server, give careful consideration to the server resource estimates, and the likely impact on performance.

1.1.2.2 If Performing the Referencing Job on the Synchronous Standby Server

If an issue such as a log transfer network failure obstructs the continuation of a job on the primary server, the standby server may be automatically disconnected from the cluster system.

Therefore, if operating the reference job on the assumption that the connection destination is the synchronous standby server, you can select to temporarily stop the job by using the user exit or the feature below, so that unexpected referencing of past data does not occur as a result of the disconnection.

- Pre-detach command
- Forced stoppage of the standby server instance on disconnection (specify in the parameter of the server configuration file)

Additionally, if the standby server is incorporated into the cluster system, reference jobs can be started or resumed by using the user exit below.

- Post-attach command

See

- Refer to "2.6 Creating a User Exit for a Database Server" or "Appendix C User Commands" for information on each user exit.
- Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the server configuration file of the database server.

Point

Mirroring Controller will continue processing regardless of the processing result of the above user exits and features.

1.2 System Configuration for Database Multiplexing Mode

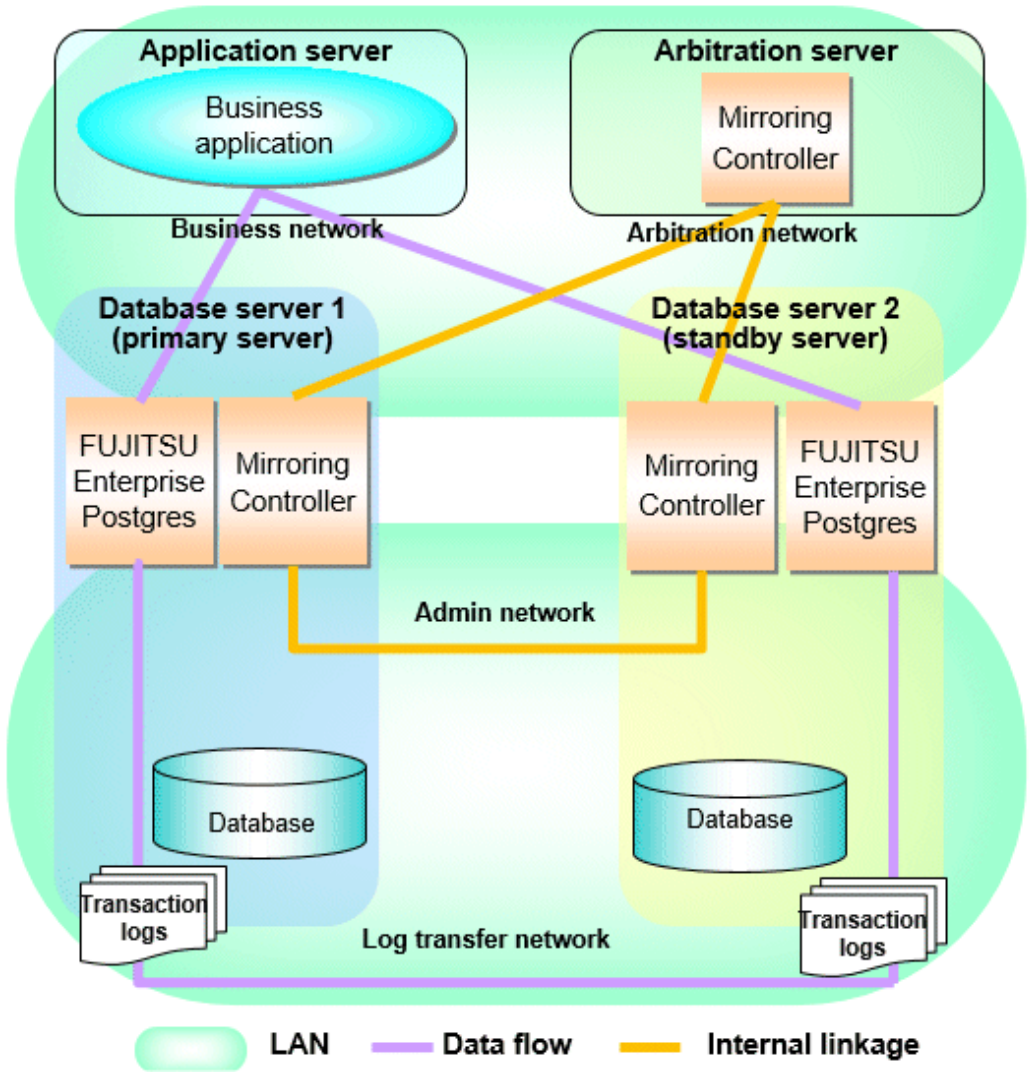
This section explains the products, features, and networks that are part of a database multiplexing system.

The following table shows the network types uses by database multiplexing systems.

Network type	Description
Job network	Network between the application that accesses the database, and the database server.

Network type	Description
Arbitration network	Network used by the arbitration server to check the status of the primary server and standby server, and communicate with Mirroring Controller of the database servers. Additionally, if the job network is disconnected from outside, it can also be used as the arbitration network. Refer to "1.4 Security in Database Multiplexing" for details on network security.
Admin network	Network used by the primary server and the standby server to monitor each other using Mirroring Controller, and to control Mirroring Controller of other servers.
Log transfer network	Network used to transfer the transaction logs of the database, which is part of database multiplexing.

Figure 1.5 System configuration for database multiplexing mode



The arbitration server is installed to check the database server status as a third party, and to perform fencing. Therefore, to obtain the intended benefits, consider the following.

- Install the arbitration server on a different server to that of the database server.
- For the arbitration network, use a network that will not be impacted by line faults or the load on the admin network or log transfer network. This is necessary to correctly determine issues on the admin network or log transfer network.

Point

- The arbitration server can also be used as an application server. However, consider the server load.
- It is recommended to link the arbitration server with other cluster systems, in order to provide redundancy.
- Use the arbitration server in combination with the same version of FUJITSU Enterprise Postgres as that of the primary server and standby server.
- The arbitration server can be built on a different platform to that of the database server.

Note

Because the ping command of the operating system is used for heartbeat monitoring of the database server, configure the network so that ICMP can be used on the admin network and the arbitration network.

1.2.1 Mirroring Controller Resources

This section describes the database server and arbitration server resources of Mirroring Controller.

1.2.1.1 Database Server Resources

The only Mirroring Controller resource is the Mirroring Controller management directory, which stores the files that define the Mirroring Controller behavior, and the temporary files that are created when Mirroring Controller is active.

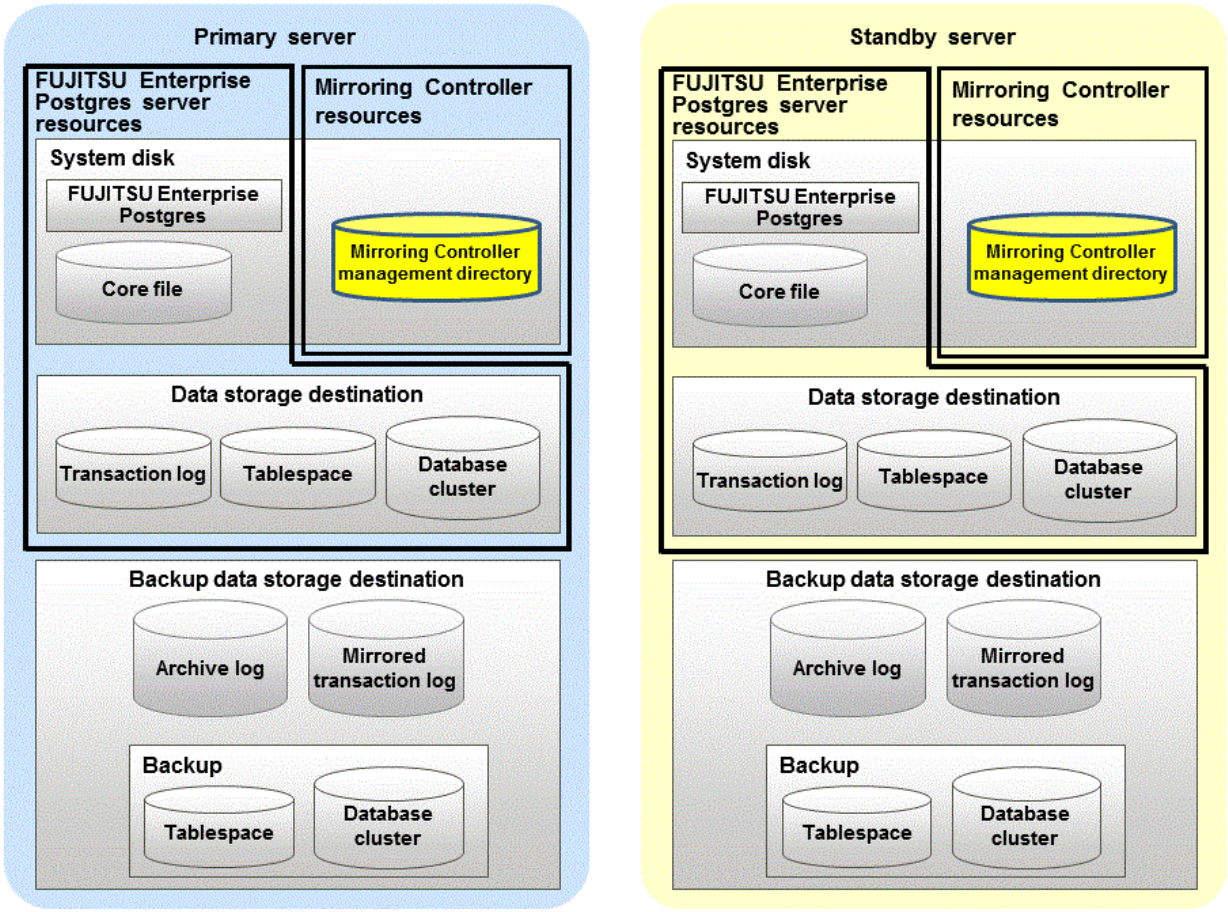
Note

- Do not create the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake or may cause unexpected problems when FUJITSU Enterprise Postgres recovery is performed (such as old version of files being restored).

  Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for information on the directories managed by FUJITSU Enterprise Postgres.
- The backup methods described in "Backing Up the Database" in the Operation Guide cannot be used to back up the Mirroring Controller resources. Therefore, users must obtain their own backup of Mirroring Controller resources, in addition to FUJITSU Enterprise Postgres server resources. Retrieve backups after stopping Mirroring Controller.
- If the automatic switch/disconnection is enabled, do not edit synchronous_standby_names for the Mirroring Controller monitoring target instance. Otherwise, if Mirroring Controller is switched after editing, data may be lost or SQL access may stop.
- If you are building on a virtual machine or cloud, make sure the virtual machines are on different physical servers. Refer to your virtual machine software and cloud vendor documentation for instructions on how to deploy virtual machines.

The content on the primary server will be backed up. You cannot tell which server is the primary server to be backed up, because switching and failback may be performed between the servers. It is also impossible to tell which server is to be restored using the backed up data. Accordingly, ensure that you create a backup of each server when it is working as the primary server.

Figure 1.6 Configuration when backing up Mirroring Controller resources



1.2.1.2 Arbitration Server Resources

The only arbitration server resource is the Mirroring Controller arbitration process management directory. This directory stores the files that define the Mirroring Controller arbitration process behavior and the temporary files created when Mirroring Controller is active.

1.2.2 Mirroring Controller Processes

This section describes the database server and arbitration server processes of Mirroring Controller.

1.2.2.1 Database Server Processes

The database server processes comprise the Mirroring Controller process and Mirroring Controller monitoring process.

Process type	Description
Mirroring Controller process	Performs operating system/server and process heartbeat monitoring and disk abnormality monitoring between database servers. Additionally, it issues arbitration requests to the arbitration server.
Mirroring Controller monitoring process	Performs heartbeat monitoring of the Mirroring Controller process. If the Mirroring Controller process returns no response or is down, the monitoring process is restarted automatically.

1.2.2.2 Arbitration Server Process

The only arbitration process is the Mirroring Controller arbitration process.

Process type	Description
Mirroring Controller arbitration process	Performs rechecks for issues detected on the primary server or the standby server. Additionally, this process performs fencing if it determines that there is an issue on the primary server or the standby server.

1.2.3 Redundancy of the Admin and Log Transfer Networks

The admin network is an important one, because it is used by Mirroring Controller to check the status of each server.

Additionally, the log transfer network is an important one, because it is necessary to ensure data freshness.

Accordingly, configure a failure-resistant network by implementing network redundancy via the NIC teaming feature provided by the operating system or network driver vendor.

Information

NIC teaming feature is provided by the operating system by default.

1.2.4 Notes on CPU Architecture and Products

Use the same CPU architecture (endian) for the primary server, standby server, and the arbitration server.

A server using only PostgreSQL streaming replication cannot be specified as the database multiplexing system log transfer destination.

1.3 Deciding on Operation when a Heartbeat Abnormality is Detected

The operation to be performed when a heartbeat abnormality is detected using operating system/server heartbeat monitoring is decided on according to the environment where database multiplexing mode is performed or the operating method.

It is possible to select from the four operations below, and specify this in the parameters of Mirroring Controller:

- Use the arbitration server to perform automatic degradation (switch/disconnect)
- Call the user exit (user command) that will perform the degradation decision, and perform automatic degradation
- Notification messages
- Perform automatic degradation unconditionally (switch/disconnect)

The table below shows if jobs can be continued on the primary server when an issue is detected during heartbeat monitoring of the operating system/server.

Continuation of jobs on the primary server when an issue is detected during heartbeat monitoring of the operating system/server

Operation	Abnormal event				
	Server/operating system failures or no responses		Admin network issue	Log transfer network issue	Issue on a network for both admin and log transfer
	Primary server	Standby server			
Automatic degradation using the arbitration server	Y (switch)	Y (disconnect)	Y	Y (disconnect)	Y (disconnect)
Call a user exit and perform automatic degradation	Y (switch)	Y (disconnect)	Y	Y (disconnect)	Y (disconnect)

Operation	Abnormal event				
	Server/operating system failures or no responses		Admin network issue	Log transfer network issue	Issue on a network for both admin and log transfer
	Primary server	Standby server			
Notification messages	N (message notification only)	N (message notification only)	Y	Y (disconnect)	Y (disconnect)
Unconditional automatic degradation	Y (switch)	Y (disconnect)	N (split brain occurs)	Y (disconnect)	N (split brain occurs)

Y: Job can be continued

N: Job cannot be continued

1.4 Security in Database Multiplexing

The database server replicates the database on all servers that comprise the cluster system. It achieves this by transferring and reflecting the updated transaction logs of the database from the primary server to the standby server.

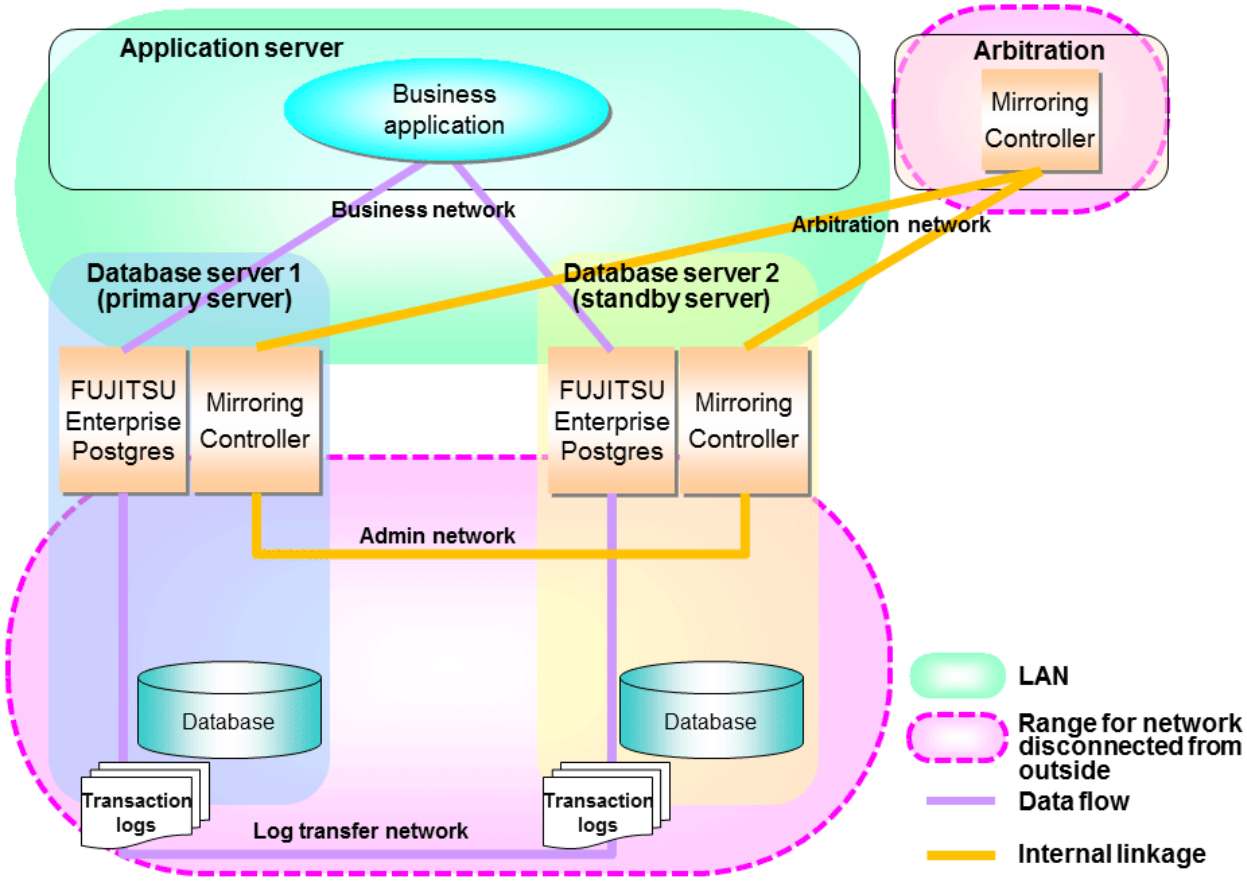
To safeguard the database against unauthorized access and preserve data confidentiality in transaction log transfers, carefully consider security and take note of the following when performing database multiplexing:

- Do not use trust authentication when using replication connection.
- Configure the admin network and the log transfer network so that they cannot be connected from the outside, as shown in Figure 1.7 Security.

Additionally, for the line on which Mirroring Controller connects from the database server to the arbitration server, take note of the following points and consider security carefully.

- Build a network with the arbitration server disconnected from outside, as shown in Figure 1.7 Security.

Figure 1.7 Security



However, it may not always be possible to adopt the configuration mentioned above. For example, you may want to place the servers in a nearby/neighboring office to minimize network delays.

In this case, combine the following features to enhance security:

- Authentication of the Standby Server
- Encryption of Transaction Logs Transferred to the Standby Server

When these features are combined, security will be achieved as shown below.

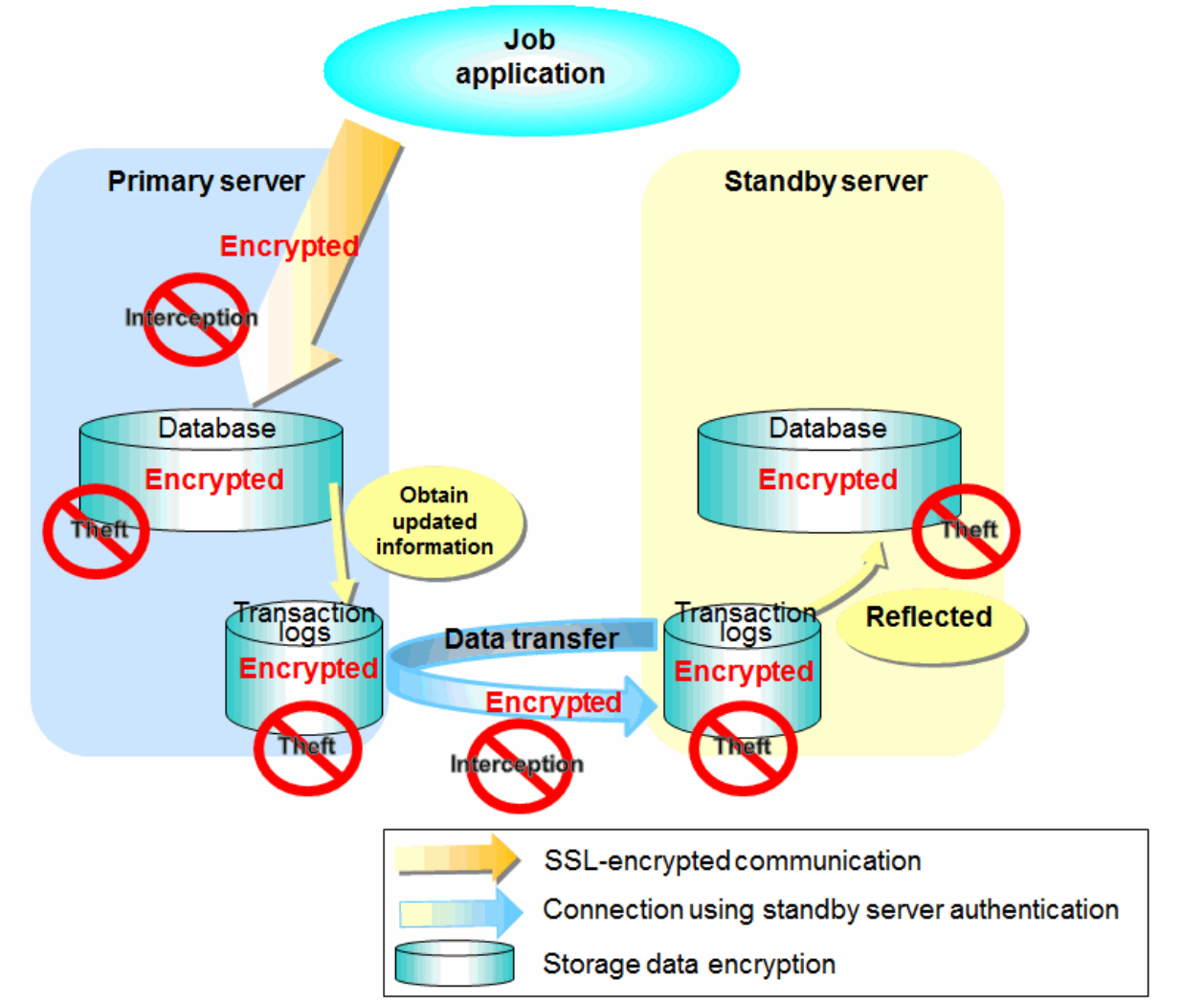
Point

If the job network is disconnected from outside, it can be used as the arbitration network. However, if a network is to be used as both a job network and arbitration network, consider the load on the network.

Note

If a port is blocked (access permission has not been granted) by a firewall, etc., enable use of the target port by granting access. Refer to the vendor document for information on how to open (grant access permission to) a port. Consider the security risks carefully when opening ports.

Figure 1.8 Security achieved when standby server authentication is combined with transaction log encryption



See

Refer to "Performing Database Multiplexing" under "Configuring Secure Communication Using Secure Sockets Layer" in the Operation Guide for information on encrypting SSL communications.

1.4.1 Authentication of the Standby Server

You can prevent spoofing connections from an external server purporting to be the standby server by using authentication with a user name and password.

Configure the setting in the primary server pg_hba.conf file so that authentication is performed for connections from the standby server in the same way as for connections from the client.

See

Refer to "Client Authentication" in the PostgreSQL Documentation for information on content that can be configured in pg_hba.conf.

1.4.2 Encryption of Transaction Logs Transferred to the Standby Server

In case the authentication of the standby server is breached so that a malicious user purporting to be the standby server can spoof data, the transaction log data can be encrypted to prevent it from being deciphered. The transparent data encryption feature is used to encrypt the data.

See

Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for details.

Chapter 2 Setting Up Database Multiplexing Mode

This chapter describes how to set up database multiplexing mode, and how to check it.

Users who perform setup and operations on the database server

Setup and operations of the database server must be performed by the instance administrator user with administrator privileges (operating system user ID belonging to the Administrators group). The instance administrator user must be assigned the "Log on as a service" user right.

Users who perform setup and operations on the arbitration server

The following users may perform setup and operations on the arbitration server when it is used for automatic degradation.

Linux

Any operating system user.

Windows

Any user with administrator privileges. This user must be assigned the "Log on as a service" user right.

Point

- Mirroring Controller selects a database superuser as the user who will connect to the database instance. This enables instance administrator users and database superusers who operate the Mirroring Controller commands to run database multiplexing mode in different environments.
- The application name for connecting to the database instance is "mc_agent".

Matching the system times

Before starting the setup, ensure that the times in the primary server, standby server and arbitration server match, by using the operating system time synchronization feature, for example.

The tolerated difference is approximately one second.

If the system times are not synchronized (because the tolerated difference is exceeded, for example), problem investigation may be affected.

Configuring ICMP

Because the ping command of the operating system is used for heartbeat monitoring of the database server, configure the network so that ICMP can be used on the admin network and the arbitration network. Refer to the relevant operating system procedure for details.

Setup

The setup procedure is shown in the table below. However, the procedure on the arbitration server should be performed only when the arbitration server is used for automatic degradation. A distinction is made between the procedures on the primary server and standby server according to whether the arbitration server is used.

Step	Task			Refer to
	Primary server	Standby server	Arbitration server	
1	Installation			2.1 Installation
2	Preparing the database server		Preparing the arbitration server	2.2 Preparing for Setup
3			Configuring the arbitration server	2.3.1 Configuring the Arbitration Server
4			Creating a user exit	2.3.2 Creating a User Exit for the Arbitration Server

Step	Task			Refer to
	Primary server	Standby server	Arbitration server	
5			Starting the arbitration process	2.3.3 Starting the Mirroring Controller Arbitration Process
6	Setting up database multiplexing mode			2.4.1 Setting Up Database Multiplexing Mode on the Primary Server
7	Creating, setting, and registering the instance			2.4.2 Creating, Setting, and Registering the Primary Server Instance
8	Creating a user exit			2.6 Creating a User Exit for a Database Server
9	Starting Mirroring Controller			2.4.3 Starting Mirroring Controller on the Primary Server
10		Setting up database multiplexing mode		2.5.1 Setting Up Database Multiplexing Mode on the Standby Server
11		Creating, setting, and registering the instance		2.5.2 Creating, Setting, and Registering the Standby Server Instance
12		Creating a user exit		2.6 Creating a User Exit for a Database Server
13		Starting Mirroring Controller		2.5.3 Starting Mirroring Controller on the Standby Server
14	Confirming the streaming replication status			2.7 Confirming the Streaming Replication Status
15	Checking the connection status			2.8.1 Checking the Connection Status on a Database Server
16		Checking the connection status		2.8.1 Checking the Connection Status on a Database Server
17			Checking the connection status	2.8.2 Checking the Connection Status on the Arbitration Server
18	Creating applications			2.9 Creating Applications
19	Checking the behavior			2.10 Checking the Behavior

Explanations for each step are provided below.

Information

- The setup procedure is also the same when changing the mode on a single server to database multiplexing mode. In this case, omit the installation of FUJITSU Enterprise Postgres and the creation of the instance.

  Refer to "3.9.2 Changing from Single Server Mode to Database Multiplexing Mode" for details.

- The primary and standby server can be pseudo-configured on the same server for system testing, for example. In this case, the setup can be performed using the same procedure, however there will be some supplementary steps.

  Before performing the setup, refer to "Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server".

2.1 Installation

Refer to the manuals below, and then install the product.

See

- Refer to the Installation and Setup Guide for Server for details on how to install FUJITSU Enterprise Postgres.
- Refer to the Installation and Setup Guide for Server Assistant for information on installing the Server Assistant on the arbitration server.

Note

Do not use the arbitration server also as a database server. The arbitration server is installed to check the database server status as a third party, and to perform fencing. Using the arbitration server also as a database server nullifies the effectiveness of the arbitration server.

2.2 Preparing for Setup

This section describes the preparation required before setting up Mirroring Controller.

2.2.1 Preparing the Database Server

2.2.1.1 Preparing the Backup Disk

In Mirroring Controller, by performing a backup, recovery is possible even if all server disks are corrupted.

The content on the primary server should be backed up. However, through switching and failback, the standby server may also become the primary server. Accordingly, prepare each of the backup disk devices for the primary and standby servers. Perform backup on the primary server used at the time of the backup.

2.2.1.2 Preparatory Tasks for the Output of Error Logs to the Event Log

This section explains the preparatory tasks required to output error logs to the event log.

Note

If you do not register an event source name, the message content output to the event log may be incomplete.

Setting each server

You should register this default event source name beforehand because the default event source name "MirroringControllerOpen" may be output to the event log when Mirroring Controller commands on the database server are used.

Example)
The following is an example in which the DLL of a 64-bit product is registered under the default event source name. Note that "<*x*>" indicates the product version.

```
> regsvr32 "c:\Program Files\Fujitsu\fsepv<x>server64\lib\mcevent.dll"
```

Setting each instance

You can output messages to any event source named by the user, so that messages output to the event log can be identified by each instance.

Example)
The following is an example in which the DLL of a 64-bit product is registered under the event source name "Mirroring Controller inst1". Note that "<*x*>" indicates the product version.

```
> regsvr32 /n /i:"Mirroring Controller inst1" "c:\Program Files\Fujitsu\fsepv<x>server64\lib
\mcevent.dll"
```

The parameter must be edited for each instance. Refer to "A.4.1 Server Configuration File for the Database Servers" to set the event_source parameter.

If installing multiple versions

If FUJITSU Enterprise Postgres is already installed on the same machine, search for the key below in a registry editor, and make a note of the path of the registered DLL. Afterwards, register a new DLL using the default event source name.

Use the DLL path that you made a note of in the above step when re-registering the default event source name during uninstallation.

```
MirroringControllerOpen
```

2.2.1.3 Security Policy Settings

Security settings that allow logon as a service are required in Mirroring Controller for the operating system user account of the instance administrator user in order to start and stop Mirroring Controller and an instance using a Windows service.

If the security settings have not been configured, refer to "E.1 Security Policy Settings" for information on configuring the settings.

2.2.2 Preparing the Arbitration Server

2.2.2.1 Preparing to Output Error Logs to the Event Log (Windows)

This section explains the preparatory tasks for outputting error logs to the event log.

If no event source name is registered, messages output to the event log may be incomplete.

Configuring each server

Event logs for the Mirroring Controller commands on the arbitration server may be output with the default event source name "MirroringControllerArbiter". Therefore, register this default event source name beforehand.

Example)
The following is an example in which the DLL of a 64-bit product is registered under the default event source name. Note that "<*x*>" indicates the product version.

```
> regsvr32 "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib\mcarbevent.dll"
```

Setting each instance

You can output messages to any event source named by the user, so that messages output to the event log can be identified by each instance.

Example)
The following is an example in which the DLL of a 64-bit product is registered under the event source name "Mirroring Controller arbiter1". Note that "<*x*>" indicates the product version.

```
> regsvr32 /n /i:"Mirroring Controller arbiter1" "c:\Program Files\Fujitsu\fsepv<x>assistant64\lib
\mcarbevent.dll"
```

The parameter must be edited for each instance. Refer to "A.4.2 Arbitration Configuration File" and set the event_source parameter.

If installing multiple versions

If FUJITSU Enterprise Postgres is already installed on the same machine, search for the key below in Registry Editor, and make a note of the path of the registered DLL. Afterwards, register a new DLL using the default event source name.

Use the DLL path that you made a note of in the above step when re-registering the default event source name during uninstallation.

```
MirroringControllerArbiter
```

2.2.2.2 Security Policy Settings (Windows)

On the arbitration server, operating system user accounts that operate the Mirroring Controller arbitration process must be assigned the "Log on as a service" user right in order to use Windows Services to start and stop the Mirroring Controller arbitration process.

If the security settings to enable this have not been configured, refer to "E.1 Security Policy Settings" and configure the settings.

2.3 Setting Up the Arbitration Server

This section explains how to set up the arbitration server.

2.3.1 Configuring the Arbitration Server

This section explains how to set up database multiplexing mode on the arbitration server.

In database multiplexing mode, the files that are required for operations are managed in the Mirroring Controller arbitration process management directory.

There is one Mirroring Controller arbitration process management directory for each arbitration process.

Point

The arbitration process for each database multiplexing system can be started on a single arbitration server.

See

- Refer to the Reference for information on the mc_arb command.
- Refer to "Appendix A Parameters" for information on the parameters to be edited for the setup.

Perform the following procedure:

Linux

1. On the arbitration server, log in as any operating system user who starts and stops the arbitration process.
2. Configure the environment variables.

   Set the following environment variables:

   - PATH

     Add the installation directory "/bin".

   - MANPATH

     Add the installation directory "/share/man".

   - LD_LIBRARY_PATH

     Add the installation directory "/lib".

   Example

   The following example configures environment variables when the installation directory is "/opt/fsepv<*x*>assistant".

   Note that "<*x*>" indicates the product version.

   sh, bash

   ```
   $ PATH=/opt/fsepv<x>assistant/bin:$PATH ; export PATH
   $ MANPATH=/opt/fsepv<x>assistant/share/man:$MANPATH ; export MANPATH
   $ LD_LIBRARY_PATH=/opt/fsepv<x>assistant/lib:$LD_LIBRARY_PATH ; export LD_LIBRARY_PATH
   ```

   csh, tcsh

```
$ setenv PATH /opt/fsepv<x>assistant/bin:$PATH
$ setenv MANPATH /opt/fsepv<x>assistant/share/man:$MANPATH
$ setenv LD_LIBRARY_PATH /opt/fsepv<x>assistant/lib:$LD_LIBRARY_PATH
```

Note

If you execute any command other than FUJITSU Enterprise Postgres (OS commands, etc.) after LD_LIBRARY_PATH is set, remove the installation directory/lib from LD_LIBRARY_PATH.

3. Create the Mirroring Controller arbitration process management directory that will store the files required by the arbitration server.

   Use ASCII characters in the Mirroring Controller arbitration process management directory.

4. In the network configuration file (network.conf), define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Create network.conf in the Mirroring Controller arbitration process management directory, based on the sample file. For network.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1.

   If users other than this are granted access permissions, the mc_arb command will not work. Accordingly, users other than the operating system user who starts and stops the arbitration process in step 1 are prevented from operating the Mirroring Controller arbitration process.

   Sample file

   ```
   /installDir/share/mcarb_network.conf.sample
   ```

   In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Refer to "A.3 Network Configuration File" for details.

   A definition example is shown below.

   ```
   Example)
   The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
   "27541".
   ```

   ```
   server1 192.0.3.100 27541
   server2 192.0.3.110 27541
   ```

5. In the arbitration configuration file (arbitration.conf), define the information related to control of the Mirroring Controller arbitration process.

   Create arbitration.conf in the Mirroring Controller arbitration process management directory, based on the sample file. For arbitration.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work.

   Sample file

   ```
   /installDir/share/mcarb_arbitration.conf.sample
   ```

   Set the parameters shown in the table below in arbitration.conf.

Table 2.1 Parameters

Parameter	Content specified	Remarks
port	Port number of the Mirroring Controller arbitration process	The port number must be 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program.

Parameter	Content specified	Remarks
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	IPv4 and IPv6 addresses can be specified. Specify the IP address, enclosed in single quotation marks (').
syslog_ident	'*programName*'	Specify using single quotation marks (') to enclose the program name used to identify the Mirroring Controller arbitration process message in the system log. Use ASCII characters excluding spaces to specify this parameter. The default is 'MirroringControllerArbiter'.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/arbiter/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where it is determined that an error has occurred. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
fencing_command_timeout	Timeout for fencing command (seconds)	If the command does not respond within the specified number of seconds, it is determined that fencing has failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Information

Refer to "A.4.2 Arbitration Configuration File" for information on the parameters and for other parameters.

Windows

1. On the arbitration server, log in as any operating system user who starts and stops the arbitration process.
2. Configure the environment variables.

   Set the following environment variable:

   - PATH

     Add the installation folders "\bin" and "\lib".

   #### Example

   The following example configures environment variables when the installation folder is "c:\Program Files\Fujitsu\fsepv<*x*>assistant64".

   Note that "<*x*>" indicates the product version.

   ```
   > SET PATH=c:\Program Files\Fujitsu\fsepv<x>assistant64\bin;c:\Program Files\Fujitsu
   \fsepv<x>assistant64\lib;%PATH%
   ```

3. Create the Mirroring Controller arbitration process management directory that will store the files required by the arbitration server.

   Use ASCII characters in the Mirroring Controller arbitration process management directory.

4. In the network configuration file (network.conf), define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Create network.conf in the Mirroring Controller arbitration process management directory, based on the sample file.

   Sample file

   ```
   installDir\share\mcarb_network.conf.sample
   ```

   In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the Mirroring Controller network configuration that will be managed by the Mirroring Controller arbitration process.

   Refer to "A.3 Network Configuration File" for details.

   A definition example is shown below.

   ```
   Example)
   The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
   "27541".
   ```

   ```
   server1 192.0.3.100 27541
   server2 192.0.3.110 27541
   ```

5. Change the access permissions for network.conf.

   For network.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work. Accordingly, users other than the operating system user who starts and stops the arbitration process in step 1 are prevented from operating the Mirroring Controller arbitration process.

   ```
   Example)
   The following is an execution example, in which the operating system user who starts and stops the
   arbitration process in step 1 is granted full access permissions as the owner when the user is
   "fsepuser". The following procedure applies when the user is logged in to the Windows server as
   "fsepuser".
   ```

   ```
   > takeown /f network.conf
   > icacls network.conf /reset
   > icacls network.conf /inheritance:r
   > icacls network.conf /grant fsepuser:F
   ```

6. In the arbitration configuration file (arbitration.conf), define the information related to control of the Mirroring Controller arbitration process.

   Create arbitration.conf in the Mirroring Controller arbitration process management directory, based on the sample file.

   Sample file

   ```
   installDir\share\mcarb_arbitration.conf.sample
   ```

   Set the parameters shown in the table below in arbitration.conf.

   Table 2.2 Parameters

Parameter	Content specified	Remarks
port	Port number of the Mirroring Controller arbitration process	The port number must be 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example]	IPv4 and IPv6 addresses can be specified. Enclose the parameter value in single quotation marks (').

Parameter	Content specified	Remarks
	my_address = '192.0.3.120'	
service_name	'*registeredServiceNameOfArbitrationProcessInWindowsServices*'	Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter. Enclose the parameter value in single quotation marks ('). The maximum length of the service name is 124 bytes.
event_source	'*eventSourceNameUsedToIdentifyArbitrationProcessMsgInEventLog*'	Use ASCII characters excluding spaces to specify this parameter. Enclose the parameter value in single quotation marks ('). The maximum length of the event source name is 255 bytes.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\arbiter\\fencing_dir\\execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where it is determined that an error has occurred. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes. Any multibyte characters must use the same encoding as the operating system.
fencing_command_timeout	Timeout for fencing command (seconds)	If the command does not respond within the specified number of seconds, it is determined that fencing has failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Information

Refer to "A.4.2 Arbitration Configuration File" for information on the parameters and for other parameters.

7. Change the access permissions for arbitration.conf.

   For arbitration.conf, set read and write permissions only for the operating system user who starts and stops the arbitration process in step 1. If users other than this are granted access permissions, the mc_arb command will not work.

   ```
   Example)
   The following is an execution example, in which the operating system user who starts and stops the
   arbitration process in step 1 is granted full access permissions as the owner when the user is
   "fsepuser". The following procedure applies when the user is logged in to the Windows server as
   "fsepuser".
   ```

   ```
   > takeown /f arbitration.conf
   > icacls arbitration.conf /reset
   > icacls arbitration.conf /inheritance:r
   > icacls arbitration.conf /grant fsepuser:F
   ```

8. Configure Windows Firewall.

   If Windows Firewall is used, enable the port number of Mirroring Controller specified in the network configuration file in step 3. Refer to "E.2 Windows Firewall Settings" for details.

9. Register the Mirroring Controller arbitration process as a Windows service.

   Execute the mc_arb command in register mode.

   For the -P option of the mc_arb command, specify the password of the operating system user who executes the command.

   Example)

```
> mc_arb register -M D:\mcarb_dir\arbiter1 -P ********
```

Note

When specifying the password in the -P option of the mc_arb command, for security reasons, you should be careful not to allow other users to access it.

Information

Use the mc_arb command with the -S option to specify automatic start and stop of the Mirroring Controller arbitration process. Refer to "2.13 Setting Automatic Start and Stop of the Mirroring Controller Arbitration Process" for details.

The Mirroring Controller arbitration process is registered as a Windows service using the service name specified in the service_name parameter of arbitration.conf in step 6.

You can execute the sc qc command to check the registration status.

2.3.2 Creating a User Exit for the Arbitration Server

The only user exit for the arbitration server is the fencing command.

The fencing command is a user command that is called by the Mirroring Controller arbitration process if Mirroring Controller performs arbitration processing and determines that a database server is unstable.

In the fencing command, the user implements a process that isolates a database server from a cluster system by, for example, stopping the target operating system or server. The fencing command that was created is to be specified for the parameter in the arbitration configuration file. Refer to "A.4.2 Arbitration Configuration File" for information on the parameters.

- Fencing the primary server during the switch
  - Prevent the Mirroring Controller management process on the primary server from communicating with the Mirroring Controller management process on the other server.
  - Prevent applications from connecting to the primary server instance.
- Fencing the standby server during disconnection
  - Prevent the Mirroring Controller management process on the standby server from communicating with the Mirroring Controller management process on the other server.
  - Prevent applications from connecting to the standby server instance.
  - Prevent the standby server from continuing streaming replication.

See

Refer to "Appendix C User Commands" for information on user exits.

2.3.3 Starting the Mirroring Controller Arbitration Process

This section explains how to start the Mirroring Controller arbitration process.

An operating system user who has logged in to the arbitration server can start the Mirroring Controller arbitration process by executing the mc_arb command in start mode.

Linux

Example)

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Windows

Example)

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

2.4 Setting Up the Primary Server

This section explains how to set up the primary server.

2.4.1 Setting Up Database Multiplexing Mode on the Primary Server

This section explains how to set up database multiplexing mode on the primary server.

In database multiplexing, the files that are required for operations are managed in the Mirroring Controller management directory.

There is one Mirroring Controller management directory for each instance.

Note

- Do not place the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake with the directories managed by FUJITSU Enterprise Postgres, and an old version of files may be restored.

See

- Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for details on the directories that are managed by FUJITSU Enterprise Postgres.
- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Appendix A Parameters" for details on each parameter to be edited for the setup.

Perform the following procedure:

1. Log in to the primary server.
2. Create the Mirroring Controller management directory that will store the files required by database multiplexing.

   Use ASCII characters in the Mirroring Controller management directory.

   Additionally, grant "Write" permission to the instance administrator user for the Mirroring Controller management directory.
3. In the network configuration file (network.conf), define the network configuration that will link between the Mirroring Controller processes.

   Create the network.conf file in the Mirroring Controller management directory, based on the sample file.

   Sample file

```
installDir\share\mc_network.conf.sample
```

In network.conf, specify the IP address or host name and port number of the primary server and standby server, and define the network configuration that will link between the Mirroring Controller processes, and between Mirroring Controller processes and the Mirroring Controller arbitration process.

Refer to "A.3 Network Configuration File" for details.

A definition example is shown below.

The content to be defined depends on the operation settings at the time a heartbeat abnormality is detected.

When automatic degradation by the arbitration server is selected

```
Example)
The IDs of the primary server and standby server are set to "server1" and "server2", and their
port numbers are set to "27540" and "27541". The ID of the server of the Mirroring Controller
arbitration process is set to "arbiter", and its port number is set to "27541".
```

```
server1 192.0.2.100,192.0.3.100 27540,27541 server
server2 192.0.2.110,192.0.3.110 27540,27541 server
arbiter 192.0.3.120 27541 arbiter
```

Ensure that the port numbers set for the primary server, standby server, and arbitration server do not conflict with other software. In addition, when the arbitration server is used for automatic degradation, use a network in which the arbitration network is not affected by a line failure in the admin network.

When the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:

- IP address or host name of the database server used as the admin network
- IP address or host name of the database server used as the arbitration network
- Port number of the database server used as the admin network
- Port number of the database server used as the arbitration network

If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf of the arbitration server.

When operation other than automatic degradation by the arbitration server is selected

```
Example)
The IDs of the servers are set to "server1" and "server2", and their port numbers are set to
"27540".
```

```
server1 192.0.2.100 27540
server2 192.0.2.110 27540
```

Ensure that the port numbers for the primary and standby server do not conflict with other software.

Register the port number of the primary server in the services file, because there are programs, such as WebAdmin, that search an available port number using the services file.

Register any name as the service name.

4. Change the access permissions for the network.conf file.

For network.conf, set read and write permissions for the instance administrator user only.

If users other than the instance administrator user are granted access permissions, the mc_ctl command will not work. Accordingly, users other than the instance administrator user are prevented from operating Mirroring Controller.

```
Example)
The following is an execution example, in which the instance administrator user is granted full
access permissions as the owner when the operating system user name of the instance administrator
user is "fsepuser". The following procedure applies when the user is logged in to the Windows
server as "fsepuser":
```

```
> takeown /f network.conf
> icacls network.conf /reset
> icacls network.conf /inheritance:r
> icacls network.conf /grant fsepuser:F
```

5. Define the information related to Mirroring Controller monitoring and control in the *serverIdentifier*.conf file.

   Create the *serverIdentifier*.conf file in the Mirroring Controller management directory, based on the sample file.

   As the file name for the *serverIdentifier*.conf file, use the server identifier name that was specified in the network.conf file in step 3.

   Sample file

```
installDir\share\mc_server.conf.sample
```

   Set the parameters shown in the table below in the *serverIdentifier*.conf file.

Table 2.3 Parameters

Parameter	Content specified	Remarks
db_instance	'*dataStorageDestinationDir*'	Use ASCII characters, and specify "\\" as the path delimiter. Enclose the parameter value in single quotation marks (').
db_instance_service_name	'*registeredServiceNameOfFujitsuEnterprisePostgresInstance*'	Specify the registered service name of the FUJITSU Enterprise Postgres instance in the Windows service. Use ASCII characters, enclosed in single quotation marks (').
db_instance_password	'*passwordOfInstanceAdminUser*'	If password authentication is performed, specify this parameter in the settings used when Mirroring Controller connects to a database instance. Use ASCII characters, enclosed in single quotation marks ('). If the specified value of this parameter includes ' or \, write \' or \\, respectively.
enable_hash_in_password	on or off	Specify on to treat the # in the db_instance_password specification as a password character, or off to treat it as a comment. The default is "off".
mc_service_name	'*registeredServiceNameOfMirroringController*'	Specify the Mirroring Controller service name registered in the Windows service. Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter. The service name is up to 124 bytes.
event_source	'*eventSourceName*'	Specify the event source name to be used to identify the Mirroring Controller message in the event log. Use ASCII characters to specify this parameter. The maximum length of the event source name is 255 bytes. By using a similar event source name as the postgresql.conf file parameter, the Mirroring

Parameter	Content specified	Remarks
		Controller output content can be referenced transparently, so log reference is easy.
remote_call_timeout	Admin communication timeout	Specify the timeout value (milliseconds) of the Mirroring Controller agent process for communication between servers. Specify a value that is less than the operation system TCP connection timeout.
heartbeat_error_action	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring	arbitration: Perform automatic degradation using the arbitration server. command: Call a user exit to determine degradation, and perform automatic degradation if required. message: Notify messages. fallback: Perform automatic degradation unconditionally. Set the same value on the primary server and standby server.
heartbeat_interval	Interval time for abnormality monitoring during heartbeat monitoring of the operating system or server (milliseconds)	Abnormality monitoring of the operating system or server is performed at the interval (milliseconds) specified in heartbeat_interval. This parameter setting is used as the default for database process heartbeat monitoring, streaming replication abnormality monitoring, and disk abnormality monitoring. When setting the monitoring time, there are some considerations to take into account to optimize degradation using abnormality monitoring. Refer to "2.11.4.1 Tuning for Abnormality Monitoring of the Operating System or Server" for details.
heartbeat_timeout	Timeout for abnormality monitoring during heartbeat monitoring of the operating system or server (seconds)	
heartbeat_retry	Number of retries for abnormality monitoring during heartbeat monitoring of the operating system or server (number of times)	
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\mc\\fencing_dir\ \execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Enclose the path in single quotation marks ('). Any multibyte characters must use the same encoding as the operating system. This parameter must be specified when "command" is set for heartbeat_error_action. Specify the path using less than 260 bytes.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Parameter	Content specified	Remarks
arbitration_timeout	Timeout for arbitration processing in the Mirroring Controller arbitration process (seconds)	The specified value must be at least equal to the heartbeat monitoring time of the operating system or server + fencing_command_timeout in the arbitration configuration file. If there is no response for at least the number of seconds specified, the primary server will not be switched and the standby server will not be disconnected. Therefore, perform degradation manually. Specify a value between 1 and 2147483647. This parameter does not need to be set for operation that does not use the arbitration server.
arbitration_command	'*ArbitrationCmdFilePath*' [Setting example] arbitration_command = 'c:\\mc\\arbitration_dir\\execute_arbitration_command.bat'	Specify the full path of the arbitration command to be executed when an abnormality is detected during heartbeat monitoring of the operating system or server. Enclose the path in single quotation marks ('). Any multibyte characters must use the same encoding as the operating system. This parameter must be specified when "command" is set for heartbeat_error_action. Specify the path using less than 260 bytes.
arbitration_command_timeout	Timeout for arbitration command (seconds)	If the command does not respond within the specified number of seconds, it is determined that execution of the arbitration command has failed and a signal (SIGTERM) is sent to the arbitration command execution process. Specify a value between 1 and 2147483647. This parameter can be specified only when "command" is set for heartbeat_error_action.

Information

Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the parameters and for other parameters.

6. Change the access permissions for the *serverIdentifier*.conf file.

   For *serverIdentifier*.conf, set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access permissions, the mc_ctl command will not work.

   ```
   Example)
   The following is an execution example, in which the instance administrator user is granted full
   access permissions when the operating system user name of the instance administrator user is
   "fsepuser". The following procedure applies when the user is logged in to the Windows server as
   "fsepuser":
   ```

   ```
   > takeown /f serverIdentifier.conf
   > icacls serverIdentifier.conf /reset
   ```

```
> icacls serverIdentifier.conf /inheritance:r
> icacls serverIdentifier.conf /grant fsepuser:F
```

7. Configure the Windows firewall.

   If the Windows firewall feature is to be enabled, you should enable the port number of Mirroring Controller that you specified in the network definition file in step 3. Refer to "E.2 Windows Firewall Settings" for details.

8. Register Mirroring Controller to the Windows service.

   Execute the mc_ctl command in the register mode.

   For the -P option of the mc_ctl command, specify the password of the operating system user who executes the command.

   Example)

```
> mc_ctl register -M D:\mcdir\inst1 -P ********
```

Note

When specifying the password in the -P option of the mc_ctl command, for security reasons, you should be careful not to allow other users to access it.

Information

You can use the mc_ctl command with the -S option to specify automatic start and stop of Mirroring Controller. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Using the service name specified in the mc_service_name parameter of *serverIdentifier*.conf in step 5, Mirroring Controller is registered to the Windows service.

You can execute the sc qc command to check the registration status.

2.4.2 Creating, Setting, and Registering the Primary Server Instance

This section explains how to create, set, and register the primary server instance.

Note

- Mirroring Controller supports instances that are registered in the Windows service.

See

- Refer to "Client Authentication" in the PostgreSQL Documentation for information on the pg_hba.conf file.
- Refer to "A.1 Parameters Set on the Primary Server" for information on the postgresql.conf file.
- Refer to "mc_ctl" in Reference for information on the command.

Perform the following procedure:

1. Refer to "Setup" in the Installation and Setup Guide for Server, and then perform the FUJITSU Enterprise Postgres setup and create the FUJITSU Enterprise Postgres instance.

   - Use ASCII characters in the data storage destination directory.

- When registering an instance to the Windows service, perform the settings required to enable Mirroring Controller to start and stop the instance. Execute the pg_ctl command with the following specified for the register mode:

  - For the service name of the -N option, specify the name set for the db_instance_service_name parameter in the server definition file

  - Specify "demand" for the -S option, so that the service does not start automatically on startup of the system

- If degradation starts occurring due to an error during operations in database multiplexing mode, recovery is required for the standby server. There are some conditions to execute the pg_rewind command to recover the standby server. One of the conditions can be satisfied by enabling checksums when executing the initdb command. This is not mandatory. Refer to "4.1.1.1.3 Identify cause of error and perform recovery" for details.

- Do not configure the Windows service of a multiplexed instance to perform automatic start, as it is started by Mirroring Controller.

2. When using transparent data encryption, configure the encryption settings for the storage data.

   Create the keystore file.

   Refer to "Database Multiplexing Mode" in the Operation Guide for details, and then configure the settings.

3. Add the following entry to the pg_hba.conf file to authenticate connections from the standby server.

   Copy the file to the standby server later.

```
# TYPE    DATABASE        USER        ADDRESS                     METHOD
  host    replication     fsep       standbyServerAddress       authenticationMethod
  host    replication     fsep       primaryServerAddress       authenticationMethod
```

   For the primary and standby server addresses, specify the IP address that will connect to the log transfer network.

   Additionally, all servers can be used as the primary server or the standby server, so add entries for the addresses of all servers that comprise the database multiplexing system.

Setting an authentication method other than trust authentication

If the primary server becomes the standby server, to perform automatic authentication of connections to the primary server, create a password file (%APPDATA%\postgresql\pgpass.conf), and then specify a password for the replication database. Accordingly, the instance administrator operating system user and the user registered in the database will be the same, so you can verify that the connection was not made by an unspecified user. Additionally, the password that was set beforehand will be used in the authentication, so that the connection will be automatic.

If trust authentication is set, all OS users who can log in to the primary server will be able to connect, and if one of these is a malicious user, then that user can corrupt the standby server data, or cause the job system to fail, by sending an erroneous transaction log. Therefore, decide on the authentication method according to the security requirements of the system using database multiplexing mode.

Refer to "Authentication Methods" in the PostgreSQL Documentation for details on the authentication methods that can be set.

4. Configure this setting to enable the instance administrator user of the primary server to connect as a database application.

   This setting enables the connection to the instance using the user name of the instance administrator user, so that Mirroring Controller can monitor instance errors. Configure this setting to enable the connection to the postgres database.

- If password authentication is used

  In the db_instance_password parameter of the *serverIdentifier*.conf file, specify the password for the instance administrator user. This password is used to connect to the database instance. If a password is not specified in the db_instance_password parameter, the connection to the database instance from Mirroring Controller will fail, and it will not be possible to perform the process monitoring of the instance.

- If password authentication is not used

  There is no need to specify the password in the db_instance_password parameter.

  Even if the password for the instance administrator user is specified in the db_instance_password parameter, it will be ignored.

- If certificate authentication using SSL is used

  Specify connection parameters for SSL in the db_instance_ext_ pq_conninfo parameter and db_instance_ext_jdbc_conninfo parameter in the *serverIdentifier*.conf file. If the pasrameters are not specified, the connection to the database instance from Mirroring Controller will fail, and it will not be possible to perform the process monitoring of the instance. If certificate authentication using SSL is not performed, the parameters specification is not required.

An example of setting the authentication method is shown below.

```
# TYPE    DATABASE        USER        ADDRESS         METHOD
  host    postgres        fsep        127.0.0.1/32    authenticationMethod
```

Note

Mirroring Controller uses the PostgreSQL JDBC 4.2 driver to connect to the database instance. Therefore, for the authentication method, specify a method supported by the JDBC driver. If an authentication method not supported by the JDBC driver is specified, Mirroring Controller will fail to start. Refer to the PostgreSQL JDBC Driver Documentation for information on authentication methods supported by the JDBC driver.

5. To use database multiplexing mode, specify the parameters shown in the table below in the postgresql.conf file.

   The postgresql.conf file is copied when the standby server instance is created. Accordingly, set the required parameters in the standby server.

   To use database multiplexing mode, specify the parameters shown in the table below in the postgresql.conf file. After editing the postgresql.conf file, restart the instance.

Table 2.4 Parameters

Parameter	Content specified	Remarks
wal_level	replica or logical	Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*standbyServerName*'	Specify the name that will identify the standby server. Enclose the name in single quotation marks ('). Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	Specify this to execute reference jobs on the standby server.
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the primary server may be deleted.

Parameter	Content specified	Remarks
		Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WAL save size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred in the transaction log transfer on the primary server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
archive_mode	on	Specify the archive log mode.
archive_command	'cmd /c ""installDir\\bin\\pgx_walcopy.cmd" "%p" "backupDataStorageDestinationDir\\archived_wal\\%f"""	Specify the command and storage destination to save the transaction log.
backup_destination	Backup data storage destination directory	Specify the name of directory where to store the backup data. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers, so that the backup data of other servers can be used to perform recovery.
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the heartbeat monitoring time of the database process, you can unify the time after which it is determined that an error has occurred.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally.

Parameter	Content specified	Remarks
		However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is on or remote_apply to prevent data loss caused by operating system or server down immediately after a switch or switch.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

*1: Number of simultaneous executions of the mc_ctl command in the status mode.

2.4.3 Starting Mirroring Controller on the Primary Server

This section explains how to start Mirroring Controller on the primary server.

When the arbitration server is used for automatic degradation, start the Mirroring Controller arbitration process on the arbitration server in advance.

1. Start the Mirroring Controller process.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Note

- When the arbitration server is used for automatic degradation, the database server must connect to the arbitration server, and as a result, Mirroring Controller startup may take longer than when the arbitration server is not used.
- If the parameter for heartbeat monitoring of operating systems or servers set by the abitration server is greater than parameter for heartbeat monitoring of operating systems and servers of the Mirroring Controller, the Mirroring Controller may fail to start. In this case, check the contents of the message notification and review the parameters for heartbeat monitoring of operating systems or servers for the arbitration server or Mirroring Controller.
- If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - switch/disconnection is not performed.

- Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore ensure that the admin network is connected before starting Mirroring Controller.

Point

- The mc_ctl command fails if the Mirroring Controller arbitration process has not been started on the arbitration server when the arbitration server is used for automatic degradation. However, if the Mirroring Controller arbitration process cannot be started in advance, it can be started by specifying the --async-connect-arbiter option in the mc_ctl command.
- After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

2. Obtain the backup.

   Use the pgx_dmpall command to collect the backup.

2.5 Setting Up the Standby Server

This section explains how to set up the standby server.

2.5.1 Setting Up Database Multiplexing Mode on the Standby Server

This section explains how to set up database multiplexing mode on the standby server.

In database multiplexing, the files that are required for operations are managed in the Mirroring Controller management directory.

There is one Mirroring Controller management directory for each instance.

Note

- Do not place the Mirroring Controller management directory in a directory managed by FUJITSU Enterprise Postgres, otherwise it may be deleted by mistake with the directories managed by FUJITSU Enterprise Postgres, and an old version of files may be restored.
- When creating a standby server for a large database, stop job system operations, specify a large value for the wal_keep_size parameter, or use replication slots.
  This is because WALs generated after the standby server is built using the pg_basebackup command, but before it is started, need to be retained. However, the number of WAL segments that can be retained is constrained by the wal_keep_size parameter.
  Additionally, setting the wal_keep_size parameter requires consideration regarding stabilization of the database multiplexing mode (refer to "2.11.1 Tuning to Stabilize the Database Multiplexing Mode" for details).

See

- Refer to "Preparing Directories for Resource Deployment" in the Installation and Setup Guide for Server for details on the directories that are managed by FUJITSU Enterprise Postgres.
- Refer to "pg_basebackup" in "Reference" in the PostgreSQL Documentation for information on the pg_basebackup command.
- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Appendix A Parameters" for details on each parameter to be edited for the setup.
- Refer to "Replication Slots" in the PostgreSQL Documentation for information on replication slots.

Perform the following procedure:

1. Log in to the standby server.

2. Create the Mirroring Controller management directory that will store the files required by database multiplexing.

   Use ASCII characters in the Mirroring Controller management directory.

   Additionally, grant "Write" permission to the instance administrator user for the Mirroring Controller management directory.

3. Copy, and then deploy, the network.conf file of the primary server.

   Copy the network.conf file that was defined in the primary server setup, and deploy it to the Mirroring Controller management directory of the standby server.

   Register the port number of the standby server that was specified in the network.conf file in the services file, because there are programs, such as WebAdmin, that search an available port number using the services file.

   Register any name as the service name.

4. Change the access permissions for the network.conf file.

   Set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access permissions, the mc_ctl command will not work. Accordingly, users other than the instance administrator user are prevented from operating Mirroring Controller.

   ```
   Example)
   The following is an execution example, in which the instance administrator user is granted full
   access permissions as the owner when the operating system user name of the instance administrator
   user is "fsepuser". The following procedure applies when the user is logged in to the Windows
   server as "fsepuser".
   ```

   ```
   > takeown /f network.conf
   > icacls network.conf /reset
   > icacls network.conf /inheritance:r
   > icacls network.conf /grant fsepuser:F
   ```

5. Copy, and then deploy, the *serverIdentifier*.conf file of the primary server.

   Copy the *serverIdentifier*.conf file that was defined in the primary server setup, and deploy it to the Mirroring Controller management directory of the standby server.

   Note

   If the primary server and standby server are to be built within the same server, change the following parameters in the *serverIdentifier*.conf file, ensuring that the names are not duplicated with those on the primary server:

   - db_instance_service_name (registered service name of the FUJITSU Enterprise Postgres instance)
   - mc_service_name (registered service name of Mirroring Controller)
   - event_source (event source name)

6. Change the access permissions for the *serverIdentifier*.conf file.

   Set read and write permissions for the instance administrator user only. If users other than the instance administrator user are granted access permissions, the mc_ctl command will not work.

   ```
   Example)
   The following is an execution example, in which the instance administrator user is granted full
   access permissions as the owner when the operating system user name of the instance administrator
   user is "fsepuser". The following procedure applies when the user is logged in to the Windows
   server as "fsepuser":
   ```

   ```
   > takeown /f serverIdentifier.conf
   > icacls serverIdentifier.conf /reset
   > icacls serverIdentifier.conf /inheritance:r
   > icacls serverIdentifier.conf /grant fsepuser:F
   ```

7. Configure the Windows firewall.

   If the Windows firewall feature is to be enabled, you should enable the port number of Mirroring Controller that you specified in the network definition file in step 3. Refer to "E.2 Windows Firewall Settings" for details.

8. Register Mirroring Controller to the Windows service.

   Execute the mc_ctl command in the register mode.

   For the -P option of the mc_ctl command, specify the password of the operating system user who executes the command.

   Example)

```
> mc_ctl register -M D:\mcdir\inst1 -P ********
```

Note

When specifying the password in the -P option of the mc_ctl command, for security reasons, you should be careful not to allow other users to access it.

Information

You can use the mc_ctl command with the -S option to specify automatic start and stop of Mirroring Controller. Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Using the service name specified in the mc_service_name parameter of *serverIdentifier*.conf in step 5, Mirroring Controller is registered to the Windows service.

You can execute the sc qc command to check the registration status.

2.5.2 Creating, Setting, and Registering the Standby Server Instance

This section explains how to create, set, and register the standby server instance.

Note

Mirroring Controller supports instances that are registered in the Windows service.

See

- Refer to "Appendix A Parameters" for details on each parameter.
- Refer to "mc_ctl" in Reference for information on the command.

Perform the following procedure:

1. Prepare for setup.

   Refer to "Preparations for Setup" in the Installation and Setup Guide for Server for information on the preparatory tasks to be performed before creating an instance on the standby server.

   Note

   If the primary server and standby server are to be built within the same server, perform preparation to ensure that the event source names of FUJITSU Enterprise Postgres are not duplicated with that of the primary server.

2. When using transparent data encryption, configure the encryption settings for the storage data.

   Deploy a copy of the keystore file of the primary server on the standby server.

   Refer to "Database Multiplexing Mode" in the Operation Guide for details.

3. Execute the pg_basebackup command to create a copy of the primary server instance on the standby server.

   Example)

```
> pg_basebackup -D D:\database\inst1 -X fetch --waldir=E:\transaction\inst1 --progress --verbose
-R --dbname="application_name=standbyServerName" -h primaryServerIpAddress -p
primaryServerPortNumber
```

Note

- Use the pg_basebackup command with the -R option to create a standby.signal file. If you do not create the standby.signal file, the Mirroring Controller cannot be started as a standby server.
- If using a method that requires password authentication for connections to the primary server, you will need to ensure that authentication is performed automatically. If the -R option is specified for the pg_basebackup command and the password parameter is specified for the --dbname option, the pg_basebackup command will set the password in the primary_conninfo parameter in postgresql.auto.conf file, enabling connections to be performed automatically.

  If a password is not set in the primary_conninfo parameter in postgresql.auto.conf file, it will be necessary to create a password file (%APPDATA%postgresql\pgpass.conf), and then specify a password for the replication database.
- The primary_conninfo parameter should not be set in the postgresql.conf file, but only in the postgresql.auto.conf file using the pg_basebackup command.
- When executing the pg_basebackup command, consider the following for collection of transaction logs.
  - When "fetch" is specified for the -X option of the command

    Transaction logs are collected at the end of the backup, so it is necessary to ensure that transaction logs that occur during backup are not deleted from the primary server. Therefore, allow for a sufficient value for the wal_keep_size parameter in postgresql.conf.
  - When the -X option is omitted or "stream" is specified for the -X option of the command

    Transaction logs are streamed, so when Mirroring Controller is running on the primary server, the connection is changed to a synchronous standby server on detection of a streaming replication connection using this command. Therefore, if a job has started on the primary server, the primary server will be impacted, therefore execute this command after stopping only the Mirroring Controller process on the primary server.

See

Refer to "Hot Standby" in the PostgreSQL Documentation for information on the standby.signal file.

4. Set the parameters shown in the table below in the postgresql.conf file.

Table 2.5 Parameters

Parameter	Content specified	Remarks
synchronous_standby_names	'*primaryServerName*'	Required after switching the primary server and then changing the original primary server to the new standby server. Enclose the name in single quotation marks ('). Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.

5. Register an instance to the Windows service.

   Refer to "Creating an Instance" in the Installation and Setup Guide for Server for information on how to register an instance to the Windows service. Note that you should execute the pg_ctl command with the following specified for the register mode to enable Mirroring Controller to start and stop an instance:

   - For the service name of the -N option, specify the name set for the db_instance_service_name parameter in the server definition file
   - Specify "demand" for the -S option, so that the service does not start automatically on startup of the system

   Note

   - Do not configure the Windows service of a multiplexed instance to perform automatic start, as it is started by Mirroring Controller.
   - If the primary server and standby server are to be built within the same server, ensure that the registered service name of the FUJITSU Enterprise Postgres instance is not duplicated with that of the primary server.

2.5.3 Starting Mirroring Controller on the Standby Server

This section explains how to start Mirroring Controller on the standby server.

When the arbitration server is used for automatic degradation, start the Mirroring Controller arbitration process on the arbitration server in advance.

1. After ensuring that the Mirroring Controller process of the primary server has started, start Mirroring Controller on the standby server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -f option specified. This action enables automatic switch/disconnection.

   If you start Mirroring Controller and the instance without specifying the -f option, automatic switch/disconnection will not be enabled. To enable both, start Mirroring Controller and then execute the mc_ctl command in enable-failover mode or restart Mirroring Controller with the -f option specified.

   Example)

   ```
   > mc_ctl start -M D:\mcdir\inst1
   ```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

   ```
   > mc_ctl start -M D:\mcdir\inst1 -F
   ```

2. Check the status of the Mirroring Controller process.

   As the instance administrator user, execute the mc_ctl command in status mode. Ensure that "mirroring status" is switchable.

   Example)

   ```
   > mc_ctl status -M D:\mcdir\inst1
   ```

Note

- When the arbitration server is used for automatic degradation, the time required for the database server to connect to the arbitration server is added on. Therefore, Mirroring Controller startup may take longer than when the arbitration server is not used.
- If the parameter for heartbeat monitoring of operating systems or servers set by the abitration server is greater than parameter for heartbeat monitoring of operating systems and servers of the Mirroring Controller, the Mirroring Controller may fail to start. In this

case, check the contents of the message notification and review the parameters for heartbeat monitoring of operating systems or servers for the arbitration server or Mirroring Controller.

- If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - switch/disconnection is not performed.
- Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore, ensure that the admin network is connected before starting Mirroring Controller.

Point

- The mc_ctl command fails if the Mirroring Controller arbitration process has not been started on the arbitration server when the arbitration server is used for automatic degradation. However, if the Mirroring Controller arbitration process cannot be started in advance, it can be started by specifying the --async-connect-arbiter option in the mc_ctl command.
- After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

2.6 Creating a User Exit for a Database Server

This section explains how to create a user exit for a database server.

The user command types explained below can be used as user exits. These commands are called by Mirroring Controller management processes.

The user can create user exits as required.

Specify the user commands that were created for the parameters in the server configuration file of the database server. Refer to "A.4.1 Server Configuration File for the Database Servers" for information on these parameters.

User command types

- Fencing command

  This user command performs fencing if Mirroring Controller performs arbitration processing and determines that a database server is unstable.

- Arbitration command

  This user command performs arbitration processing in lieu of the arbitration server when there is no arbitration server.

- State transition commands

  These user commands are called when Mirroring Controller performs state transition of a database server.
  It includes the following types:

  - Post-switch command

    This user command is called after a promotion from standby server to primary server.

  - Pre-detach command

    This user command is called before the standby server is disconnected from a cluster system.
    If the pre-detach command is specified on both the primary server and standby server, it is called first on the standby server and then on the primary server.

    If the settings are configured to forcibly stop the instance on the standby server when the standby server is disconnected, the pre-detach command is called on the standby server and then the instance on the standby server is stopped.

- Post-attach command

  This user command is called after the standby server has been attached to a cluster system.
  If the post-attach command is specified on both the primary server and standby server, it is called first on the primary server and then on the standby server.

Point

When the arbitration server is used for automatic degradation and the requirements can be satisfied using the fencing command on the arbitration server only, the fencing command on the database server is not required. In addition, if the requirements can be satisfied using the fencing command on the database server only, create a fencing command on the arbitration server for termination processing only (without implementation).

Table 2.6 Availability of user commands, and database server calling the command

User command	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring				Database server calling the command	
	Message output	Automatic degradation by arbitration server	Automatic degradation by arbitration command	Unconditional automatic degradation	Primary server	Standby server
Fencing command	Y (*1)	Y (*2)	R	N	Y	Y
Arbitration command	N	N	R	N	Y	Y
Post-switch command	Y	Y	Y	Y	Y	N
Pre-detach command	Y	Y	Y	Y	Y	Y (*3)
Post-attach command	Y	Y	Y	Y	Y	Y (*3)

R: Required

Y: Can be used

N: Cannot be used

*1: Called only when the mc_ctl command is used to execute forced switching or forced disconnection.

*2: Creation of a fencing command on a database server is optional, but it must be created on the arbitration server.

*3: If message output or unconditional automatic degradation is selected, this command is called only from the primary server.

See

Refer to "Appendix C User Commands" for information on the interface for each user command.

2.7 Confirming the Streaming Replication Status

Before performing the setup of the database multiplexing mode, ensure that the prerequisite streaming replication feature has been set up correctly.

Perform the following procedure:

1. On the primary server, ensure that single-row searches can be performed using the pg_stat_replication statistics view.

   An example output of the psql command is shown below.

   ```
   Example)
   ```

```
postgres=# select * from pg_stat_replication;
-[ RECORD 1 ]----+------------------------------
pid              | 10651
usesysid         | 10
usename          | fsep
application_name | standby
client_addr      | 192.0.2.210
client_hostname  |
client_port      | 55098
backend_start    | 2020-03-23 11:17:49.628793+09
backend_xmin     |
state            | streaming
sent_lsn         | 0/3000060
write_lsn        | 0/3000060
flush_lsn        | 0/3000060
replay_lsn       | 0/3000060
write_lag        |
flush_lag        |
replay_lag       |
sync_priority    | 1
sync_state       | sync
reply_time       | 2020-03-23 11:23:27.703366+09
```

2. Confirm the search results of step 1.

   Ensure that the connection established with the intended standby server is in synchronous mode.

   Table 2.7 Items to be checked

Item	Required value
application_name	Value specified for synchronous_standby_names parameter in the postgresql.conf file of the primary server.
client_addr	IP address of the standby server.
state	"streaming".
sync_state	"sync".

See

- Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for information on the pg_stat_replication statistics view.
- Note that the pg_stat_replication statistics view may change in the future.

2.8 Checking the Connection Status

This section explains how to check the connection status from a database server or the arbitration server.

2.8.1 Checking the Connection Status on a Database Server

This section explains how to use a database server to check the connection status of the Mirroring Controller arbitration process and the Mirroring Controller process on the primary server and standby server.

Perform the following procedure:

1. On the primary server and standby server, execute the mc_ctl command in status mode with the --arbiter option specified.

   ```
   Example)
   The mc_ctl command is executed with the --arbiter option specified, and the status is output.
   ```

```
> mc_ctl status --arbiter -M D:\mcdir\inst1

arbiter_id   host            status
-------------------------------------
arbiter      192.0.3.120     online
```

2. On the primary server and standby server, check the result displayed by executing the mc_ctl command in status mode in step 1.

   Items to be checked

   Check that the output status" is "online".

See

Refer to the Reference for information on the mc_ctl command.

2.8.2 Checking the Connection Status on the Arbitration Server

This section explains how to use the arbitration server to check the connection status of the Mirroring Controller arbitration process and the Mirroring Controller process on the primary server and standby server.

Perform the following procedure:

1. Execute the mc_arb command in status mode on the arbitration server.

   The example below executes the mc_arb command, and shows the status.

   Linux

   Example)

```
$ mc_arb status -M /mcarb_dir/arbiter1

server_id    host            status
-------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

   Windows

   Example)

```
> mc_arb status -M D:\mcarb_dir\arbiter1

server_id    host            status
-------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

2. Check the result displayed by executing the mc_arb command in step 1.

   Items to be checked

   Check that the output status is "online" on both lines.

See

Refer to the Reference for information on the mc_arb command.

2.9 Creating Applications

This section explains how to create applications using database multiplexing, and points that should be noted when you create the applications.

2.9.1 Application Connection Server Settings

If database multiplexing is used and a failover occurs, it will be necessary to switch the application connection server. Accordingly, use the application connection switch feature to create applications.

Refer to "Application Connection Switch Feature" in the Application Development Guide for details.

2.10 Checking the Behavior

To check if the environment setup was performed correctly, start the application and then check the behavior of the switch and rebuild.

2.11 Tuning

This section explains how to tune database multiplexing mode.

2.11.1 Tuning to Stabilize the Database Multiplexing Mode

When large amounts of data are updated, the write-to load for the database will become great, and the multiplexing state may become unstable.

Accordingly, by editing the parameters below in the postgresql.conf file, a stable multiplexing state can be maintained. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on transaction log space requirements.

Table 2.8 Parameters

Parameter	Content
wal_keep_size	Refer to "2.4.2 Creating, Setting, and Registering the Primary Server Instance" for details.
max_wal_size	The transaction log is written out according to the checkpoint trigger. If a transaction log with the capacity of the value specified in this parameter is generated, the checkpoint will be executed. If a large value is specified in this parameter, the time required for crash recovery will increase. If a small value is specified in this parameter, many checkpoints will be generated, which will affect the performance of the applications that connect to the primary server.

2.11.2 Tuning to Stabilize Queries on the Standby Server

Queries made using reference jobs on the standby server may be canceled by jobs executed on the primary server.

To reduce the possibility of a job being canceled, specify as large a value as possible for the max_standby_archive_delay parameter in the postgresql.conf file.

- Refer to "Handling Query Conflicts" in the PostgreSQL Documentation for details.
- Refer to "Standby Servers" in the PostgreSQL Documentation for details on the max_standby_archive_delay parameter.

2.11.3 Tuning to Stabilize Queries on the Standby Server (when Performing Frequent Updates on the Primary Server)

If jobs are updated on the primary server regularly and frequently, it will be easy for the query made by the reference job on the standby server to be canceled. In this case, edit one of the postgresql.conf file parameters shown in the table below.

Table 2.9 Parameters

Parameter	Description
hot_standby_feedback	When "on" is set, the deletion (vacuum) of the data area that was deleted or updated on the primary server is suppressed. Accordingly, the query on the standby server will not be canceled. (*1)
vacuum_defer_cleanup_age	The deletion (vacuum) of the data area that was deleted or updated on the primary server is delayed until the specified number of transactions is processed. Accordingly, the probability that the query on the standby server will be canceled decreases.

*1: Because the vacuum is delayed, the data storage destination disk space of the primary server comes under pressure.
Additionally, if there is conflict between accesses and queries executed on the standby server, transaction logs indicating this conflict will be transferred.
Accordingly, specify as large a value as possible for the max_standby_archive_delay parameter so that access conflicts do not occur.

See

- Refer to "Standby Servers" in the PostgreSQL Documentation for details on the hot_standby_feedback parameter.
- Refer to "Master Server" in the PostgreSQL Documentation for details on the vacuum_defer_cleanup_age parameter.

2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring

Mirroring Controller uses a monitoring method that outputs an error if the timeout or number of retries is exceeded when accessing resources targeted for monitoring. Setting inappropriate values in these settings may lead to misdetection or a delay in automatic degradation, so you must design these values appropriately.

For example, the following type of issue occurs if the tuning related to abnormality monitoring is not performed appropriately.

- If the timeout is too short

  Results in redundant degradation and availability falls.

- If the timeout is too long

  It takes longer for automatic degradation to be performed even when an error affecting operational continuity occurs, potentially causing downtime.

You can optimize degrading operation by editing the values for the parameters in the server configuration file described below in accordance with the system. Refer to "A.4 Server Configuration File" for information on how to edit these parameters.

2.11.4.1 Tuning for Abnormality Monitoring of the Operating System or Server

Tuning for abnormal monitoring of the operating system or server depends on the operation when heartbeat abnormality is detected by the heartbeat monitoring of operating systems or servers.

See

Refer to "1.1.1 Monitoring Using Database Multiplexing Mode" for the operation when heartbeat abnormality is detected in the the heartbeat monitoring of operating systems or servers.

2.11.4.1.1 Tuning Abnormality Monitoring for Operations that Use an Arbitration Server for Automatic Degeneration

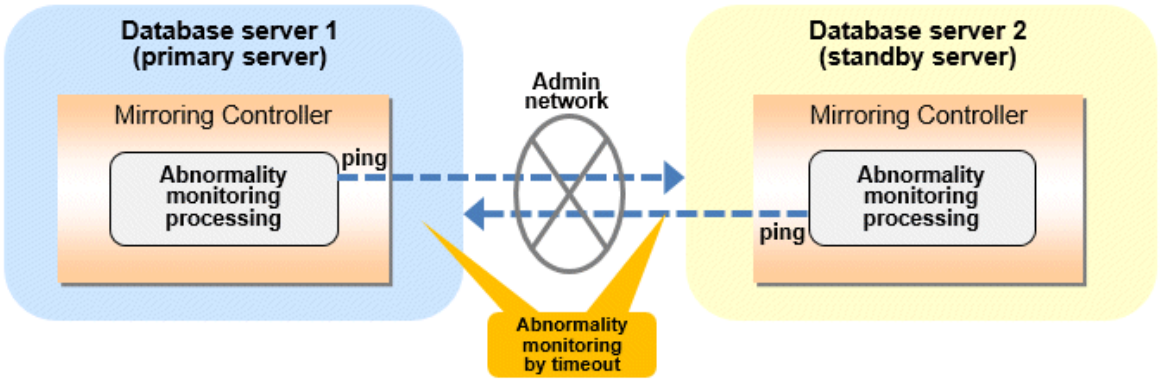
In an operation that use an arbitration server for automatic degeneration, the database server is periodically monitored for abnormalities so that the Mirroring Controller arbitration process can immediately respond to an arbitration request from the Mirroring Controller.The automatic degradation using the arbitration server can optimize the time from error detection to automatic degradation of the operating systems or servers by editing the following parameters.

- Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server
- Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file
- Parameters for the arbitration processing and fencing

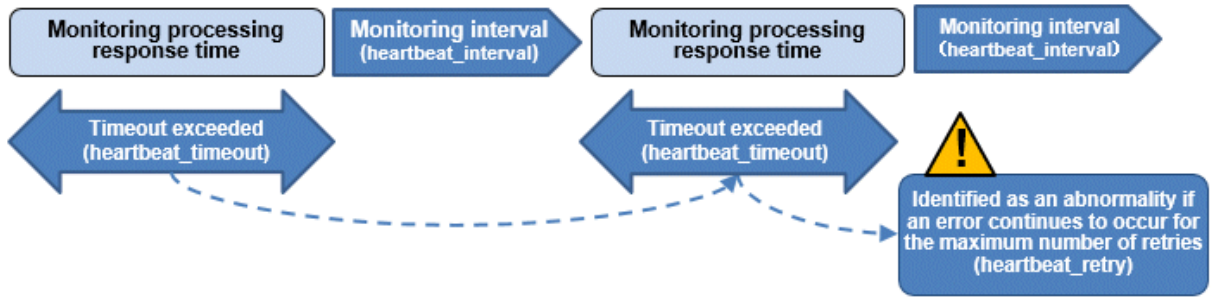
Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server

Table 2.10 Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server

Parameter	Description
Abnormality monitoring interval (heartbeat_interval)	Mirroring Controller is configured so that abnormality monitoring does not place a load on the system. This parameter does not normally need to be set. (The default is 800 milliseconds.)
Abnormality monitoring timeout (heartbeat_timeout)	Take into account the time during which a load is placed continuously on the server or admin network performance. For example, it is envisaged that this parameter will be used in situations such as when performing high-load batch jobs or when a large number of online jobs occur continuously and concurrently. (The default is 1 second.)
Abnormality monitoring retries (heartbeat_retry)	This parameter can be set when needing a safety value for situations in which the value specified for heartbeat_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is 2 times.)



Flow of abnormality monitoring by timeout



The expression for calculating the time required to detect an abnormality by Mirroring Controller is shown below.

```
Abnormality detection time of Mirroring Controller = ( heartbeat_timeout(seconds) +
heartbeat_interval(milliseconds) / 1000 ) x ( heartbeat_retry(number of times) + 1)
```

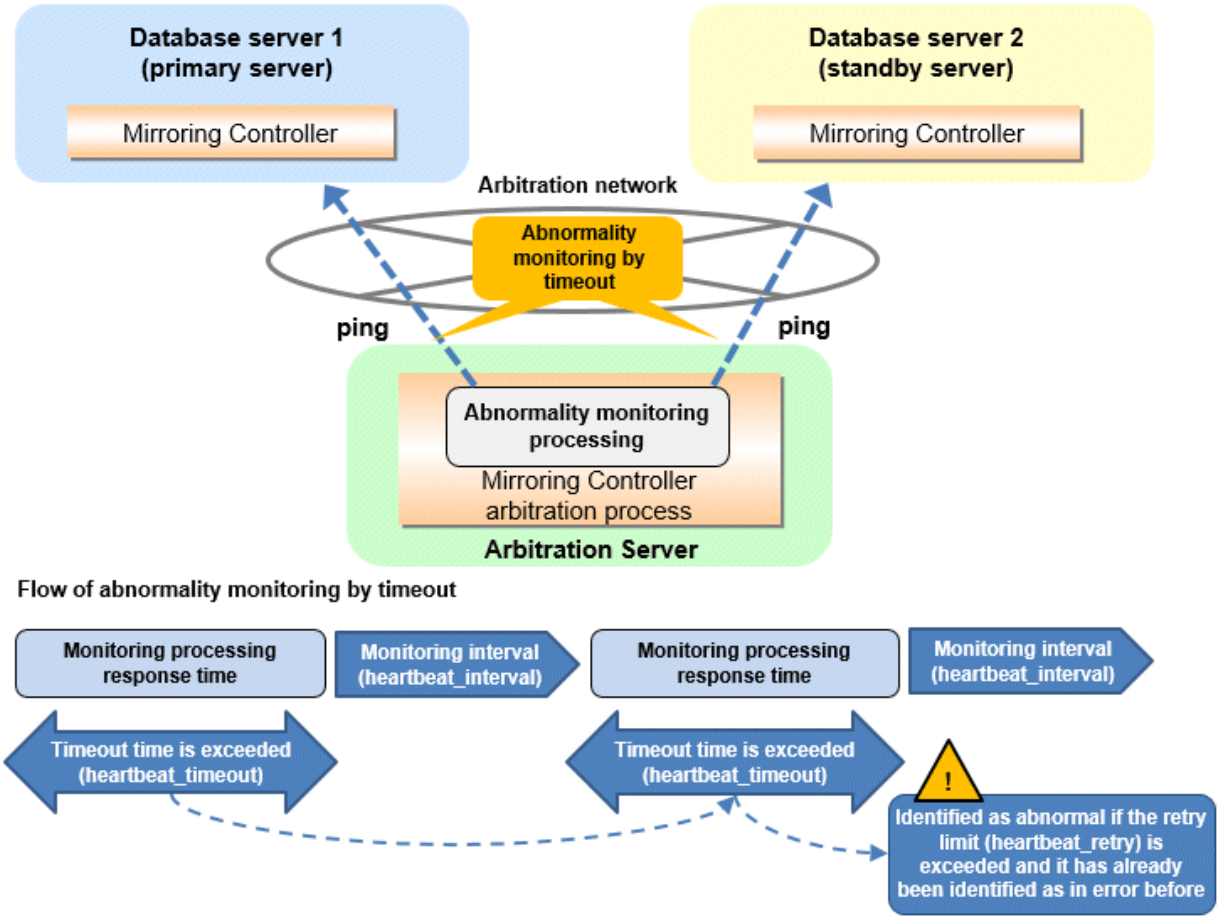
The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time of Mirroring Controller = ( 1 + 800 / 1000 ) x ( 2 + 1 )
            = 5.4(seconds)
```

Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file

Table 2.11 Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file

Parameter	Description
Abnormality monitoring interval (heartbeat_interval)	Mirroring Controller arbitration process is configured so that abnormality monitoring does not place a load on the system. This parameter does not normally need to be set. (The default is the value set in heartbeat_interval in the server configuration file of the database server.) (milliseconds).
Abnormality monitoring timeout (heartbeat_timeout)	Take into account the time during which a load is placed continuously on the server and arbitration network capabilities. (The default is the value set in heartbeat_timeout in the server configuration file of the database server.) (seconds).
Abnormality monitoring retries (heartbeat_retry)	This parameter can be set when needing a safety value for situations in which the value specified for heartbeat_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is the value set in heartbeat_retry in the server configuration file of the database server.) (number of times)



The expression for calculating the time required to detect an abnormality by Mirroring Controller arbitration process is shown below.

```
Abnormality detection time of Mirroring Controller arbitration process = ( heartbeat_timeout(seconds)
+ heartbeat_interval(milliseconds) / 1000 ) x ( heartbeat_retry(number of times) + 1)
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time of Mirroring Controller arbitration process = ( 1 + 800 / 1000 ) x ( 2 + 1 )
            = 5.4(seconds)
```

Point

The abnormality detection time of the operation for automatic degradation using the arbitration server can be calculated as follows.

```
Abnormality detection time = Max(Abnormality detection time by Mirroring Controller, Abnormality
detection time by Mirroring Controller arbitration process)
```

Note

If the heartbeat_interval is set in the arbitration configuration file, the relationship between the parameter for operating system or server abnormality monitoring specified in the server configuration file of the database server file and the heartbeat_interval of the arbitration configuration file must satisfy the following relational expression.

```
 Heartbeat_interval in the arbitration configuration file (milliseconds) / 1000 ) <
( heartbeat_timeout(seconds) + heartbeat_interval(milliseconds) / 1000 ) * heartbeat_retry(number of
times) + heartbeat_timeout(seconds)
```

Parameters for the arbitration processing and fencing

Table 2.12 Parameters for the arbitration processing and fencing

Parameter	Description
Arbitration processing timeout (arbitration_timeout in the server configuration file of the database server)	Take into account the time to perform arbitration processing on the Mirroring Controller arbitration process. The value must be greater than or equal to abnormality detection time of Mirroring Controller arbitration process + fencing_command_timeout in the arbitration configuration file (seconds).
Fencing timeout (fencing_command_timeout in the arbitration configuration file)	Take into account the time to execute the fencing command (seconds).

Flow from the abnormality detection to the automatic degeneracy

When performing automatic degradation using the arbitration server, the flow from the abnormality detection in the operating system or server to the occurrence of automatic degeneracy and the parameters is shown below.

<table>
<tr><th>Flow from the abnormality detection to the automatic degeneracy</th><th>Description</th><th colspan="2">Parameter</th></tr>
<tr><td>(1) Abnormality detection</td><td>Mirroring Controller detect the database server operating system or server errors.</td><td colspan="2">Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server</td></tr>
<tr><td>(2) Arbitration request</td><td>Mirroring Controller that detect the operating system or server error asks the Arbitration Server to check the status of the other server's operating system or server.</td><td>-</td><td rowspan="3">arbitration_timeout in the server configuration file of the database server</td></tr>
<tr><td>(3) Arbitration processing</td><td>The Mirroring Controller arbitration process checks the status of the other server's operating system or server. However, if the result of the operating system or server abnormality monitoring by the arbitration server has been determined before the arbitration request from the Mirroring Controller of the database server, this process is not performed.</td><td>Parameters for the abnormality monitoring of the operating system or server in the arbitration configuration file</td></tr>
<tr><td>(4) Fencing</td><td>If the Mirroring Controller arbitration process determines that the other server is an abnomaly of the operating system or server, it fences the other server and isolates it from the cluster system. If the Mirroring Controller arbitration process determines that the operating system or server status is normal, this process and the (6) are not performed.</td><td>fencing_command_timeout in the arbitration configuration file</td></tr>
<tr><td>(5) Return of the arbitration results</td><td>Returns the results of the arbitration to the Mirroring Controller of the database server that requested the arbitration.</td><td colspan="2">-</td></tr>
</table>

Flow from the abnormality detection to the automatic degeneracy	Description	Parameter
(6) Automatic degradation	The automatic degradation is performed. If fencing fails in (4), this procedure is not performed.	-

-: No associated parameters

Note

If the fencing_command parameter is specified in the server configuration file of the database server, the fencing command is invoked on the database server if fencing is successful on the arbitration server. In that case, add the value of the fencing_command_timeout parameter in the server configuration file of the database server to the estimate.

Figure 2.1 When the Mirroring Controller on the primary server detects an operating system or server error

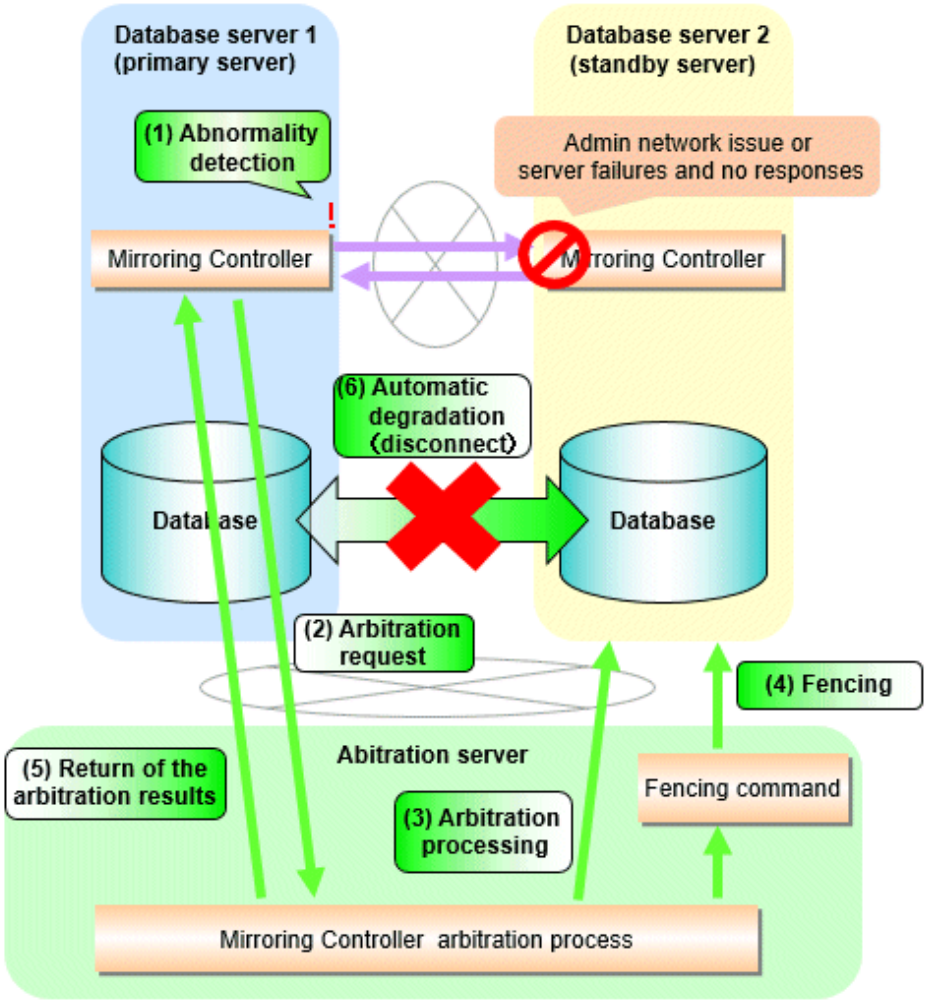
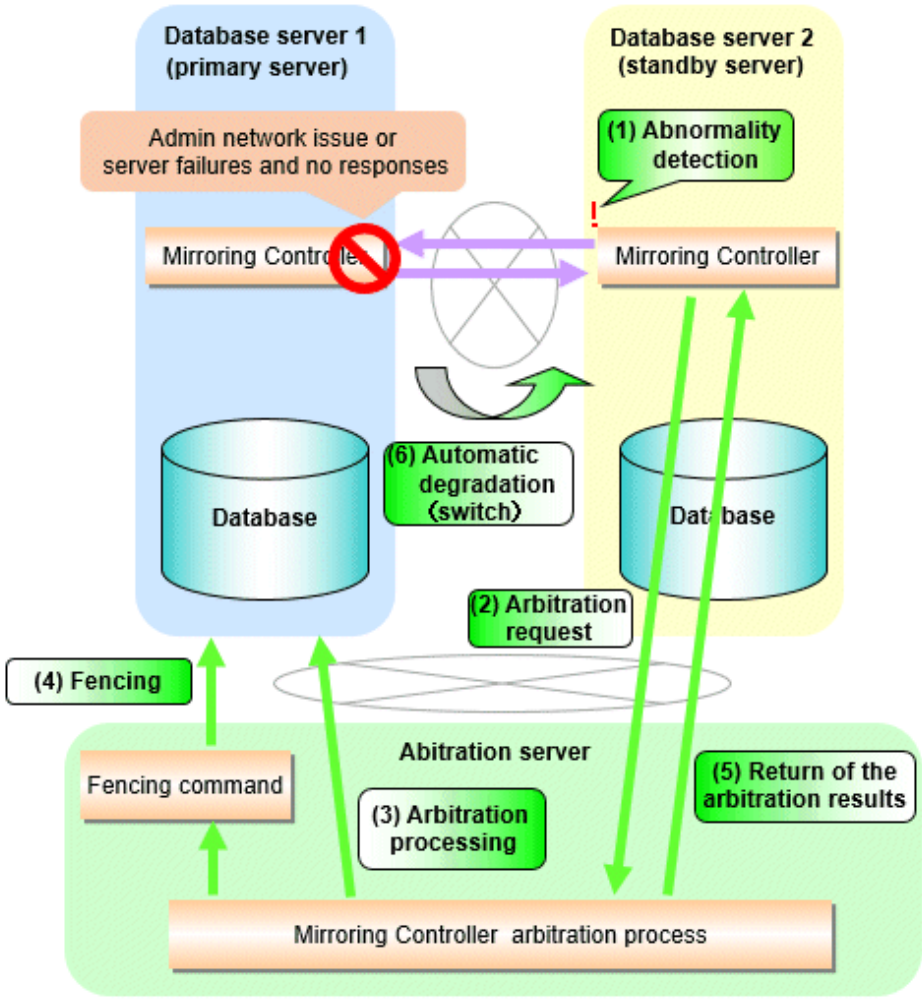


Figure 2.2 When the Mirroring Controller on the standby server detects an operating system or server error



2.11.4.1.2 Tuning Abnormality Monitoring for Operations that Perform Automatic Degeneration by Calling a User Exit that Determines Degeneration

In an operation that perform automatic degeneration by calling a user exit that determines degeneration, you can optimize the time from operating system or server abnormality detection to automatic degradation by editing the operating system or server abnormality monitoring parameters and parameters related to arbitration processing and fencing in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server.

Table 2.13 Parameters for the arbitration processing and fencing

Parameter	Description
Arbitration processing timeout (arbitration_command_timeout)	Take into account the time to execute the arbitration command(seconds).
Fencing timeout (fencing_command_timeout)	Take into account the time to execute the fencing command (seconds).

Flow from the abnormality detection to the automatic degeneracy

When performing automatic degradation by calling a user exit that determines degeneration, the flow from the abnormality detection in the operating system or server to the occurrence of automatic degeneracy and the parameters is shown below.

Flow from the abnormality detection to the automatic degeneracy	Description	Parameter
(1) Abnormality detection	Mirroring Controller detect the database server operating system or server errors.	Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server
(2) Arbitration processing	An arbitration command is executed to check the status of the other server's operating system or server.	arbitration_command_timeout in the server configuration file of the database server
(3) Fencing	If the operating system or server status of the other server is abnomal in (2), it fences the other server and isolates it from the cluster system. If the operating system or server status of the other server is nomal in (2), this process and (4) are not executed.	fencing_command_timeout in the server configuration file of the database server
(4) Automatic degradation	The automatic degradation is performed. If fencing fails in (3), this procedure is not performed.	-

-: No associated parameters

Figure 2.3 When the Mirroring Controller on the primary server detects an operating system or server error

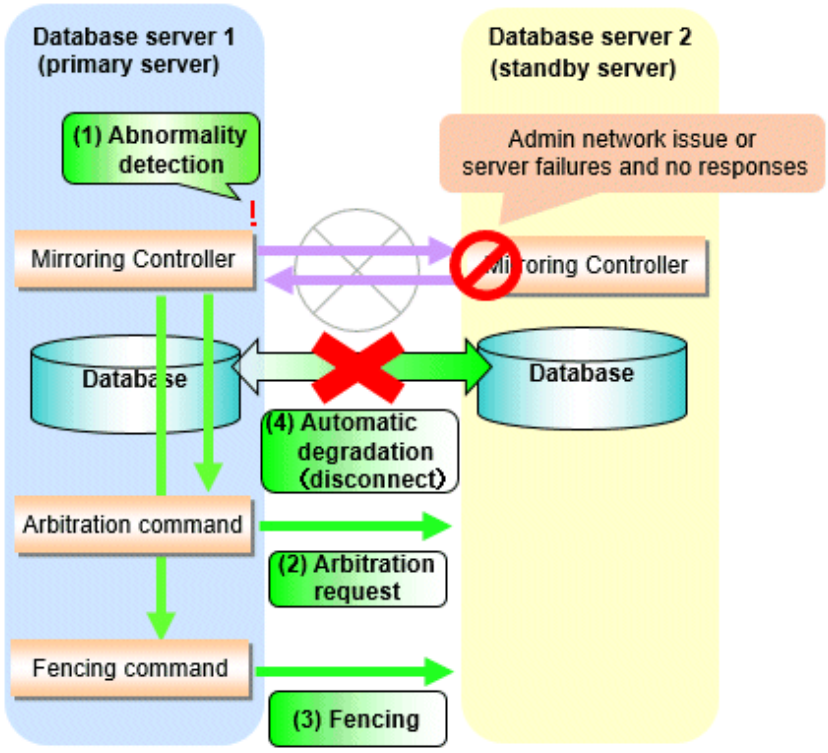
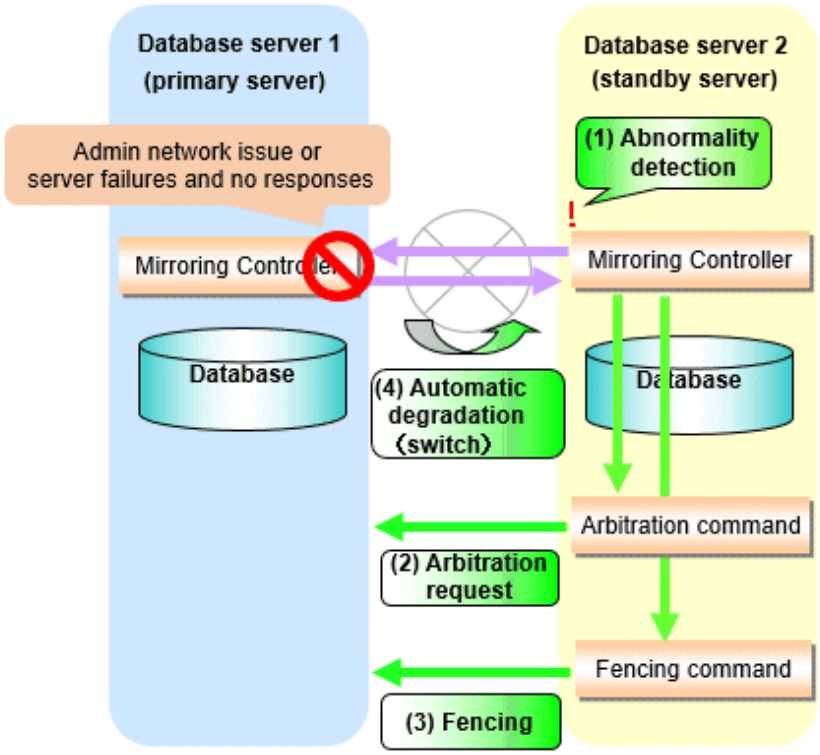


Figure 2.4 When the Mirroring Controller on the standby server detects an operating system or server error



2.11.4.1.3 Tuning Abnormality Monitoring for Operations that Notify Messages

In an operation that notify messages, you can optimize the abnormality detection time by editing the operating system or server abnormality monitoring parameters in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server. In addition, when the Mirroring Controller detects an error, it does not perform the arbitration processing, fencing, or automatic degradation, but only notification messages is performed.

2.11.4.1.4 Tuning Abnormality Monitoring for Operations that Perform Automatic Degenerate Unconditionally due to Heartbeat Abnormality

In an operation that perform automatic degenerate unconditionally due to heartbeat abnormality, you can optimize the time from operating system or server abnormality detection to automatic degradation by editing the operating system or server abnormality monitoring parameters in the server configuration file of the database server. Refer to "Parameters for the abnormality monitoring of the operating system or server in the server configuration file of the database server" for information on the operating system or server abnormality monitoring parameters in the server configuration file of the database server. In addition, when the Mirroring Controller detects an error, it does not perform the arbitration processing, fencing, or automatic degradation, but only automatic degenerate unconditionally is performed.

Note

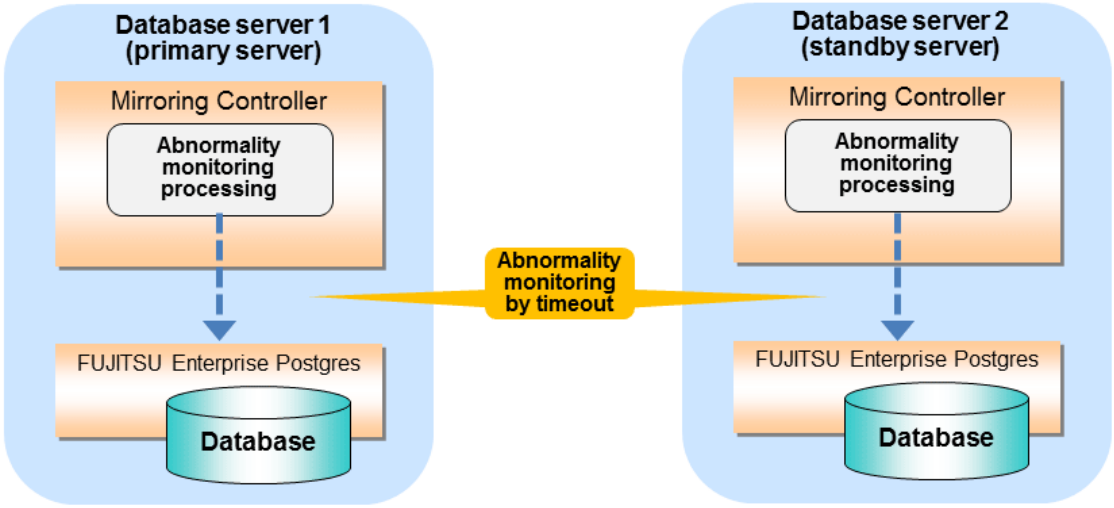
Refer to "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" for notes on the operation that perform automatic degenerate unconditionally due to heartbeat abnormality.

2.11.4.2 Tuning for Abnormality Monitoring of Darabase Processes

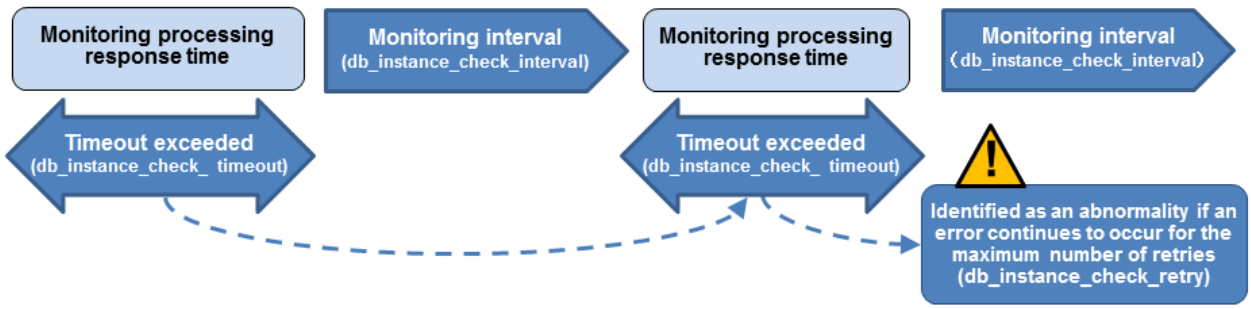
In an abnormality monitoring of database pocesses, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.14 Parameters for abnormality monitoring of database processes

Parameter	Description
Abnormality monitoring interval (db_instance_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Timeout for abnormality monitoring of database processes (db_instance_check_timeout)	Take into account the time during which a load is placed continuously on the database. For example, it is envisaged that this parameter will be used in situations such as when performing high-load batch jobs or when a large number of online jobs occur continuously and concurrently. (The default is the value set in heartbeat_timeout.) (seconds)
Abnormality monitoring retries (db_instance_check_retry)	This parameter can be set when needing a safety value for situations in which the value specified for db_instance_check_timeout is exceeded, for example, when using systems with fluctuating loads, however, this parameter does not normally need to be set. (The default is the value set in heartbeat_retry.) (number of times)



Flow of abnormality monitoring by timeout



The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = ( db_instance_check_timeout(seconds) +
db_instance_check_interval(milliseconds) / 1000 ) x ( db_instance_check_retry(number of times) + 1 )
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time = ( 1 + 800 / 1000 ) x ( 2 + 1 )
             = 5.4(seconds)
```

Note

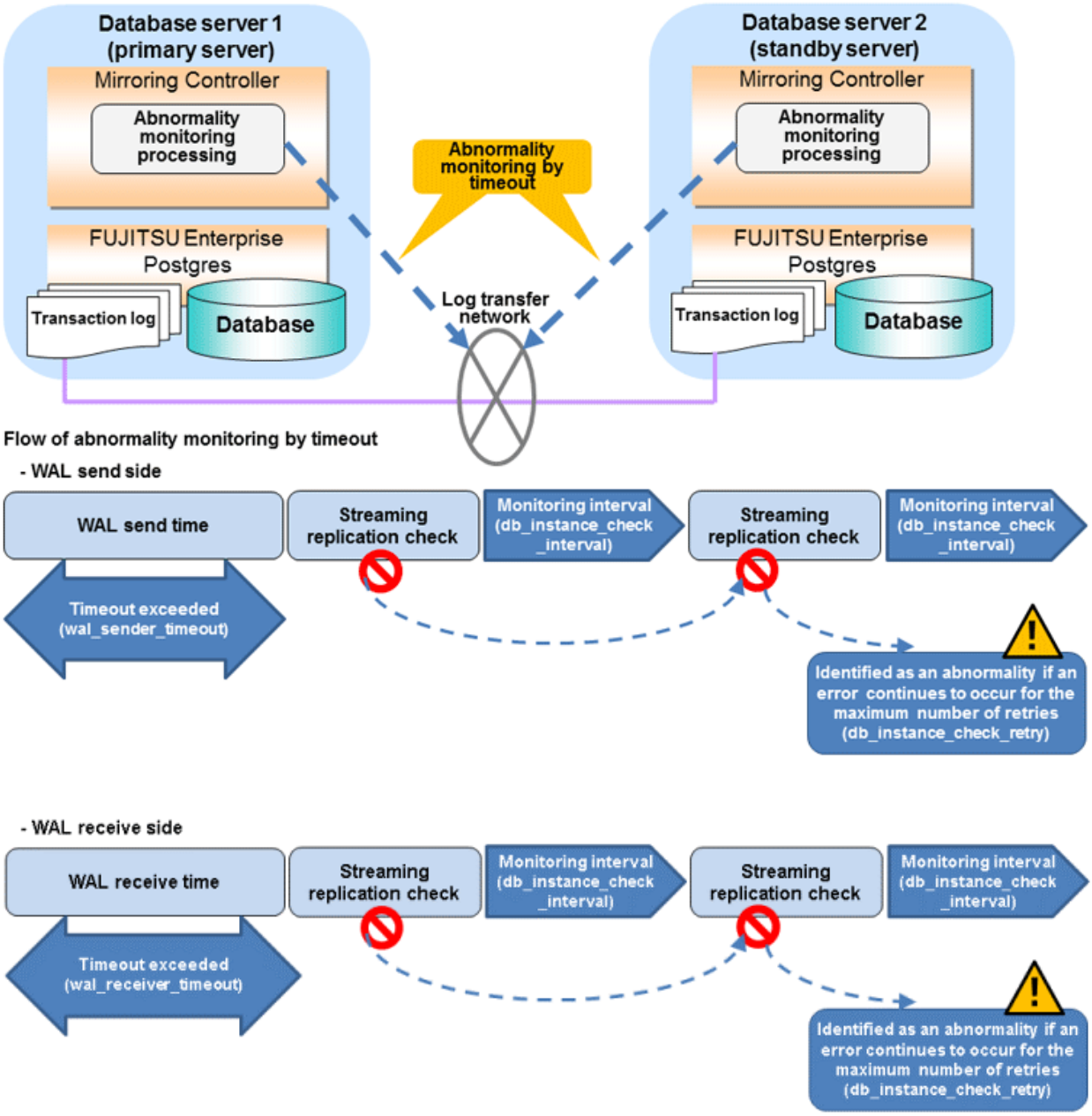
- If the db_instance_timeout_action parameter in *serverIdentifier*.conf is set to "message", and the db_instance_check_timeout parameter is set to a short value, a crash of the database process will be detected as "no response", and it may take time for automatic degradation to occur. Therefore, specify an appropriate timeout for db_instance_check_timeout.
- If a high load on the database and an event that prevents connection to an instance occur at the same time, it is judged as abnormal without retrying monitoring.

2.11.4.3 Tuning for Abnormality Monitoring of Streaming Replication

In an abnormality monitoring of streaming replication, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.15 Parameters for abnormality monitoring of streaming replication

Parameter	Description
Abnormality monitoring interval (db_instance_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Abnormality monitoring retries (db_instance_check_retry)	This parameter can be set when needing a safety value, such as when it is anticipated that a temporary log transfer LAN error may occur, but it does not normally need to be set. (The default is the value set in heartbeat_retry.) (number of times)
Timeout for abnormality monitoring of streaming replication (wal_sender_timeout and wal_receiver_timeout in postgresql.conf)	Take into account the capacity and load of the log transfer network and the time during which a load is placed continuously on the database. For example, if there is a succession of data update jobs that generate a high WAL volume, you must configure the settings to avoid misdetection. (The default is 60 seconds.)



The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = ( wal_sender_timeout(seconds) +
db_instance_check_interval(milliseconds) / 1000 x ( disk_check_retry(number of times) + 1 ) )  Or,
            = ( wal_receiver_timeout(seconds) + db_instance_check_interval(milliseconds) / 1000 x
( disk_check_retry(number of times) + 1 ) )
```

The abnormality detection time when the default value is used is shown below.

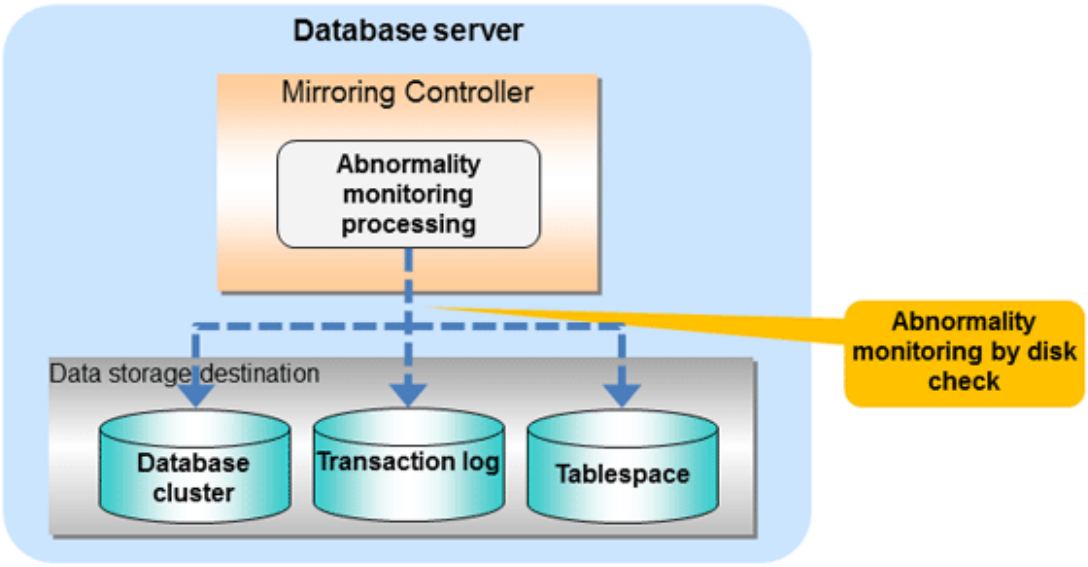
```
Abnormality detection time = 60 + (800 / 1000 x (2 + 1))
            = 62.4(seconds)
```

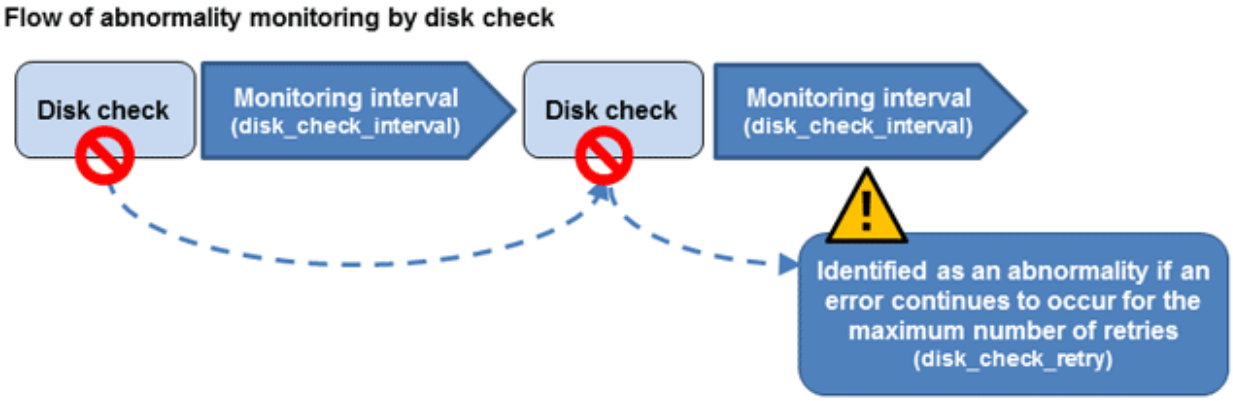
2.11.4.4 Tuning for Disk Abnormality Monitoring

In an abnormality monitoring of the disk, you can optimize by editing the following parameters in the server configuration file of the database server.

Table 2.16 Parameters for disk abnormality monitoring

Parameter	Description
Abnormality monitoring interval (disk_check_interval)	Abnormality monitoring by Mirroring Controller is set so as not to place load on the system, but normally it does not need to be set. (The default is the value set in heartbeat_interval.) (milliseconds)
Abnormality monitoring retries (disk_check_retry)	This parameter can be set when needing a safety value, such as when it is anticipated that a temporary disk input/output error may occur, but normally it does not need to be set. (The default is the value set in heartbeat_retry.) (number of times)





The expression for calculating the time required to detect an abnormality is shown below.

```
Abnormality detection time = disk_check_interval (milliseconds) / 1000 x ( disk_check_retry(number of times) + 1 )
```

The abnormality detection time when the default value is used is shown below.

```
Abnormality detection time = 800 / 1000  x ( 2 + 1 )
            = 2.4(seconds)
```

Note

- The tuning described above impacts on the time taken from detection of a timeout until switching the primary server. Therefore, modify the values while taking into account the switch/disconnection time, using a design for which misdetection does not occur.
- Immediately selecting automatic degradation when a heartbeat abnormality occurs in operating system or server heartbeat monitoring risks causing split brain. Refer to "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" for details.

Information

Mirroring Controller uses connections to database instances and SQL access to monitor abnormality in some resources targeted for monitoring. The connection destination database names and connection user names used for abnormality monitoring conform to the parameters in the server configuration file. The application name is "mc_agent".

2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances

Multiplexed instances and Mirroring Controller can be started and stopped automatically in line with the starting and stopping of the operating system of the database server.

However, to stop the operating system on the primary server, it is necessary to stop the operating system on the standby server so that no unnecessary automatic switching or errors occur.

Note

To guarantee the startup sequence of Mirroring Controller on the primary and standby servers, first confirm that the primary server has started, and then start the standby servers in sequence.

The startup sequence of the Mirroring Controller process on the database server and the Mirroring Controller arbitration process on the arbitration server is not guaranteed. If the arbitration server cannot be started first, execute the mc_ctl command in start mode with the --async-connect-arbiter option specified to start the Mirroring Controller process.

You can configure the Windows service to perform automatic start and stop of Mirroring Controller.

Setting automatic start and stop of a multiplexed instance

No settings are required for Mirroring Controller to start and stop an instance.

Note

Do not configure the Windows service of a multiplexed instance to perform automatic start.

Configuring automatic start and stop for database multiplexing mode

Configuring during setup

When registering Mirroring Controller to the Windows service in "2.4.1 Setting Up Database Multiplexing Mode on the Primary Server" and "2.5.1 Setting Up Database Multiplexing Mode on the Standby Server", specify "auto" for the -S option of the register mode used with the mc_ctl command.

```
Example)
```

```
> mc_ctl register -M D:\mcdir\inst1 -P ******** -S auto
```

Changing the configuration after setup

Use the sc config command to change the configuration of the Windows service of Mirroring Controller.

Example)
The following is an example using the registered service name "Mirroring_Controller_inst1".

```
> sc config "Mirroring_Controller_inst1" start= auto
```

See

Refer to documentation such as Windows Help and Support for the sc command for information on how to configure the service.

Information

You can check the registration status in the Windows service window or by using the sc qc command.

2.13 Setting Automatic Start and Stop of the Mirroring Controller Arbitration Process

You can automatically start or stop the Mirroring Controller arbitration process when the operating system on the arbitration server is started or stopped.

Linux

Note

If you start the Mirroring Controller arbitration process, wait for time correction, network setup, and so on.

Perform the following procedure:

1. Create a unit file.

   Copy the unit file sample stored in the directory below, and revise it to match the target instance.

   Sample file

   ```
   /installDir/share/mcarboi.service.sample
   ```

   Example)
   In the following example, the installation directory is "/opt/fsepv<x>assistant", and the identifier of the arbitration process is "arbiter1". Note that "<x>" indicates the product version.

   ```
   # cp /opt/fsepv<x>assistant/share/mcarboi.service.sample /usr/lib/systemd/system/
   mcarboi_arbiter1.service
   ```

   Revise the underlined portions of the options below in the unit file.

Section	Option	Specified value	Description
Unit	Description	FUJITSU Enterprise Postgres Mirroring Controller Arbiter <*arbitrationProcessId*>	Specifies the feature overview. Specifies the identifier of the targeted arbitration process. (*1)
Service	ExecStart	/bin/bash -c '*installDir*/bin/mc_arb_std start *installDir mirroringControllerArbitrationProcessMgmtDir mc_arbOption*'	Command to be executed when the service is started.

Section	Option	Specified value	Description
			Specify the option you want to add when the mc_arb command is executed without the -M option in the mc_arb option. Note that the content specified in this mc_arb option is carried over from the mc_arb_std command in "Specified value" to the mc_arb command.
	ExecStop	/bin/bash -c '*installDir*/bin/ mc_arb_std stop *installDir mirroringControllerArbitrationProcessMgmtDir mc_arbOption*'	Command to be executed when the service is stopped. Specify the option you want to add when the mc_arb command is executed without the -M option in the mc_arb option. Note that the content specified in this mc_arb option is carried over from the mc_arb_std command in "Specified value" to the mc_arb command.
	User	User	Specify the account of the operating system user.
	Group	Group	Specify the group to which the user belongs.

*1: The arbitration process identifier used here is a name for identifying the Mirroring Controller arbitration process.

The naming conventions for identifying the Mirroring Controller arbitration process are as follows:

- Up to 16 bytes
- The first character must be an ASCII alphabetic character
- The other characters must be ASCII alphanumeric characters

2. Enable automatic start and stop.

   As the operating system superuser, use the systemctl command to enable automatic start and stop.

   Example)

```
# systemctl enable mcarboi_arbiter1.service
```

Windows

You can configure the Windows service to perform automatic start and stop.

Configuring during setup

When registering the Mirroring Controller arbitration process as a Windows service in "2.3.1 Configuring the Arbitration Server", specify "auto" for the -S option of the register mode used with the mc_arb command.

Example)

```
> mc_arb register -M D:\mcdir\inst1 -P ******** -S auto
```

Changing the configuration after setup

Use the sc config command to change the configuration of the Windows service of the Mirroring Controller arbitration process.

Example)
The configuration of the registered service name "Mirroring_Controller_Arbiter1" is changed.

```
> sc config "Mirroring_Controller_Arbiter1" start= auto
```

See

Refer to sc command help for information on how to configure the service.

Information

You can check the registration status in the Windows service window or by using the sc qc command.

2.14 Backup Operation

This section explains the backup operation for database multiplexing mode.

2.14.1 Backing up Database Multiplexing Mode Information

When changing the Mirroring Controller settings, in addition to backing up the database, back up the configuration file in the Mirroring Controller management directory so that the Mirroring Controller settings are not lost.

When the arbitration server is used for automatic degradation, also back up the configuration file in the Mirroring Controller arbitration process management directory.

2.14.2 Database Backup Operation

Using database multiplexing mode is the same as obtaining the backup data on the standby server as a safeguard against a disk failure. Note that all server disks may be corrupted due to some cause.

As a safeguard against this type of case, execute the pgx_dmpall command on the primary server to create the backup data.

However, it is not definite as to which server runs as the primary server, so ensure that the pgx_dmpall command is executed periodically on all servers, so that the backup data will be obtained. For example, create a script to obtain the backup data, and set it in the operation management software.

Point

When the pgx_dmpall command is executed on the standby server, it will not match the statuses, however the error message shown below will be output and return the value "1".

If a script that ignores only this type of error is executed on all servers, the backup data of the primary server can be obtained.

Error message

```
ERROR:recovery is in progress (10095)
```

Note

- Consider the possibility that the server that runs as the primary server may be destroyed alongside the backup data, so it is recommended to promote another server to become the primary server, and then back up the data on the new primary server without waiting for the next scheduled backup.
- Specify the same backup directory name for the primary and standby servers. If different backup directory names are specified, and recovery is performed using the backup data of the other server, the recovery cannot be performed correctly.

See

- Period backups allow shorter recovery time and reduction in disk usage. Refer to "Backing Up the Database" in the Operation Guide for details on the backup operation.
- Refer to "Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode" for details on recovery based on the backup data that was obtained using the pgx_dmpall command.

Chapter 3 Operations in Database Multiplexing Mode

This chapter describes the periodic operations that are performed when running database multiplexing mode.

The periodic operations are the same as the operations on a single server.

See

Refer to "Periodic Operations" in the Operation Guide for information on the periodic operations.

3.1 Starting and Stopping the Mirroring Controller Arbitration Process

This section describes how to start and stop the Mirroring Controller arbitration process.

3.1.1 Starting the Mirroring Controller Arbitration Process

Linux

While the Mirroring Controller arbitration process is in a stopped state, execute the mc_arb command in start mode to start the Mirroring Controller arbitration process.

```
Example)
```

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Windows

The Mirroring Controller arbitration process can be started using one of the following options:

- Using the mc_arb command
- Starting the service on system startup

Using the mc_arb command

While the Mirroring Controller arbitration process is in a stopped state, execute the mc_arb command from the command prompt to start the Mirroring Controller arbitration process.

```
Example)
```

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

Starting the service on system startup

Specify automatic start when registering the Mirroring Controller arbitration process to the Windows service during setup of database multiplexing mode. Accordingly, the Mirroring Controller arbitration process service will start on startup of the operating system.

See

Refer to the Reference for information on how to specify the mc_arb command.

3.1.2 Stopping the Mirroring Controller Arbitration Process

Linux

While the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

```
Example)

$ mc_arb stop -M /mcarb_dir/arbiter1
```

Windows

The Mirroring Controller arbitration process can be stopped using one of the following options:

- Using the mc_arb command
- Stopping the service

Using the mc_arb command

While the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode from the command prompt to stop the Mirroring Controller arbitration process.

```
Example)

> mc_arb stop -M D:\mcarb_dir\arbiter1
```

Stopping the service

Select [Administrative Tools], then [Services] to open the [Services] window, and then select the Mirroring Controller service and click the [Stop] menu.

See

Refer to the Reference for information on how to specify the mc_arb command.

Note

- The arbitration server will be forcibly stopped when the service is stopped.
- Before shutting down the operating system on the arbitration server, either stop the Mirroring Controller on the primary server or standby server or shut down the operating system on the primary server or standby server.

3.2 Starting and Stopping Mirroring Controller

This section describes how to start and stop the Mirroring Controller.

3.2.1 Starting Mirroring Controller

Mirroring Controller can be started using one of the following:

- Using the mc_ctl command
- Starting a service on system startup

Note

Mirroring Controller must be started by a user with administrator privileges (user ID belonging to the Administrators group).

Using the mc_ctl command

While Mirroring Controller is in a stopped state, execute the mc_ctl command from the command prompt to start the instance and Mirroring Controller.

Enabling automatic switch/disconnection

Execute the mc_ctl command in start mode.

Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

Disabling automatic switch/disconnection

Execute the mc_ctl command in start mode with the -F option specified.

Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Point

- To start the Mirroring Controller process only, execute the mc_ctl command in start mode with the --mc-only option specified.
- After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.
- When the arbitration server is used for automatic degradation, the Mirroring Controller process startup fails on the database server if the Mirroring Controller arbitration process has not been started on the arbitration server in advance. However, even if the Mirroring Controller arbitration process cannot be started in advance, the Mirroring Controller process can be started by specifying the --async-connect-arbiter option in the mc_ctl command.

See

Refer to the Command Reference for information on how to specify the mc_ctl command.

Starting a service on system startup

Specify automatic start when registering Mirroring Controller to the Windows service during setup of database multiplexing mode. Accordingly, the Mirroring Controller service will start on startup of the operating system.

See

Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for details.

Note

- Mirroring Controller startup usually fails if the standby server is mistakenly started as the primary server or if the old primary server is not recovered after the switch and is then mistakenly started as the primary server. However, if the admin network is disconnected, then startup does not fail, and both servers may become primary servers. Therefore, ensure that the admin network is connected before starting Mirroring Controller.
- When only the instance is started without starting Mirroring Controller, the impact will be as follows:
  - Enabling automatic switch/disconnection

    Features such as automatic switch and automatic disconnection will not work until Mirroring Controller is started.

- Disabling automatic switch/disconnection

  Errors indicated in "1.1 What is Database Multiplexing Mode" will not be detected until Mirroring Controller is started.

3.2.2 Stopping Mirroring Controller

Mirroring Controller can be stopped using one of the following ways:

- Using the mc_ctl command
- Stopping the service

Note

Mirroring Controller must be stopped by a user with administrator privileges (user ID belonging to the Administrators group).

Using the mc_ctl command

While Mirroring Controller is running, execute the mc_ctl command from the command prompt in stop mode to stop Mirroring Controller.

```
Example)
```

```
> mc_ctl stop -M D:\mcdir\inst1
```

Point

To stop the Mirroring Controller process only, execute the mc_ctl command in stop mode with the --mc-only option specified.

See

Refer to the Command Reference for information on how to specify the mc_ctl command.

Stopping the service

Select [Administrative Tools], then [Services] to open the [Services] window, and then select the Mirroring Controller service and click the [Stop] menu.

Note

- To prevent an unintended automatic switch, before shutting down the operating system on the primary server, you must stop the Mirroring Controller, or shut down the operating system on the standby server.
- If you stop the Mirroring Controller by stopping the service, you must firstly exit all applications or programs that are using the instance that is to be stopped.
- When only the instance is stopped without stopping Mirroring Controller, the impact will be as follows:
  - Enabling automatic switch/disconnection

    Mirroring Controller determines that an error has occurred in the instance, and performs an unnecessary automatic switch. Automatic switch may also stop working correctly in some cases.
  - Disabling automatic switch/disconnection

    Mirroring Controller determines that an error has occurred in the instance, and outputs an error to the event log.

3.3 Checking the Database Multiplexing Mode Status

3.3.1 Checking the Status of the Database Server

This section describes how to check the status of the database server.

Check the multiplexed database status by executing the mc_ctl command in status mode.

Additionally, errors can be detected by monitoring the Mirroring Controller messages. If the status or messages are monitored periodically, you can react quickly following an automatic switch failure.

Checking the status of the multiplexing database

When the mc_ctl command is executed, the details of the multiplexing configuration, information about whether switch is possible following the error, and location and details of the error that caused the switch or disconnection are displayed.

After starting database multiplexing mode, execute the mc_ctl command in status mode to check the multiplexing status.

An example of the status displayed when the mc_ctl command is executed is shown below.

Example)

```
> mc_ctl status -M D:\mcdir\inst1

mirroring status
----------------
switchable
server_id  host_role       host            host_status  db_proc_status       disk_status
-------------------------------------------------------------------------------------------------
----
server1    primary         192.0.2.100     normal       normal                 normal
server2    standby         192.0.2.110     normal       normal                 normal
```

Checking the status of connection to the Mirroring Controller arbitration process

When the arbitration server is used for automatic degradation, the status of the connection to the Mirroring Controller arbitration process can be checked by specifying the --arbiter option. If the output status is "online", it indicates that an arbitration request can be made from the database server to the arbitration server. When the arbitration server is used for automatic degradation, regularly execute the command in status mode with the --arbiter option specified and check that the output status is "online".

Example)
The mc_ctl command is executed with the --arbiter option specified, and the status is output.

```
> mc_ctl status --arbiter -M D:\mcdir\inst1

arbiter_id   host            status
-------------------------------------
arbiter      192.0.3.120     online
```

Checking the status of data synchronization

Additionally, by referencing the pg_stat_replication statistics view on the primary server, the data synchronization status can be confirmed. However, when creating the monitoring program, note that the content of pg_stat_replication may be changed in the future.

The following example shows that the locations of the transaction log after it is sent and received (sent_lsn, replay_lsn) match, and that they are fully synchronized.

Example)

```
postgres=# select * from pg_stat_replication;
-[ RECORD 1 ]----+------------------------------
pid              | 10651
usesysid         | 10
usename          | fsep
```

```
application_name | standby
client_addr      | 192.0.2.210
client_hostname  |
client_port      | 55098
backend_start    | 2020-03-23 11:17:49.628793+09
backend_xmin     |
state            | streaming
sent_lsn         | 0/3000060
write_lsn        | 0/3000060
flush_lsn        | 0/3000060
replay_lsn       | 0/3000060
write_lag        |
flush_lag        |
replay_lag       |
sync_priority    | 1
sync_state       | sync
reply_time       | 2020-03-23 11:23:27.703366+09
```

See

- Refer to "mc_ctl" in Reference for information on the command.
- Refer to "Notes on Application Compatibility" in the Application Development Guide for information on retaining application compatibility.
- Refer to "The Statistics Collector" in "Server Administration" in the PostgreSQL Documentation for details on pg_stat_replication.

3.3.2 Checking the Status of the Arbitration Server

This section describes how to check the status of the arbitration server.

The status of the connection between the Mirroring Controller arbitration process and primary server/standby server can be checked by executing the mc_arb command in status mode.

The example below executes the mc_arb command, and shows the status.

Linux

Example)

```
$ mc_arb status -M /mcarb_dir/arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

Windows

Example)

```
> mc_arb status -M D:\mcarb_dir\arbiter1

server_id    host            status
--------------------------------------
server1      192.0.3.100     online
server2      192.0.3.110     online
```

3.4 Manually Switching the Primary Server

The primary server cannot be switched automatically in the following case:

- If automatic switch/disconnection is disabled
- If output of messages is selected for heartbeat abnormalities during heartbeat monitoring of the operating system or server and the operating system/server crashes or becomes unresponsive

In this case, to manually switch the primary server, execute the mc_ctl command in switch mode on either the primary server or the standby server.

Example)

```
> mc_ctl switch -M D:\mcdir\inst1
```

Point

If automatic switch/disconnection is enabled, it is possible to perform switch of primary server at any time.

3.5 Manually Disconnecting the Standby Server

The procedure to perform disconnection of the standby server differs depending on whether the automatic switch/disconnection is enabled or disabled.

If automatic switch/disconnection is enabled

Execute the mc_ctl command in stop mode on the standby server.

Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

If automatic switch/disconnection is disabled

1. Execute the mc_ctl command in stop mode on the standby server.

   Example)

   ```
   > mc_ctl stop -M D:\mcdir\inst1
   ```

2. Comment out the synchronous_standby_names parameter in the postgresql.conf file on the primary server.
3. Execute the pg_ctl command in reload mode on the primary server.

   Example)

   ```
   > pg_ctl reload -D D:\database\inst1
   ```

3.6 Action Required when a Heartbeat Abnormality is Detected

The message below is output when a heartbeat abnormality is detected during heartbeat monitoring of operating systems or servers:

```
detected an error on the monitored object "server(server identifier name)": no response:ping timeout
(MCA00019)
```

If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", even if automatic switch/disconnection is enabled and Mirroring Controller is started, automatic switch/disconnection is not performed when a heartbeat abnormality is detected. Therefore, user action will be necessary.

This section explains the action required when the heartbeat_error_action parameter is set to "message" and a heartbeat abnormality is detected.

1. Identify the cause of the heartbeat abnormality. The possible causes are below:
   - The remote operating system or server crashed or is unresponsive

- An admin network issue occurred

2. Address the cause identified in step 1.

   - The remote operating system or server crashed or is unresponsive

     Manually perform switch or disconnection using the mc_ctl command.

   - An admin network issue occurred

     Refer to "Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode", and recover the database multiplexing system.

3.7 Monitoring Mirroring Controller Messages

The messages that are output by Mirroring Controller are output to both the database server and the arbitration server. If the automatic switch fails, for example, an important message related to the continuation of the operation may be output, so ensure that the system log messages are monitored.

If the arbitration server is used for automatic degradation, monitor messages on both the database server and the arbitration server.

Message output destination on the database server

Messages are output to the event log.

Message output destination on the arbitration server

Linux

Messages are output to the system log.

Windows

Messages are output to the event log.

Point

- To monitor message types considered to be important, an operating system setting must be configured beforehand. Refer to the operating system manuals, check if the message is of a message type that is monitored to be output to the system log, and configure the setting if required.
- If the heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message", only message output is performed when a heartbeat abnormality is detected during heartbeat monitoring of operating systems and servers - automatic switch/disconnection is not performed. Therefore users need to monitor the messages. Refer to "3.6 Action Required when a Heartbeat Abnormality is Detected" for details.

Display format on the database server

```
eventSourceName[processId]: messageType: messageContent (messageNumber)
```

Specify the event source name in the event_source parameter of the serverIdentifier.*conf* file of the database server.

The message types output by Mirroring Controller, their severity, and their corresponding value in the event log are shown in the table below.

Table 3.1 Message type, severity, and corresponding value in the event log

Message type	Severity	Meaning	Event log
INFO	Information	Provides information that does not fall under LOG or NOTICE.	INFORMATION
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)	

Message type	Severity	Meaning	Event log
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	
WARNING	Warning	Provides a warning, for example it will soon be impossible to maintain multiplexing capabilities.	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR
FATAL		Reports that an abnormality was detected in the multiplexed database systems requiring recovery of the system, and also the content and cause of the abnormality.	
PANIC		Reports that an abnormality was detected in all multiplexed database systems requiring immediate recovery of the system, and also the content and cause of the abnormality.	

The message severity has the following meanings:

- Information

  Informational status. A message that was reported by the system is displayed. No action is required.

- Notice

  Informational status, but a message that should be noted is displayed. If necessary, take the actions described in the "Action" section of the message.

- Warning

  No error has occurred, but the user is requested to check, and take action. Take the actions described in the "Action" section of the message.

- Error

  An error has occurred. Take the actions described in the "Action" section of the message.

Display format on the arbitration server

Linux

```
programName[processId]: messageType: messageText (messageNumber)
```

Specify the program name in the syslog_ident parameter of the arbitration.conf file of the arbitration server.

Windows

```
eventSourceName[processId]: messageType: messageText (messageNumber)
```

Specify the event source name in the event_source parameter of the arbitration.conf file of the arbitration server.

The message types output by Mirroring Controller, their severity, and their corresponding value in the output destination log are shown in the table below.

Table 3.2 Message type, severity, and corresponding value in the output destination log

Message type	Severity	Meaning	System log (Linux)	Event log (Windows)
INFO	Information	Provides information not categorized as LOG or NOTICE.	INFO	INFORMATION
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)		

Message type	Severity	Meaning	System log (Linux)	Event log (Windows)
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	NOTICE	
WARNING	Warning	Provides a warning, for example it will soon be impossible to perform the arbitration process.	WARNING	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR	ERROR
FATAL		Reports that an abnormality was detected in the arbitration server requiring recovery of the system, and also the content and cause of the abnormality.	CRIT	
PANIC		Reports that an abnormality was detected in the arbitration server requiring immediate recovery of the system, and also the content and cause of the abnormality.	ALERT	

The message severity has the following meanings:

- Information

  Informational status. A message that was reported by the system is displayed. No action is required.

- Notice

  Informational status, but a message that should be noted is displayed. If necessary, take the actions described in the "Action" section of the message.

- Warning

  No error has occurred, but the user is requested to check, and take action. Take the actions described in the "Action" section of the message.

- Error

  An error has occurred. Take the actions described in the "Action" section of the message.

3.8 Server Maintenance

To perform maintenance tasks such as periodic server inspections and the application of updates for software products including the operating system, you must perform a planned stop of the server, and then perform the maintenance.

3.8.1 Rolling Updates

In database multiplexing mode, rolling updates, that perform the maintenance for the servers that comprise the cluster system, can be performed while jobs continue.

First, perform the maintenance for the standby server, and then switch the standby server to the primary server. Then, perform the maintenance for the original primary server that was switched to the standby server. This enables maintenance to be performed while jobs continue.

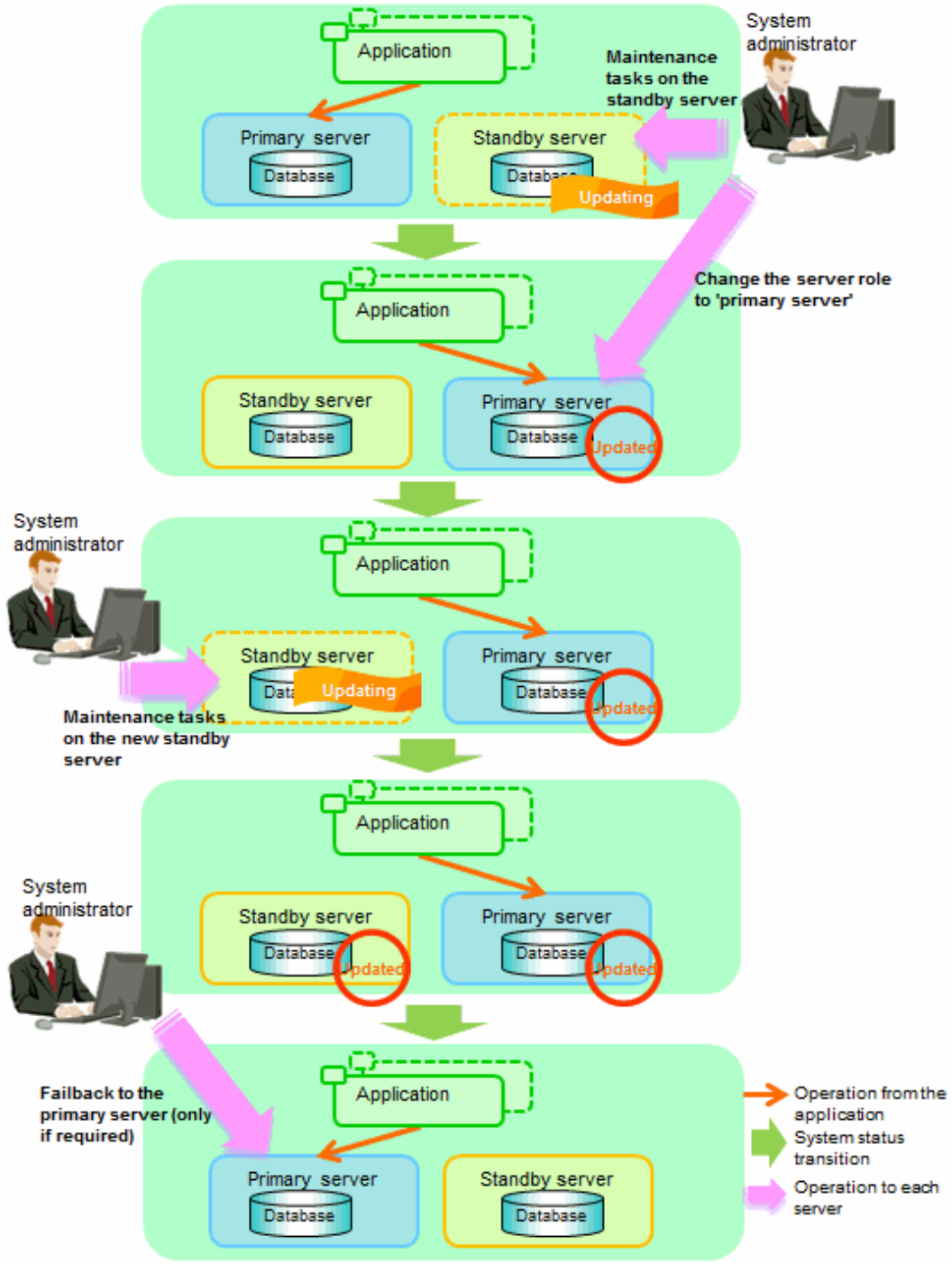
Note that arbitration server maintenance can be performed without affecting database server operation, so it is not necessary to consider rolling update.

See

If the downtime due to the maintenance of the standby server is expected to be long, refer to "Standby server downtime" in "3.9.1 Changes Required when the Standby Server is Stopped".

The flow of a rolling update is shown below.

Figure 3.1 Performing a Rolling Update



Perform the following procedure as shown in the above figure:

Standby server maintenance tasks

1. To perform the maintenance on the standby server, stop Mirroring Controller.

   Example)

   ```
   > mc_ctl stop -M D:\mcdir\inst1
   ```

2. Ensure that Mirroring Controller has completely stopped.

   If the multiplexed instances and Mirroring Controller have been configured on the standby server to start and stop automatically when the operating system of the database server is started or stopped, cancel the setting to start and stop automatically.

   ### See

   Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for information on how to configure the multiplexed instances and Mirroring Controller to start and stop automatically when the operating system of the database server start and stops.

   This task should be performed by the instance administrator user with administrator privileges.

   Use the sc config command to disable automatic start of multiplexed instances and Mirroring Controller from the Windows service.

   ```
   Example)
   The following is an example using the registered service name "Mirroring_Controller_inst1".
   ```

   ```
   > sc config "Mirroring_Controller_inst1" start= demand
   ```

   ### Information

   You can use the sc qc command to check the registration status.
   Refer to documentation such as Windows Help and Support for the sc command for information on registry content.

3. Perform maintenance tasks.

4. Create a copy of the primary server instance on the standby server.

   Execute the pg_basebackup command to create data in the standby server by synchronizing with the primary server.

   ```
   Example)
   ```

   ```
   > pg_basebackup -D D:\database\inst1 -X fetch --waldir=E:\transaction\inst1 --progress --verbose
   -R --dbname="application_name=standbyServerName" -h primaryServerHostName -p
   primaryServerPortNumber
   ```

   ### See

   The procedure for copying the primary server instance to the standby server is the same as the procedure for setting up the standby server.

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

5. Check the settings for automatic start and stop of the multiplexed instances and Mirroring Controller.

   If the multiplexed instances and Mirroring Controller were configured in step 2 to not start and stop automatically when the operating system of the database server starts and stops, then change the settings back. This step can be skipped if automatic start and stop are not required.

   This task should be performed by an instance administrator user with administrator privileges.

   Use the sc config command to enable automatic start of multiplexed instances and Mirroring Controller from the Windows service.

   ```
   Example)
   The following is an example using the registered service name "Mirroring_Controller_inst1".
   ```

   ```
   > sc config "Mirroring_Controller_inst1" start= auto
   ```

Information

You can use the sc qc command to check the registration status.
Refer to documentation such as Windows Help and Support for the sc command for information on registry content.

6. Start (rebuild) Mirroring Controller on the standby server.

   This operation is required when determining the maintenance tasks on the standby server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

Switching to the primary server

To perform the maintenance on the primary server, execute the mc_ctl command in the switch mode on the primary server or the standby server.

Example)

```
> mc_ctl switch -M D:\mcdir\inst1
```

When the switch is complete, the synchronous_standby_names parameter in the postgresql.conf file of the new primary server will be commented as follows:

Example)

```
#synchronous_standby_names = 'primary'
```

New standby server maintenance tasks

1. Stop the Mirroring Controller.

   On the new standby server (the primary server before the switch), execute the mc_ctl command in stop mode.

   Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

2. Ensure that Mirroring Controller has completely stopped.

   If the multiplexed instances and Mirroring Controller have been configured on the new standby server to start and stop automatically when the operating system of the database server is started or stopped, cancel the setting to start and stop automatically now.

See

Refer to "2.12 Setting Automatic Start and Stop of Mirroring Controller and Multiplexed Instances" for information on how to configure the multiplexed instances and Mirroring Controller to start and stop automatically when the operating system of the database server starts and stops.

This task should be performed by an instance administrator user with administrator privileges.

Use the sc config command to disable automatic start of multiplexed instances and Mirroring Controller from the Windows service.

```
Example)
The following is an example using the registered service name "Mirroring_Controller_inst1".
```

```
> sc config "Mirroring_Controller_inst1" start= demand
```

Information

You can use the sc qc command to check the registration status.
Refer to documentation such as Windows Help and Support for the sc command information on registry content.

3. Perform the maintenance on the new standby server that was stopped.

4. Create a copy of the new primary server instance on the new standby server.

   Execute the pg_basebackup command to create data in the new standby server by synchronizing with the new primary server.

   ```
   Example)
   ```

   ```
   > pg_basebackup -D D:\database\inst1 -X fetch --waldir=\transaction\inst1 --progress --verbose -
   R --dbname="application_name=standbyServerName" -h primaryServerHostName -p
   primaryServerPortNumber
   ```

   ### See

   The procedure for copying the primary server instance to the standby server is the same as the procedure for setting up the standby server.

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

5. Check the settings for automatic start and stop of the multiplexed instances and Mirroring Controller.

   If the multiplexed instances and Mirroring Controller were configured in step 2 to not start and stop automatically when the operating system of the database server starts and stops, then change the settings back. This step can be skipped if automatic start and stop are not required.

   This task should be performed by an instance administrator user with administrator privileges.

   Use the sc config command to enable automatic start of multiplexed instances and Mirroring Controller from the Windows service.

   ```
   Example)
   The following is an example using the registered service name "Mirroring_Controller_inst1".
   ```

   ```
   > sc config "Mirroring_Controller_inst1" start= auto
   ```

   ### Information

   You can use the sc qc command to check the registration status.
   Refer to the document such as Windows Help and Support for the sc command for information on registry content.

6. After the maintenance is complete, edit the following parameters in the postgresql.conf file of the standby server as required.

   Copying an instance results in the value of the synchronous_standby_names parameter becoming the specified value on the primary server. Therefore, correct it to the specified value on the standby server. If the parameter was commented out, then you must uncomment it.

7. On the standby server, start (rebuild) Mirroring Controller.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

Failback of the Primary Server

Revert the primary server and standby server to the original server configuration. Do this to execute the main job on the previous primary server. Refer to "4.1.1.3 Failback of the Primary Server" for details.

Note

Obtain a backup as soon as this task is complete.

3.8.2 Stopping for Maintenance

Perform this procedure to stop all servers for periodic inspections, for example. On the server on which Mirroring Controller is running, execute the mc_ctl command in stop mode to stop the instance and Mirroring Controller.

After that, on the server where the Mirroring Controller arbitration process is running, execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

Stopping Mirroring Controller

Example)

```
> mc_ctl stop -M D:\mcdir\inst1 -a
```

Stopping the Mirroring Controller arbitration process

Linux

Example)

```
$ mc_arb stop -M /mcarb_dir/arbiter1
```

Windows

Example)

```
> mc_arb stop -M D:\mcarb_dir\arbiter1
```

3.8.3 Arbitration Server Maintenance

Arbitration server maintenance can be performed without affecting database server operation.

Follow the procedure below to perform arbitration server maintenance.

1. Execute the mc_arb command in stop mode to forcibly stop the Mirroring Controller arbitration process.

   Linux

   Example)

   ```
   $ mc_arb stop -M /mcarb_dir/arbiter1 -e
   ```

   Windows

   Example)

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1 -e
   ```

2. Perform maintenance tasks.

3. Execute the mc_arb command in start mode to restart the Mirroring Controller arbitration process.

   Linux

   Example)

   ```
   $ mc_arb start -M /mcarb_dir/arbiter1
   ```

   Windows

   Example)

   ```
   > mc_arb start -M D:\mcarb_dir\arbiter1
   ```

4. Execute the mc_arb command in status mode to check that the arbitration server is connected to the database server.

   The example below executes the mc_arb command, and shows the status.

   Linux

   Example)

   ```
   $ mc_arb status -M /mcarb_dir/arbiter1

   server_id    host            status
   ---------------------------------------
   server1      192.0.3.100     online
   server2      192.0.3.110     online
   ```

   Windows

   Example)

   ```
   > mc_arb status -M D:\mcarb_dir\arbiter1

   server_id    host            status
   ---------------------------------------
   ```

```
server1      192.0.3.100     online
server2      192.0.3.110     online
```

5. Check the command output.

   Items to be checked

   Check that the output status is "online" on both lines.

3.9 Changes in Operation

The following changes in operation may be required:

- Changes required when the standby server is stopped
- Changing from single server mode to database multiplexing mode
- Changing from database multiplexing mode to single server mode
- Changing to database multiplexing mode when the arbitration server is used for automatic degradation
- Changing parameters
- Uninstalling in the database multiplexing mode

3.9.1 Changes Required when the Standby Server is Stopped

Operation when the standby server is stopped

Before performing maintenance for the primary server instance when the standby server has been stopped, stop Mirroring Controller on the primary server, comment out the synchronous_standby_names parameter in the postgresql.conf file of the primary server, and then execute the pg_ctl command in reload mode.

If this operation is not performed, operations performed on the primary server for the instance will remain in a wait state.

See

Refer to "pg_ctl" in Reference for information on the command.

Standby server downtime

If you specified the synchronous_standby_names parameter of the postgresql.conf file and then the standby server instance is stopped, consider the points below.

- The wal_sender_timeout parameter in the postgresql.conf file

  If the standby server is stopped after the timeout time set in this parameter was exceeded, an error stating that the transaction log could not be received may be output to the primary server event log, and all transaction logs that should be transferred to the standby server are accumulated.

- The wal_keep_size parameter in the postgresql.conf file

  If a transaction log that exceeds the value set in this parameter was generated while the standby server was stopped, the transaction log may be deleted.

  Additionally, setting this parameter requires consideration regarding stabilization of the database multiplexing mode. Refer to "2.11.1 Tuning to Stabilize the Database Multiplexing Mode" for details.

Note

The standby server must be rebuilt if the pending transaction log to be transferred to the standby server is lost when the standby server is started after the maintenance task is complete.

Take the action advised in the recovery operation that starts from "4.1.1.1.3 Identify cause of error and perform recovery" through to "4.1.1.2 Rebuild the Standby Server".

3.9.2 Changing from Single Server Mode to Database Multiplexing Mode

The procedure for switching single server mode to database multiplexing mode for the purposes of high reliability and load distribution of the system is explained below.

This procedure is equivalent to the setup procedure explained in "Chapter 2 Setting Up Database Multiplexing Mode".

Note

If the data storage destination directory name is not comprised of ASCII characters

Stop the application job and then perform the following procedure to migrate to a directory with a name that uses only ASCII characters:

1. Stop the database instance on the primary server.
2. Change the name of the data storage destination directory to one that uses only ASCII characters.
   For example, do not perform operations that will cause the symbolic link contained in the data storage destination directory to become lost, such as moving data to another drive.

See

When encrypting the storage data, refer to "Database Multiplexing Mode" in the Operation Guide, and then perform the setup for encryption on the primary and standby servers.

1. Install on the arbitration server

   Perform this step only if the arbitration server is used for automatic degradation.

   Install the Server Assistant on the server where the Mirroring Controller arbitration process is started.

   Refer to "Installation" in the Installation and Setup Guide for Server Assistant for information on how to install the Server Assistant.

2. Install on the standby server

   Install FUJITSU Enterprise Postgres on the server to be started as the standby server.

   Refer to "Installation" in the Installation and Setup Guide for Server for information on how to install FUJITSU Enterprise Postgres.

   Use ASCII characters in the data storage destination directory.

3. Stop the application jobs

   Stop the application jobs to be connected to the primary server.

4. Change the primary server settings

   To allow connections from the server to be started as the standby server, configure the settings in step 2 and thereafter of "2.4.2 Creating, Setting, and Registering the Primary Server Instance" on the primary server.

5. Set up the arbitration server

   Refer to "2.3 Setting Up the Arbitration Server" for details.

   Perform this step only if the arbitration server is used for automatic degradation.

6. Set up database multiplexing mode on the primary server

   Refer to "2.4.1 Setting Up Database Multiplexing Mode on the Primary Server" for details.

7. Set up database multiplexing mode on the standby server

   Refer to "2.5.1 Setting Up Database Multiplexing Mode on the Standby Server" for details.

8. Create the standby server instance and start it

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance" for details.

After the above steps are completed, refer to the remaining explanations in "Chapter 2 Setting Up Database Multiplexing Mode" and ensure that the required settings and operations are completed.

3.9.3 Changing from Database Multiplexing Mode to Single Server Mode

The procedure for stopping database multiplexing mode and changing to single server mode is explained below.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

The tasks on the arbitration server are required only if the arbitration server is used for automatic degradation.

Tasks on the database server

1. Determine the server for which the instance is to be stopped, and switch this server

   Determine the server that is to be excluded as the database multiplexing mode target, and for which the instance is to be stopped.

   If the server for which the instance is to be stopped is the primary server, execute the mc_ctl command in the switch mode to switch the standby server to the primary server.

   The standby server after the switch is complete will be the server for which the instance is to be stopped.

   If the server for which the instance is to be stopped is the standby server, there is no need to perform the switch operation.

   Example)

```
> mc_ctl switch -M D:\mcdir\inst1
```

2. Stop Mirroring Controller and the instance.

   On the server that was determined in step 1, execute the mc_ctl command in the stop mode to stop Mirroring Controller and the instance.

   Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

3. Unregister Mirroring Controller from the Windows service.

   Execute the mc_ctl command in unregister mode to unregister Mirroring Controller from the Windows service.

   Example)

```
> mc_ctl unregister -M D:\mcdir\inst1
```

4. Delete registries related to the event log

   If error logs are output to the event log in "2.2.1.2 Preparatory Tasks for the Output of Error Logs to the Event Log", delete the registered event source name for each instance.

   Example)

```
> regsvr32 /u /i:"Mirroring Controller inst1" "c:\Program Files\Fujitsu\fsepv<x>server64\lib
\mcevent.dll"
```

   Note that "<x>" indicates the product version.

5. Delete the file resources

   Delete the following file resources:

   - Data storage destination directory

- Mirroring Controller management directory

  Example)

```
> rmdir /S /Q D:\database\inst1
> rmdir /S /Q D:\mcdir\inst1
```

See

Refer "Security-Related Notes" in the Operation Guide for information on deleting the data securely.

6. Stop the application jobs

   Stop the application jobs to be connected to the primary server.

7. Stop Mirroring Controller and the instance on the primary server

   Execute the mc_ctl command in stop mode on the primary server.

   Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

8. Unregister Mirroring Controller from the Windows service on the primary server

   Execute the mc_ctl command in unregister mode to unregister Mirroring Controller from the Windows service.

   Example)

```
> mc_ctl unregister -M D:\mcdir\inst1
```

9. Delete registries related to the event log on the primary server

   If error logs are output to the event log in "2.2.1.2 Preparatory Tasks for the Output of Error Logs to the Event Log", delete the registered event source name for each instance.

   Example)

```
> regsvr32 /u /i:"Mirroring Controller inst1" "c:\Program Files\Fujitsu\fsepv<x>server64\lib
\mcevent.dll"
```

   Note that "<*x*>" indicates the product version.

10. Delete the database multiplexing mode settings that were configured for the primary server instance.

    Reset the postgresql.conf file parameters to their values before the database multiplexing operation was set.

    Delete the file resources from the Mirroring Controller management directory.

    If the backup operation was performed, delete the following resources:

    - Mirroring Controller management directory backup data obtained in database multiplexing mode
    - Instance backup data obtained in database multiplexing mode

    Additionally, if the primary_conninfo parameter is set in the postgresql.auto.conf file, execute the ALTER SYSTEM RESET statement to delete the setting.

    Example)
    An example execution of the psql command is shown below.

```
postgres=# ALTER SYSTEM RESET primary_conninfo;
```

    After these actions are performed, ensure that the backup data is collected when starting the single operation.

See

- Refer to "Security-Related Notes" in the Operation Guide for details on deleting the data securely.
- Refer to "2.14 Backup Operation" for details on the backup operation.
- Refer to "Appendix A Parameters" for details on the postgresql.conf file parameters.

Point

In the above procedure, if the postgresql.conf file of the single primary server can be changed by reloading the file, the operation mode can be changed without stopping the application job.

In that case, execute the mc_ctl command in stop mode with the --mc-only option specified to stop only Mirroring Controller in relation to stopping the primary server.

Tasks on the arbitration server

Linux

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example)

   ```
   $ mc_arb stop -M /mcarb_dir/arbiter1
   ```

2. Delete the Mirroring Controller arbitration process management directory.

   Example)

   ```
   $ rm -rf /mcarb_dir/arbiter1
   ```

Windows

1. Execute the mc_arb command in stop mode to stop the Mirroring Controller arbitration process.

   Example)

   ```
   > mc_arb stop -M D:\mcarb_dir\arbiter1
   ```

2. Unregister the Mirroring Controller arbitration process from the Windows service.

   Execute the mc_arb command in unregister mode to unregister the Mirroring Controller arbitration process from the Windows service.

   Example)

   ```
   > mc_arb unregister -M D:\mcarb_dir\arbiter1
   ```

3. Delete registrations related to the event log

   If error logs are output to the event log in "2.2.2.1 Preparing to Output Error Logs to the Event Log (Windows)", delete the registered event source name for each instance.

   Example)

   ```
   > regsvr32 /u /i:"Mirroring Controller arbtier1" "c:\Program Files\Fujitsu
   \fsepv<x>assistant64\lib\mcarbevent.dll"
   ```

   Note that "<x>" indicates the product version.

4. Delete the Mirroring Controller arbitration process management directory.

   Example)

```
> rmdir /S /Q D:\mcarb_dir\arbiter1
```

3.9.4 Changing to Database Multiplexing Mode when the Arbitration Server is Used for Automatic Degradation

This section provides the procedure to change to database multiplexing mode using the Mirroring Controller only on the database server when the arbitration server is used for automatic degradation.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

Tasks on the arbitration server

1. Set up the arbitration server.

   Refer to "2.3 Setting Up the Arbitration Server" for information on how to set up the arbitration server.

Tasks on the database server

1. On the server where Mirroring Controller is running, execute the mc_ctl command in stop mode to stop Mirroring Controller on the primary server and standby server.

   Example)

```
> mc_ctl stop -M D:\mcdir\inst1 -a --mc-only
```

2. Edit the network.conf file of the primary server and standby server to add the information of the arbitration server.

   Refer to "A.3 Network Configuration File" for details.

   The definition example of the network.conf file of the primary server is shown below:

   Example)

   The IDs of the primary server and standby server are set to "server1" and "server2", and their port numbers are set to "27540" and "27541". The ID of the server of the Mirroring Controller arbitration process is set to "arbiter", and its port number is set to "27541".

```
server1 192.0.2.100,192.0.3.100 27540,27541 server
server2 192.0.2.110,192.0.3.110 27540,27541 server
arbiter 192.0.3.120 27541 arbiter
```

Note

- Ensure that the port numbers set for the primary server, standby server, and arbitration server do not conflict with other software. Also do not configure the same segment for the admin network and arbitration network.
- If the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:
  - IP address or host name of the database server used as the admin network
  - IP address or host name of the database server used as the arbitration network
  - Port number of the database server used as the admin network
  - Port number of the database server used as the arbitration network
- If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf.

3. Edit the *serverIdentifier*.conf file of the primary server and standby server to add parameters required for the operation where the arbitration server is used for automatic degradation.

   Refer to "A.4.1 Server Configuration File for the Database Servers" for information on the parameters required when the arbitration server is used for automatic degradation.

4. On the primary server and standby server, execute the mc_ctl command in start mode to start the Mirroring Controller process.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 --mc-only
```

Common tasks

1. Check the connection status from the database server or arbitration server.

   Refer to "2.8 Checking the Connection Status" for details.

3.9.5 Changing Parameters

Stop Mirroring Controller before editing the Mirroring Controller server configuration file and network configuration file.

If the Mirroring Controller process crashes or becomes unresponsive, restart is performed automatically by the Mirroring Controller monitoring process, and the configuration file is reloaded. Therefore, if the configuration file was being edited, unintended behavior will occur.

3.9.6 Uninstalling in Database Multiplexing Mode

This section explains how to uninstall FUJITSU Enterprise Postgres on a server using database multiplexing mode.

Some tasks must be performed on the database server, and others must be performed on the arbitration server.

The tasks on the arbitration server are required only if the arbitration server is used for automatic degradation.

Tasks on the database server

1. Stop the multiplexed instances and Mirroring Controller

   Refer to "3.2 Starting and Stopping Mirroring Controller" for information on how to stop the instance.

2. Unregister Mirroring Controller from the Windows service

   Execute the mc_ctl command in unregister mode to unregister Mirroring Controller from the Windows service.

   Example)

```
> mc_ctl unregister -M D:\mcdir\inst1
```

3. Delete registries related to the event log

   If messages are output to the event log, DLLs are registered in accordance with "2.2.1.2 Preparatory Tasks for the Output of Error Logs to the Event Log". Delete these registries so that no unnecessary issues occur.

   Example)
   The following is an example in which the DLL of a 64-bit product that is registered under the default event source name is deleted. Note that "<*x*>" indicates the product version.

```
> regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>server64\lib\mcevent.dll"
```

   - Delete the registered DLL for each instance

     DLL registration is performed so that messages output to the event log are identified by each instance, and are output to any event source named by the user.

     Accordingly, it is necessary to delete the DLL registry for each instance. Delete the DLL registry for each event source name.

     Example)
     The following is an example in which the DLL of a 64-bit product that is registered under the

event source name "Mirroring Controller inst1" is deleted. Note that "<*x*>" indicates the product version.

```
> regsvr32 /u /i:"Mirroring Controller inst1" "c:\Program Files\Fujitsu\fsepv<x>server64\lib
\mcevent.dll"
```

- If installing multiple versions

  If the database multiplexing system you set up using the FUJITSU Enterprise Postgres package has been set to output error logs to the event log, use the DLL path name that you took note of previously as explained in "2.2.1.2 Preparatory Tasks for the Output of Error Logs to the Event Log" to reregister the default event source name.

Note

Ensure that you delete the DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

4. Uninstall FUJITSU Enterprise Postgres

   Refer to "Uninstallation" in the Installation and Setup Guide for Server for information on how to uninstall FUJITSU Enterprise Postgres.

Tasks on the arbitration server

Refer to "Uninstallation" in the Installation and Setup Guide for Server Assistant, and uninstall the Server Assistant.

Chapter 4 Action Required when an Error Occurs in Database Multiplexing Mode

This chapter describes the action required if an error occurs in database multiplexing mode.

In database multiplexing mode, when an error is detected, the switch or disconnection of the standby server is performed automatically, so that only the primary server starts degrading. In this case, the recovery tasks will be required for the standby server on which the switch or disconnection was performed.

Other possible cases are as follows:

- When automatic switch fails
- When automatic disconnection fails
- When all servers or instances were stopped

4.1 Action Required when Server Degradation Occurs

If the server has started degrading, the recovery tasks will vary depending on whether the cause was the switch (failover or switchover), or the disconnection.

Execute the mc_ctl command in status mode, or refer to the event log, and check if the cause of the server to start degrading was the switch or the disconnection.

In the example below, the mc_ctl command is executed in status mode.

If a switch has occurred, "switched" (the switch is complete and the server is in a degrading state) is displayed for "mirroring status".

Example)

```
> mc_ctl status -M D:\mcdir\inst1
mirroring status
----------------
switched

   :
```

If a disconnection has occurred, "not-switchable" (disconnection was performed so the server cannot be switched) is displayed for "mirroring status".

Example)

```
> mc_ctl status -M D:\mcdir\inst1
mirroring status
----------------
not-switchable

  :
```

Note

If Mirroring Controller detects any errors on the server on which operations are continuing during recovery to database multiplexing mode from a degrading operation state, perform the procedure in "4.1.3 Addressing Errors During Degrading Operation", and then recover to database multiplexing mode.

4.1.1 Operations when the Server has Started Degrading after a Switch has Occurred

This section explains the operations when the server has started degrading after a switch has occurred.

Note

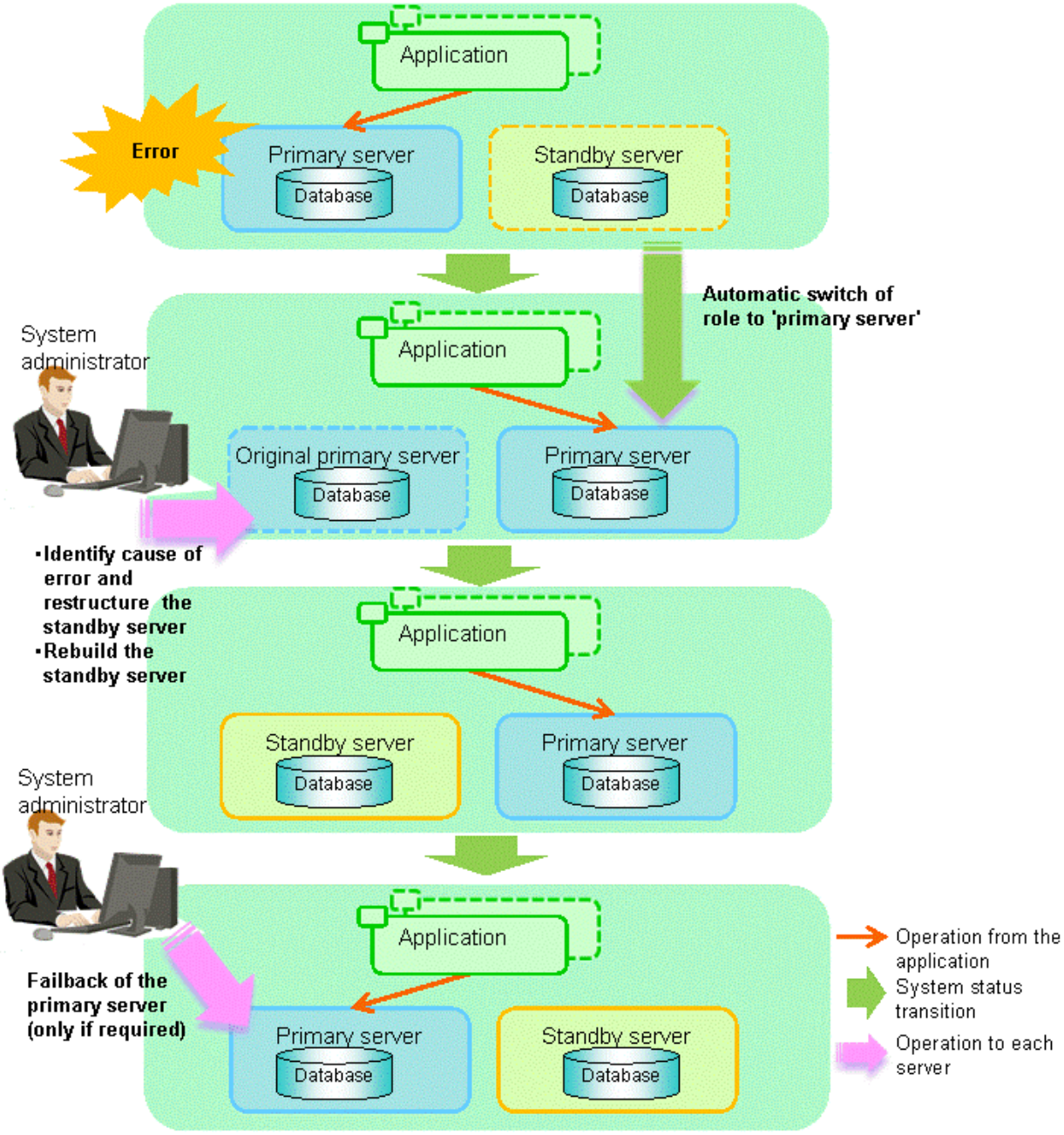
- After a switch has occurred as a result of an abnormality on the primary server, the database will not have a multiplexed configuration until the standby server is rebuilt. Remove the cause of the error as quickly as possible, and then rebuild the standby server.
- If the reference job was executed on the standby server, and the servers are switched because an error occurred on the primary server, the load is concentrated on the new primary server. Accordingly, pause the reference job on the original standby server, rebuild the original primary server as the new standby server, and then resume the reference job for the new standby server.
- If the instance on the new primary server is stopped before the original primary server where the error occurred is rebuilt as the new standby server, a split brain occurs at startup from the instance on the original primary server. Therefore, start the instance on the new primary server before rebuilding the standby server.

If the switch occurred and the server has started degrading, perform the following operations to recover the standby server and revert it to its original state:

- Identify Cause of Error and Restore the Standby Server
- Rebuild the Standby Server
- Failback of the Primary Server (only if required)

The flow of these operations is shown in the figure below.

Figure 4.1 Flow of operations



4.1.1.1 Identify Cause of Error and Restore the Standby Server

Perform the recovery according to the following procedure:

1. Stop Mirroring Controller
2. Recovery of the Mirroring Controller management directory
3. Identify cause of error and perform recovery

4.1.1.1.1 Stop Mirroring Controller

Execute the mc_ctl command in stop mode for the original primary server on which the error occurred.

```
Example)
```

```
> mc_ctl stop -M D:\mcdir\inst1
```

This also stops the instance that is required to perform the recovery.

Note

If the instance does not stop, refer to "Actions in Response to Failure to Stop an Instance" in the Operation Guide, and then stop the instance.

Then, specify the -e option in the above command to forcibly stop Mirroring Controller.

4.1.1.1.2 Recovery of the Mirroring Controller management directory

Copy the files in the Mirroring Controller management directory from the backup data, and then perform the recovery.

4.1.1.1.3 Identify cause of error and perform recovery

Refer to the event log of the primary server and the standby server to identify the cause of the error, and then perform recovery.

The following commands can be used to recover a standby server. Select depending on the recovery and the situation.

- pg_basebackup

  Creates a copy of all resources of the primary server instance.

- pg_rewind

  Creates a copy of only the updated files on the new primary server. For this reason, if this command is used to incorporate a new standby server, recovery time can be shortened. To use this command to build the original primary server as a new standby server, at least one of the following must be met:

  a. Checksums were enabled when an instance was created, or

  b. The wal_log_hints parameter of postgresql.conf was enabled when an instance was started.

  Additionally, full_page_writes must be enabled, which is its default value.

See

- Refer to "pg_basebackup" in "Reference" in the PostgreSQL Documentation for information on the pg_basebackup command.
- Refer to "pg_rewind" in "Reference" in the PostgreSQL Documentation for information on the pg_rewind command.

The example below executes the pg_rewind command to perform recovery by synchronizing data on the original primary server with the new primary server.

1. Wait for the application of unapplied update transaction logs on the new primary server.

   Execute the SQL below on the new primary server, and wait until the result is false.

   ```
   # select pg_is_in_recovery();
   ```

   Example)

   ```
   > psql -h hostNameOfNewPrimaryServer -p portNumOfNewPrimaryServer -d dbName -c "select
   pg_is_in_recovery();"
   ```

   Any database can be connected to.

Note

If the pg_rewind command is executed immediately after promotion of the new primary server, the processing in steps 1 and 2 is required. If update-type SQL can be executed on the new primary server and checkpoint processing is executed after promotion, the processing in steps 1 and 2 will not be necessary.

2. Update the timeline ID.

   Execute checkpoint processing, and update the timeline ID.

   ```
   > psql -h hostNameOfNewPrimaryServer -p portNumOfNewPrimaryServer -d dbName -c "checkpoint;"
   ```

   Any database can be connected to.

3. Create a copy of the new primary server instance in the original primary server (new standby server).

   Execute the pg_rewind command to synchronize the new standby server data with the new primary server.

   Example)

   ```
   > pg_rewind -D D:\database\inst1 -R --source-server="user=userName host=newPrimaryServerHostName
   port=newPrimaryServerPortNumber dbname=dbName application_name=newStandbyServerName"
   ```

   ### Note

   - Use the pg_rewind command with the -R option to create a standby.signal file. If you do not create the standby.signal file, the Mirroring Controller cannot be started as a standby server.
   - If using a method that requires password authentication for connections to the primary server, you will need to ensure that authentication is performed automatically. If the -R option is specified for the pg_rewind command and the password parameter is specified for the --dbname option, the pg_rewind command will set the password in the primary_conninfo parameter in postgresql.auto.conf file, enabling connections to be performed automatically.

     If a password is not set in the primary_conninfo parameter in postgresql.auto.conf file, it will be necessary to create a password file (%APPDATA%postgresql\pgpass.conf), and then specify a password for the replication database.
   - If you need to set a connection string other than host, port and application_name, include it in the setting of the primary_conninfo parameter.
   - The primary_conninfo parameter should not be set in the postgresql.conf file, but only in the postgresql.auto.conf file using the pg_rewind command.

4. Specify parameters in the postgresql.conf file of the original primary server (new standby server).

   Set the parameters required for the standby server in postgresql.conf.

   Refer to "Table 2.5 Parameters" for information on the parameters to set in postgresql.conf.

See

- Refer to "Hot Standby" in the PostgreSQL Documentation for details on the standby.signal file.
- Refer to "Setting Up a Standby Server" in the PostgreSQL Documentation for details on the primary_conninfo.

Note

A new timeline is branched for the new primary server due to promotion, so 'latest' needs to be specified for the recovery_target_timeline parameter so that the old primary server (new standby server) follows the new primary server.

4.1.1.2 Rebuild the Standby Server

The starting of the recovered original primary server as the standby server is referred to as the "standby server rebuild".

On the original primary server, start Mirroring Controller and the instance.

Enabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode.

Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.1.3 Failback of the Primary Server

To revert the primary server and standby server to the original server configuration after rebuilding the standby server, perform failback for the primary server.

Do this to execute the main job on the previous primary server.

Perform the following procedure:

1. Failback of the primary server

   Execute the mc_ctl command in switch mode on the primary server or the standby server.

   Example)

   ```
   > mc_ctl switch -M D:\mcdir\inst1
   ```

   After executing the mc_ctl command in switch mode, the status will be as follows:

   Example)

   ```
   > mc_ctl status -M D:\mcdir\inst1
   mirroring status
   ----------------
   switched
   server_id  host_role                  host        host_status   db_proc_status       disk_status
   ------------------------------------------------------------------------------------------------
   server1    primary                   192.0.2.100 normal        abnormal(postmaster) normal
   server2    none(inactivated primary) 192.0.2.110 normal        abnormal(postmaster) normal
   ```

2. Stop the original primary server

   On the original primary server, execute the mc_ctl command in stop mode to stop Mirroring Controller and the instance.

   Example)

   ```
   > mc_ctl stop -M D:\mcdir\inst1
   ```

3. Create a copy of the new primary server instance in the original primary server (new standby server)

   Execute the pg_basebackup command to create data in the new standby server by synchronizing with the new primary server.

   Example)

```
> pg_basebackup -D D:\database\inst1 -X fetch --waldir=E:\transaction\inst1 --progress --verbose
-R --dbname="application_name=standbyServerName" -h primaryServerHostName -p
primaryServerPortNumber
```

   See

   The procedure for copying the new primary server instance to the new standby server is the same as the procedure for setting up the new standby server.

   Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

4. Rebuild the standby server

   On the standby server, start Mirroring Controller and the instance.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

   Point

   After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.2 Operations when the Server has Started Degrading after a Disconnection has Occurred

This section explains the operations when the server has started degrading after a disconnection has occurred.

Note

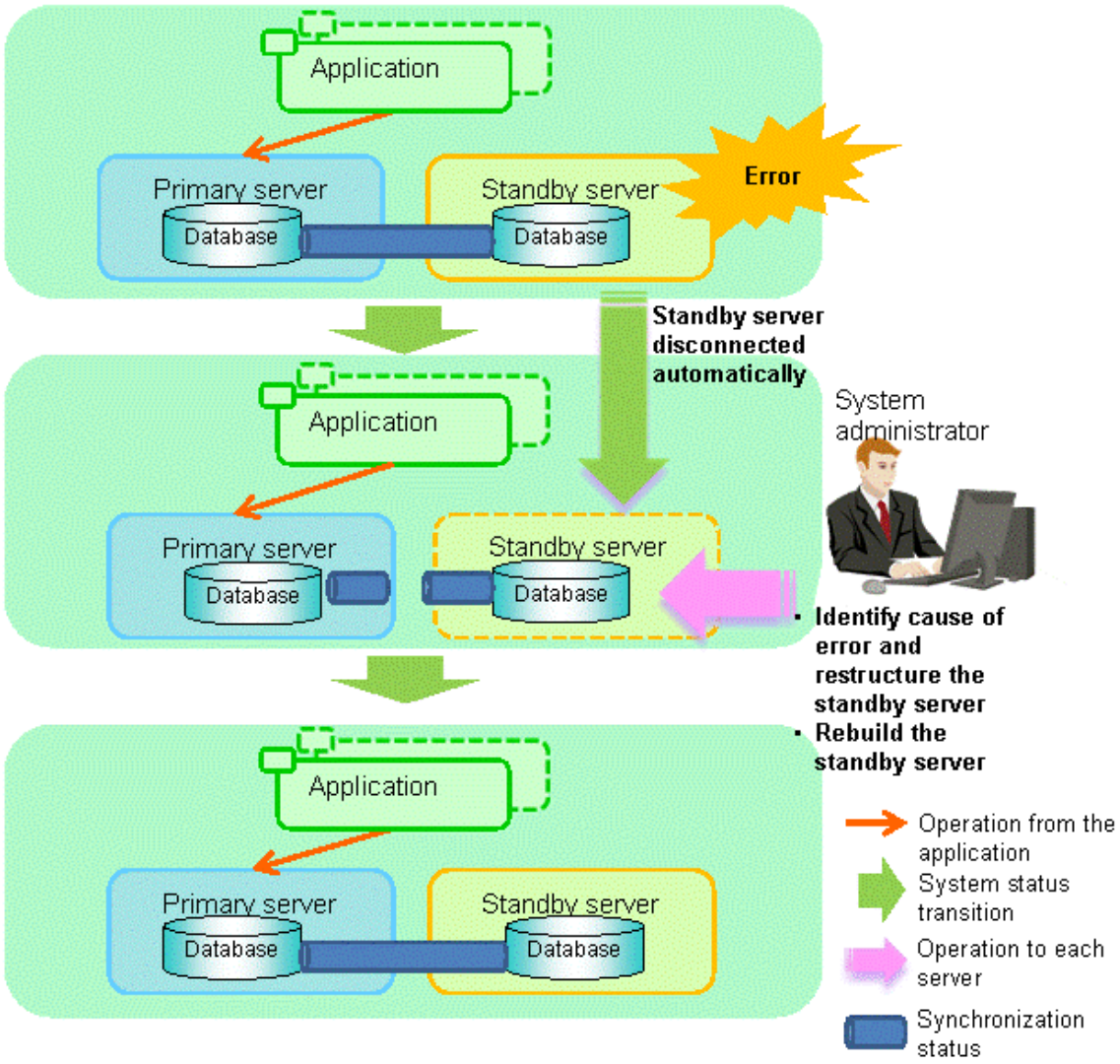
After a disconnection has occurred as a result of an abnormality on the standby server, the database will not have a multiplexed configuration until the standby server is rebuilt. Remove the cause of the error as quickly as possible, and then rebuild the standby server.

If the disconnection occurred and the server has started degrading, perform the following operations to recover the standby server and revert it to its original state:

- Identify Cause of Error and Restore the Standby Server
- Rebuild the Standby Server

The flow of these operations is shown in the figure below.

Figure 4.2 Flow of operations



4.1.2.1 Identify Cause of Error and Restore the Standby Server

Perform the recovery according to the following procedure:

1. Stop Mirroring Controller
2. Recovery of the Mirroring Controller management directory
3. Identify cause of error and perform recovery

4.1.2.1.1 Stop Mirroring Controller

Execute the mc_ctl command in stop mode for the standby server on which the error occurred.

Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

This also stops the instance that is required to perform the recovery.

Note

If the instance does not stop, refer to "Actions in Response to Failure to Stop an Instance" in the Operation Guide, and then stop the instance.

Then, specify the -e option in the above command to forcibly stop Mirroring Controller.

4.1.2.1.2 Recovery of the Mirroring Controller management directory

Copy the files in the Mirroring Controller management directory from the backup data, and then perform the recovery.

4.1.2.1.3 Identify cause of error and perform recovery

Refer to the event log of the primary server and the standby server to identify the cause of the error, and then perform recovery.

Execute the pg_basebackup command to perform recovery by synchronizing data in the primary server with the standby server.

```
Example)
```

```
> pg_basebackup -D D:\database\inst1 -X fetch --waldir=E:\transaction\inst1 --progress --verbose -R --
dbname="application_name=standbyServerName" -h primaryServerHostName -p primaryServerPortNumber
```

See

This recovery procedure is the same as the procedure for setting up the standby server.

Refer to "2.5.2 Creating, Setting, and Registering the Standby Server Instance", and then perform the recovery.

4.1.2.2 Rebuild the Standby Server

Start the Mirroring Controller and the instance of the standby server, and rebuild the standby server.

Enabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode.

```
Example)
```

```
> mc_ctl start -M D:\mcdir\inst1
```

Disabling automatic switch/disconnection

As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

```
Example)
```

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

Point

After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

4.1.3 Addressing Errors During Degrading Operation

This section explains how to address errors that may occur on the server on which operation is continuing during degrading operation triggered by a switch or disconnection.

If needing to recover from backup data

If it is necessary to recover the database using backup data due to data becoming corrupted from disk failure or user operation error, refer to the following for information on recovery to database multiplexing mode:

- Action Required when All Database Servers or Instances Stopped
- Recovering from an Incorrect User Operation

If a temporary error occurs

If a temporary error occurs, such as due to a high load on the server or insufficient system resources, remove the cause of the error and restart Mirroring Controller, and then refer to the following for details on recovery to database multiplexing mode:

- Operations when the Server has Started Degrading after a Switch has Occurred
- Operations when the Server has Started Degrading after a Disconnection has Occurred

See

Refer to "3.2.1 Starting Mirroring Controller" and "3.2.2 Stopping Mirroring Controller" for information on restarting Mirroring Controller.

4.2 Action Required when Automatic Switch Fails

If the system behavior is unstable, for example there are insufficient temporary system resources, the Mirroring Controller automatic switch may fail.

Perform the switch manually using one of the following methods:

- Refer to the procedures in "3.4 Manually Switching the Primary Server".
- In the standby server, execute the mc_ctl command in switch mode with the -force option specified to forcibly perform the switch.

  Example)

```
> mc_ctl switch -M D:\mcdir\inst1 --force
```

Point

- Even if connection cannot be established between database servers, it is possible to fence the primary server and forcibly switch by executing the mc_ctl command in switch mode with the --force option specified.
- The primary server is not fenced in the cases below, so stop Mirroring Controller and instances of the primary server database in advance:
  - The --no-fencing option is specified when performing forced switch.
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message" and the fencing command is not configured to be used (the fencing_command parameter is omitted in *serverIdentifier*.conf).
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "fallback".

See

Recovery to database multiplexing mode

Refer to "4.1.1.2 Rebuild the Standby Server" and "4.1.1.3 Failback of the Primary Server" for information on recovery to database multiplexing mode.

4.3 Action Required when Automatic Disconnection Fails

If the system behavior is unstable, for example there are insufficient system resources such as available memory or free disk space, automatic disconnection using Mirroring Controller may not be possible.

Perform the disconnection manually using one of the following methods:

- Refer to the procedures in "3.5 Manually Disconnecting the Standby Server".
- In the primary server, execute the mc_ctl command in detach mode to perform forced disconnection.

  Example)

```
> mc_ctl detach -M D:\mcdir\inst1
```

Point

- Even if connection cannot be established between database servers, it is possible to fence the standby server and forcibly disconnect by executing the mc_ctl command in detach mode.
- In the cases below, stop Mirroring Controller and instances of the standby server database in advance so that the standby server is not fenced:
  - The --no-fencing option is specified when performing forced disconnection.
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "message" and the fencing command is not configured to be used (the fencing_command parameter is omitted in *serverIdentifier.conf*).
  - The heartbeat_error_action parameter in *serverIdentifier*.conf is set to "fallback".

See

Recovery to database multiplexing mode

Refer to "4.1.2.2 Rebuild the Standby Server" for information on recovery to database multiplexing mode.

4.4 Action Required when All Database Servers or Instances Stopped

This section explains what happens when all database servers or instances on the database server have stopped, so jobs cannot continue.

See

Recovery to database multiplexing mode

Refer to "4.1.1.2 Rebuild the Standby Server" and "4.1.1.3 Failback of the Primary Server" for information on recovery to database multiplexing mode.

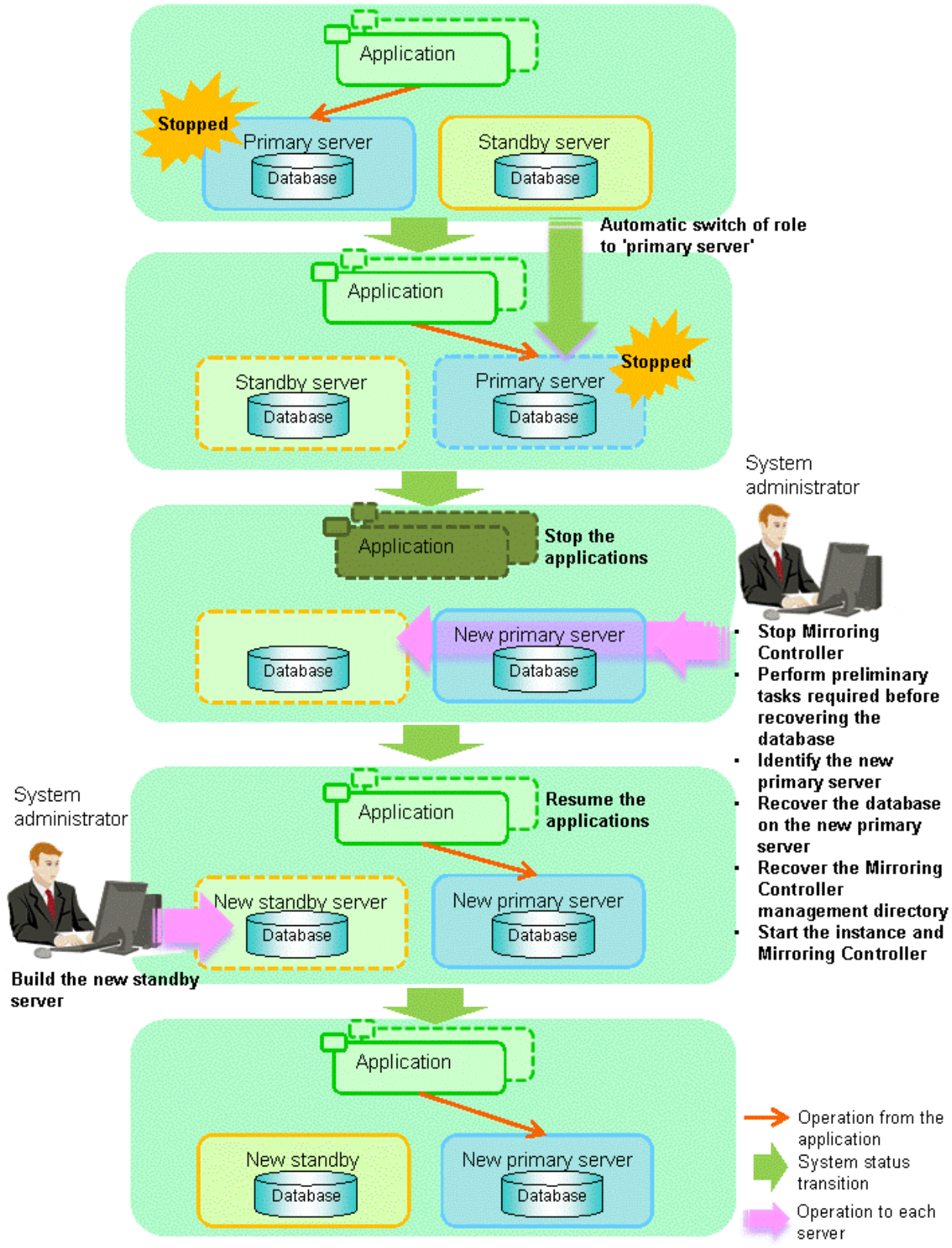
Overview of recovery operations

After recovering the database to the state immediately prior to the failure on a specific server comprising the database multiplexing system, restore the system.

In other words, after specifying the server on which the database is to be recovered and then recovering it as the new primary server, configure all other servers as new standby servers.

The flow of these recovery operations is shown in the figure below.

Figure 4.3 Flow of recovery operations



Perform the following procedure.

1. Stop applications

   Stop running applications.

2. Stop Mirroring Controller

   Execute the mc_ctl command in stop mode on all servers that comprise the database multiplexing system.

   Example)

```
> mc_ctl stop -M D:\mcdir\inst1
```

Note

Forcibly stop Mirroring Controller

If Mirroring Controller does not stop, execute the mc_ctl command in stop mode with the -e option specified.

Example)

```
> mc_ctl stop -M D:\mcdir\inst1 -e
```

3. Perform prerequisite tasks before recovering the database

   First, refer to "Actions when an Error Occurs" in the Operation Guide, and then identify the cause of the error and perform recovery of the disk on which the failure occurred, etc.

4. Identify the new primary server

   Perform the following operations on all servers comprising the database multiplexing system, and check the server containing the backup data that shows the latest date. This server will become the new primary server, on which the database is to be recovered.

   Example)
   In the example below, the pgx_rcvall command is executed with the -l option specified and the backup data that shows the latest date is identified.

```
> pgx_rcvall -l -D D:\database\inst1
Date                    Status          Dir
2013-07-01 13:30:40     COMPLETE        E:/backup/inst1/2013-07-01_13-30-40
```

5. Recover the database on the new primary server

   Recover the database using the recovery method that uses the pgx_rcvall command based on the backup data.

   a. Perform the following operations on all servers comprising the database multiplexing system, and check the server containing the archive log and mirrored transaction log that show the latest date.

      Example)
      In the example below, the archive log and mirrored transaction log that show the latest date are identified.

```
> dir /OD <backupDataStorageDir>\*_wal
```

   b. If the server containing the latest archive log and mirrored transaction log is different to the new primary server identified in step 4, all files and directories under the directory shown below are copied and written to the backup storage destination directory on the new primary server.

      Deployment destination directory of the archive log and mirrored transaction log

```
<backupDataStorageDir>\*_wal
```

   c. Execute the pgx_rcvall command on the new primary server, specifying the backup storage destination directory of the new primary server.

      Example)
      In the example below, the pgx_rcvall command is executed with the -B option specified.

```
> pgx_rcvall -B E:\backup\inst1 -D D:\database\inst1
```

See

Refer to "Actions when an Error Occurs" in the Operation Guide for information on the pgx_rcvall command.

6. Recover the Mirroring Controller management directory

   Copy the files in the Mirroring Controller management directory from the backup data on the new primary server, and then perform the recovery.

7. Start the instance and Mirroring Controller

   Start the instance and Mirroring Controller on the new primary server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

   ```
   > mc_ctl start -M D:\mcdir\inst1
   ```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

   ```
   > mc_ctl start -M D:\mcdir\inst1 -F
   ```

   ### Point

   After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

8. Resume applications

   Resume execution of applications.

9. Build the new standby server

   Refer to "2.5 Setting Up the Standby Server" for information on building (setting up) a standby server from the primary server.

Point

It is not necessary to repeat steps that have already been performed, such as registering to Windows services.

4.5 Recovering from an Incorrect User Operation

This section describes how to recover an instance when data has been corrupted due to incorrect user operation.

For example, when data has been corrupted due to incorrect user operation, such as data being unintentionally changed or deleted by an application or command, it is necessary to restore the original data on the primary server and resynchronize with the standby server.

Use the following procedure to perform recovery.

1. Identify the primary server

   Execute the mc_ctl command in status mode on each server, and search for a server for which "primary" or "none(inactivated primary)" is displayed.

2. Stop the applications and commands that caused the incorrect operation to occur

   Stop applications and commands that are running on the primary server. This will minimize the impact caused by the incorrect data.

Also, if any applications used for reference by the standby server are running, stop them too.

3. Stop the instance and Mirroring Controller

   Stop the instance and Mirroring Controller on both the primary server and standby server.

   Example)

```
$ mc_ctl stop -a -M D:\mcdir\inst1
```

4. Recover the database on the primary server

   Recover the database using the recovery method in which the pgx_rcvall command uses the backup data to recover the database to a restore point prior to the time when the incorrect operation was performed.

   See

   Refer to "Recovering from an Incorrect User Operation" in the Operation Guide for information on using the pgx_rcvall command to recover the database to a restore point, and then perform only the database recovery procedure while the instance is in a stop state.

5. Start the instance and Mirroring Controller

   Start the instance and Mirroring Controller on the primary server.

   Enabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1
```

   Disabling automatic switch/disconnection

   As the instance administrator user, execute the mc_ctl command in start mode with the -F option specified.

   Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F
```

   Point

   After Mirroring Controller is started, automatic switch/disconnection can be enabled or disabled using the enable-failover or disable-failover mode of the mc_ctl command.

6. Build the new standby server

   Refer to "2.5 Setting Up the Standby Server" for information on building (setting up) a standby server from the primary server.

   Point

   It is not necessary to repeat steps that have already been performed, such as registering to Windows services.

Chapter 5 Managing Mirroring Controller Using WebAdmin

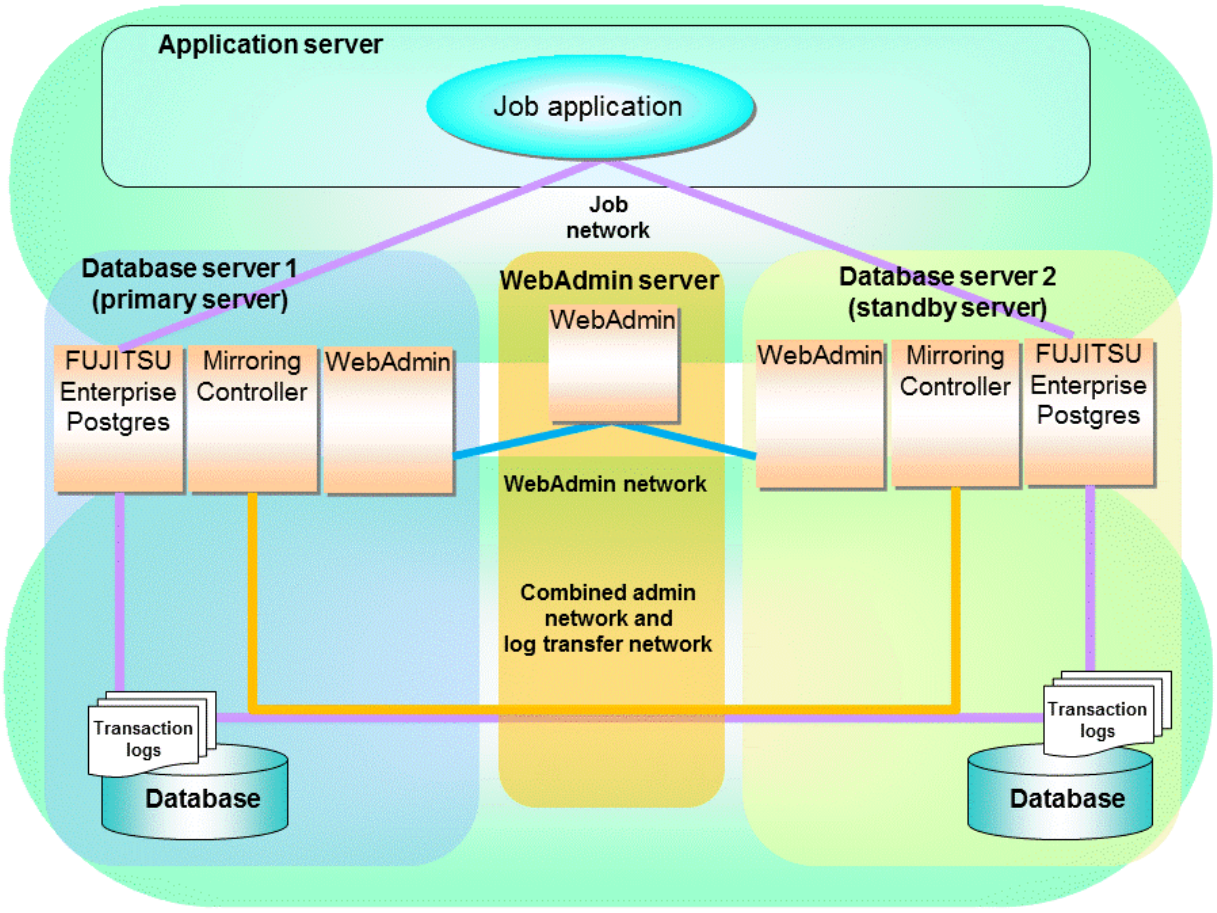
This chapter describes how to set up and manage Mirroring Controller in a streaming replication cluster using WebAdmin.

Mirroring Controller can be used to monitor a streaming replication cluster and perform automatic switching or disconnect synchronous replication when there is an error.

WebAdmin can be used to set up Mirroring Controller in an existing replication cluster. Mirroring Controller can be set up for either synchronous standby instances or asynchronous standby instances.

The configuration of the database multiplexing system built using WebAdmin is shown below:

Figure 5.1 Configuration of database multiplexing operation system using WebAdmin



Point

- If Mirroring Controller is set up to the replication cluster using WebAdmin, the network with the host name (or IP address) specified in [Host name] will be used as the admin network and the log transfer network.
- To use a network other than the job network as the log transfer network, before building the replication cluster specify a host name other than the job network one in [Host name].

Note

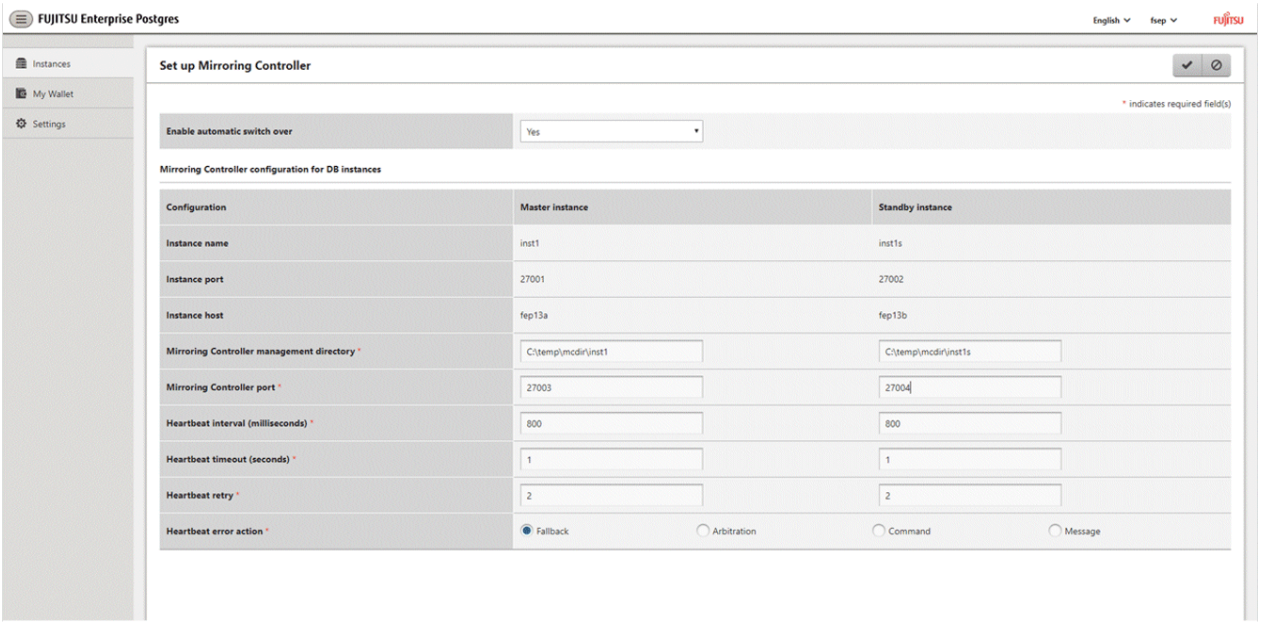
If you set up the arbitration server using WebAdmin, install WebAdmin on the arbitration server.

5.1 Mirroring Controller Setup

Perform the following procedure to set up Mirroring Controller in a streaming replication cluster.

1. In the [Instances] tab, select the standby instance on which Mirroring Controller needs to be set up.
2. Click .
3. Enter the information for the Mirroring Controller to be set up.

   In the example below, Mirroring Controller is being set up for the replication cluster having master instance "inst1" and standby instance "inst1s".



   The instance name, host address and port of the master and standby instances are displayed for easy reference.

   Enter the following items on master instance and on standby instance fields for Mirroring Controller setup, as shown in the above screenshot:

   - [Enable automatic switch over]: Toggles the automatic switch/disconnection functionality. Select "Yes". The default is "No".
   - [Mirroring Controller management directory]: Directory where the Mirroring Controller configuration files will be stored. When the [Mirroring Controller management directory] is entered, WebAdmin will search the Mirroring Controller configuration files in the entered directory based on the [Data storage path] of the corresponding DB instance. If Mirroring Controller configuration files are found, the Mirroring Controller fields will be auto filled.
   - [Mirroring Controller port]: Port number of Mirroring Controller. Note that if the Windows firewall feature is enabled, you must enable the port number of Mirroring Controller. Refer to "E.2 Windows Firewall Settings" for details.
   - [Heartbeat interval (milliseconds)]: Number of milliseconds between two consecutive heartbeat checks. The default is "800".
   - [Heartbeat timeout (seconds)]: Number of seconds for the heartbeat timeout. The default is "1".
   - [Heartbeat retry]: Number of retries for heartbeat monitoring, before failover occurs. The default is "2".
   - [Heartbeat error action]: Operation when a heartbeat abnormality is detected. The default is "Fallback".

     When using FUJITSU Enterprise Postgres 10, 11 and 12 instances created with previous versions, the instances will be in compatibility mode, and the "Fallback" is preselected and cannot be changed in the [Heartbeat error action] for Mirroring Controller setup.

     When setting up Mirroring Controller for FUJITSU Enterprise Postgres 9.5 and 9.6 instances, the [Heartbeat error action] is not supported and therefore is not displayed.

When the [Heartbeat error action] is set to "Arbitration", the following extra items are displayed:

- [Arbitration network IP address]: IP address of the arbitration network.
- [Mirroring Controller Arbitration port]: Port number of Mirroring Controller for communicating with the arbitration server.

The [Arbitration server configuration] section is also displayed with the following items. The [Arbitration server configuration] will not be auto filled.

- [Location]: Location of the arbitration server. "Local" or "Remote" can be selected depending on your configuration.

  If the arbitration server and WebAdmin server are located on the same server, you can select "Local" and the following items are displayed:

  - [Arbitration management directory]: Directory where the arbitration server configuration files will be stored.
  - [Arbitration server host or IP address]: Host name or IP address of the arbitration server.
  - [Arbitration process port]: Port number for the arbitration process.
  - [Fencing command]: Full path of the fencing command that fences a database server when an abnormality is detected.

  If "Remote" is set for the item, the items below are displayed in addition to the above items.

  - In the [Arbitration server configuration] section, [Operating system credential] is displayed where you can enter the following information:

    [User name]: User name to access the arbitration server.

    [Password]: Password to access the arbitration server.

  - In the [Remote WebAdmin for Arbitration server] section, the following items are displayed:

    [Remote WebAdmin address]: IP address of the remote WebAdmin installed on the arbitration server.

    [Remote WebAdmin port]: Port number for the WebAdmin installed on the arbitration server.

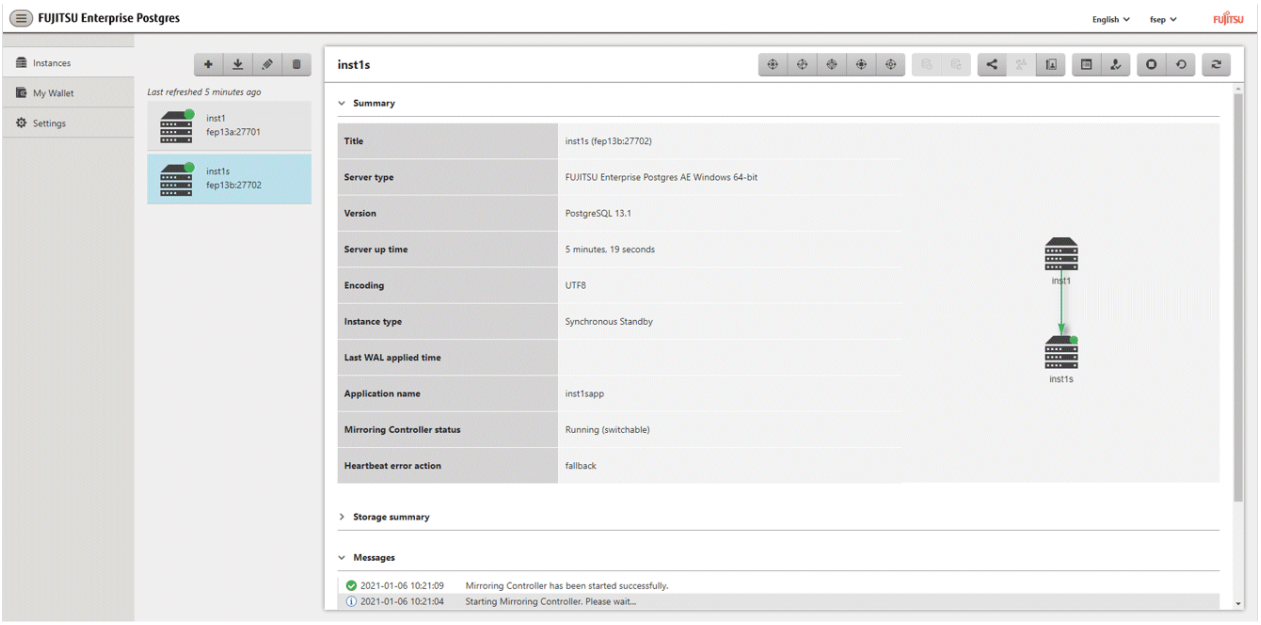
When the [Heartbeat error action] is set to "Command", the following extra items are displayed:

- [Arbitration command]: Full path of the arbitration command to be executed when an abnormality is detected.
- [Fencing command]: Full path of the fencing command that fences a database server when an abnormality is detected.

4. Click to set up Mirroring Controller.

5. Upon successful completion, Mirroring Controller will be started on master and standby instances.

   In the [Instances] tab, select standby instance. The page below is displayed, in which you can check the Mirroring Controller status. In the example below, standby instance "inst1s" is used.



After the Mirroring Controller has been set up, ([Edit Mirroring Controller] button) and ([Mirroring Controller Configuration] button) are available. These buttons are displayed only when FUJITSU Enterprise Postgres 10 or later instances are created with FUJITSU Enterprise Postgres WebAdmin 13.

For FUJITSU Enterprise Postgres 9.5 and 9.6 instances, the [Heartbeat error action] will not be displayed.

When the [Heartbeat error action] is "Arbitration", the following information is displayed: whether the arbitration status is "online" or "offline", the arbitration server IP address and the arbitration process port.

Note

Operating system credential (User name, Password) should not contain hazardous characters. Refer to "Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters".

5.2 Edit Mirroring Controller Setup

Settings made in "5.1 Mirroring Controller Setup" can be updated in either the master instance or a standby instance using WebAdmin.

Perform the following procedure to edit Mirroring Controller configuration:

1. In the [Instances] tab, select the instance for which the Mirroring Controller configuration is to be edited.
2. Click .
3. Enter the information for the Mirroring Controller to be updated. Refer to "5.1 Mirroring Controller Setup".
4. Click to update the Mirroring Controller.
5. Upon successful completion, Mirroring Controller will be started on master and standby instances.

Editing and saving the [Edit Mirroring Controller] page will reset all other settings that are not listed on this page to default values.

5.3 Mirroring Controller Configuration

The information related to Mirroring Controller monitoring and control (refer to "A.4.1 Server Configuration File for the Database Servers") and the information related to arbitration and control of the Mirroring Controller arbitration process (refer to "A.4.2 Arbitration Configuration File") can be set using WebAdmin. You can view and update the configuration on either the master instance or the standby instance.

Perform the following procedure:

1. In the [Instances] tab, select the instance for the Mirroring Controller configuration you want to view.
2. Click to view the Mirroring Controller configuration.
3. Click to show the editing page for the Mirroring Controller configuration. The Mirroring Controller configurations defined during [Mirroring Controller Setup] are read-only on this page. Refer to "5.1 Mirroring Controller Setup".

   Additionally, refer to the "Appendix A Parameters" for information about the settings and the corresponding parameter names.

   The items common to all [Heartbeat error action] are:

   - Target DB
   - Core file path
   - Remote call timeout (milliseconds)
   - Agent alive timeout (seconds)
   - DB instance check interval (milliseconds)
   - DB instance check timeout (seconds)
   - DB instance check retry
   - DB instance timeout action
   - Disk check interval (milliseconds)
   - Disk check retry
   - Tablespace directory error action
   - Post-switch command
   - Post-promote command
     (Post-promote command is replaced in FUJITSU Enterprise Postgres 12. The Post-promote command is still valid and will be displayed when it is used in the server configuration file of Mirroring Controller.)
   - Post-attach command
   - Pre-detach command
   - State transition command timeout (seconds)
   - Check synchronous standby names validation

   When the [Heartbeat error action] is set to "Arbitration", the following extra items are displayed:

   - Arbitration timeout (seconds)
   - Arbiter alive interval (milliseconds)
   - Arbiter alive retry
   - Arbiter alive timeout (seconds)
   - Arbiter connect interval (milliseconds)
   - Arbiter connect timeout (seconds)
   - Fencing command

- Fencing command timeout (seconds)
- Shutdown detached synchronous standby

When the [Heartbeat error action] is set to "Arbitration", the [Arbitration server configuration] section is displayed with the following items:

- Core file path
- Fencing command timeout (seconds)
- Heartbeat interval (milliseconds)
- Heartbeat timeout (seconds)
- Heartbeat retry

When the [Heartbeat error action] is set to "Command", the following extra items are available:

- Fencing command timeout (seconds)
- Arbitration command timeout (seconds)
- Shutdown detached synchronous standby

When the [Heartbeat error action] is set to "Message", the following extra items are available:

- Fencing command
- Fencing command timeout (seconds)

In addition, the following configurations are provided:

- DB instance JDBC connection SSL parameters
- DB instance libpq connection SSL parameters

4. Click to update the Mirroring Controller configurations.

5.4 Stopping Mirroring Controller

Mirroring Controller can be stopped either in master instance or in standby instance using WebAdmin.

Perform the following procedure to stop Mirroring Controller.

1. In the [Instances] tab, select the instance where to stop Mirroring Controller.
2. Click .
3. In the confirmation dialog box, click [Yes].

Mirroring Controller will be stopped on the selected instance. The Mirroring Controller status will be updated, and a confirmation message entry will be displayed in the [Message] section.

5.5 Starting Mirroring Controller

Mirroring Controller can be started either in master instance or in standby instance using WebAdmin.

Perform the following procedure to start Mirroring Controller.

1. In the [Instances] tab, select the instance where to start Mirroring Controller.

2. Click .
3. In the confirmation dialog box, select the desired failover mode, and then click [Yes].

Mirroring Controller will be started on the selected instance. The Mirroring Controller status will be updated, and a confirmation message entry will be displayed in the [Message] section.

5.6 Disabling Failover Mode

Disabling failover mode in Mirroring Controller disables automatic switch/disconnection between master and standby instances.

Perform the following procedure to disable failover mode.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Failover mode will be disabled in Mirroring Controller. The Mirroring Controller status will be updated and a confirmation message entry will be displayed in the [Message] section.

5.7 Enabling Failover Mode

Enabling failover mode in Mirroring Controller enables automatic switch/disconnection between master and standby instances.

Perform the following procedure to enable failover.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Failover mode will be enabled in Mirroring Controller. The Mirroring Controller status will be updated and a confirmation message entry will be displayed in the [Message] section.

5.8 Deleting Mirroring Controller Setup

Deleting Mirroring Controller setup removes its setup from master and standby instances.

1. In the [Instances] tab, select the instance.
2. Click .
3. In the confirmation dialog box, click [Yes].

Mirroring Controller setup will be removed from the cluster. The cluster status will be updated and a confirmation message entry will be displayed in the [Message] section.

For the instances in FUJITSU Enterprise Postgres 12 or later, WebAdmin does not delete the Mirroring Controller management directory and the configuration files.

5.9 Status Update after Failover

When Mirroring Controller performs a failover, standby instance will be promoted to standalone instance. The Mirroring Controller setup will be removed from both standby and master instances.

The following scenario describes one of the ways in which failover can be triggered, and the results achieved by the use of Mirroring Controller in WebAdmin.

1. In the [Instances] tab, select the master instance "inst1".
2. Click .

3. In the confirmation dialog box, the warning "This instance is being monitored by Mirroring Controller. Stopping the instance may result in cluster failover." is displayed.
4. Choose the stop mode and click [Yes].

   In the server, the following takes place:

   a. The master instance is stopped.
   b. Failover is triggered in Mirroring Controller.
   c. The Mirroring Controller setup is removed from both master and standby instances
   d. Standby instance is promoted to standalone.
5. When the instance is refreshed in WebAdmin, the latest status of the instances will be displayed.

Note

When failover is performed, the Mirroring Controller setup is removed from both master and standby instances. Therefore, to manage the Mirroring Controller using WebAdmin again, create the standby instance and set up Mirroring Controller.

Refer to "Creating a Standby Instance" in the Operation Guide for details.

Refer to "5.1 Mirroring Controller Setup" for details.

5.10 Action Required when an Error Occurs in the Combined Admin Network and Log Transfer Network

Communication errors may temporarily occur in the network used as the admin network and log transfer network due to reasons such as high load on the server or insufficient system resources. Because of this, there is a risk of causing a split-brain situation by mistake even though the server has no issues.

Split brain is a phenomenon in which both servers temporarily operate as primary servers, causing data updates to be performed on both servers.

How to detect split brain using WebAdmin

If the conditions below are met, split brain may occur. Refer to "Split-brain detection method" and "How to recover from a split-brain" in "Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality" and take the actions described.

1. A standby instance is selected in the [Instances] tab, and
2. "Standalone" is displayed in [Instance type], and
3. A master instance is selected in the [Instances] tab, and
4. "Standalone" is displayed in [Instance type].

Note

The admin network is important because Mirroring Controllers use it to confirm the status of each server.

The log transfer network is also important to maintain the data freshness.

Therefore, use network configurations resistant to faults for these networks by using the network redundancy channel bonding feature provided by the operating system or network driver vendor.

5.11 Performing Automatic Degradation Using the Arbitration Server

If database multiplexing is performed using WebAdmin, it is also possible to perform automatic degradation using the arbitration server. In such cases, it is necessary to perform tasks on the database server and the arbitration server after setting up Mirroring Controller in WebAdmin.

Tasks on the arbitration server

Perform setup of the arbitration server using Mirroring Controller commands.

1. Set up the arbitration server.

   Refer to "2.3 Setting Up the Arbitration Server" in "Chapter 2 Setting Up Database Multiplexing Mode" for information on how to set up the arbitration server.

Tasks on the database server

Change some of the settings after setting up Mirroring Controller in WebAdmin.

1. Set up Mirroring Controller in WebAdmin.

   Refer to "5.1 Mirroring Controller Setup" for details.

2. Use WebAdmin to stop Mirroring Controller on the master and standby instances.

   Refer to "5.4 Stopping Mirroring Controller" for details.

3. Edit the network configuration file of the master and standby instances, and add the arbitration server information.

   The network configuration file is network.conf, which exists in the Mirroring Controller management directory specified during Mirroring Controller setup. Refer to "A.3 Network Configuration File" for details.

   A definition example of network.conf is shown below.

   ```
   Example:
   The port number of the database server to be used as the arbitration network is set to "27541".
   The ID of the server of the Mirroring Controller arbitration process is set to "arbiter", and its
   port number is set to "27541".
   ```

   ```
   dbsvm27500 192.0.2.100,192.0.3.100 27540,27541 server
   dbsvs27500 192.0.2.110,192.0.3.110 27540,27541 server
   arbiter 192.0.3.120 27541 arbiter
   ```

Note

- Ensure that the port numbers set for the database server and the arbitration server do not conflict with other software. In addition, do not configure the same segment for the admin network and the arbitration network.
- If the server type is "server", two IP addresses or host names, and two port numbers need to be specified in the following order:
  - IP address or host name of the database server used as the admin network
  - IP address or host name of the database server used as the arbitration network
  - Port number of the database server used as the admin network
  - Port number of the database server used as the arbitration network
- If the server type is "arbiter", specify the IP address or host name set for the my_address parameter and the port number set for the port parameter in arbitration.conf of the arbitration server.
- WebAdmin also support editing mirroring controller configuration via Use WebAdmin to edit Mirroring Controller configurations.
  Refer to "5.2 Edit Mirroring Controller Setup" for detailes.

4. Edit the server configuration file of the master and standby instances, and add the parameters required for automatic degradation using the arbitration server.

   The server configuration file is *instanceName*.conf or *instancePort*.conf, which exists in the Mirroring Controller management directory specified during Mirroring Controller setup.

   To perform automatic degradation using the arbitration server, set the heartbeat_error_action parameter to "arbitration".

   Refer to "A.4.1 Server Configuration File for the Database Servers" for information on other parameters.

5. Use WebAdmin to start Mirroring Controller on the master and standby instances.

   Refer to "5.5 Starting Mirroring Controller" for details.

Common tasks

1. Use the Mirroring Controller command to check the connection status from the database server or the arbitration server.

   Refer to "2.8 Checking the Connection Status" for information on how to check the connection status.

Appendix A Parameters

This appendix describes the configuration files and parameters required by the database multiplexing mode.

See

Refer to "Server Configuration" in the PostgreSQL Documentation for information on the postgresql.conf file.

A.1 Parameters Set on the Primary Server

The content for the parameters set in the postgresql.conf file of the primary server is shown in the table below.

Table A.1 postgresql.conf file

Parameter	Value set	Explanation
wal_level	replica or logical	Specify the output level for the transaction log. Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*standbyServerName*'	Use single quotation marks (') to enclose the name that will identify the standby server. Any name can be specified. Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	Specify whether queries can be run on the standby server. Specify this to execute reference jobs on the standby server.
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the primary server may be deleted. Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WAL save size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that the receiver process (walreceiver) of the transaction log is in an abnormal state on the primary server. The specified value must be larger than the value set for the wal_receiver_status_interval parameter set in the postgresql.conf file of the standby server.

Parameter	Value set	Explanation
		By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
archive_mode	on	Specify the archive log mode.
archive_command	'cmd /c ""installDir\\bin\ \pgx_walcopy.cmd" "%p" "backupDataStorageDestinationDir \\archived_wal\\%f"""	Specify the command and storage destination to save the transaction log.
backup_destination	Backup data storage destination directory	Specify the name of directory where to store the backup data. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers, so that the backup data of other servers can be used to perform recovery.
listen_addresses	Primary server IP address, host name, or "*"	Specify the IP address or host name of the primary server. Specify the IP address or corresponding host name that will be used to connect to the log transfer network. The content specified is also used to allow connections from client applications. To receive the connection and the transaction log from any client or standby server, specify "*". Refer to "Connections and Authentication" in the PostgreSQL Documentation for details.
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections value	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally. However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to

Parameter	Value set	Explanation
		prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is "on" or "remote_apply" to prevent data loss caused by operating system or server down immediately after a switch or switch.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

*1: Number of simultaneous executions of the mc_ctl command in the status mode.

A.2 Parameters Set on the Standby Server

This section explains the content of the file and parameters set on the standby server. After editing postgresql.conf file, start the instance.

The content for the parameters specified in postgresql.conf file is shown in the table below.

Table A.2 postgresql.conf file

Parameter	Value set	Explanation
wal_level	replica or logical	Specify the output level for the transaction log. Specify "logical" when logical decoding is also to be used.
max_wal_senders	2 or more	Specify "2" when building a Mirroring Controller cluster system. When additionally connecting asynchronous standby servers to the cluster system, add the number of simultaneous connections from these standby servers.
synchronous_standby_names	'*primaryServerName*'	Use single quotation marks (') to enclose the name that will identify the primary server. Any name can be specified. This name will be required to rebuild the original primary server as the new standby server after the primary server was switched. Do not change this parameter while Mirroring Controller is running. Do not specify multiple names to this parameter as the Mirroring Controller can manage only one standby server.
hot_standby	on	Specify whether queries can be run on the standby server. Specify this to execute reference type jobs on the standby server.

Parameter	Value set	Explanation
wal_keep_size	WAL save size (megabytes)	If a delay exceeding the value set in this parameter occurs, the WAL segment required later by the primary server may be deleted. Additionally, if you stop a standby server (for maintenance, for example), consider the stop time and set a value that will not cause the WAL segment to be deleted. Refer to "Estimating Transaction Log Space Requirements" in the Installation and Setup Guide for Server for information on estimating the WAL save size.
wal_log_hints	on	When using the pg_rewind command to recover a standby server, specify this parameter or enable checksums when executing the initdb command.
wal_sender_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that the receiver process (walreceiver) of the transaction log is in an abnormal state on the primary server. The specified value must be larger than the value set for the wal_receiver_status_interval parameter set in the postgresql.conf file of the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
wal_receiver_timeout	Timeout (milliseconds)	Specify the time period after which it is determined that an error has occurred when the transaction log was received on the standby server. By aligning this value with the value for the database process heartbeat monitoring time, you can unify the time after which it is determined that an error has occurred.
backup_destination	Backup data storage destination directory	Specify the name of the backup data storage directory. Set the permissions so that only the instance administrator user can access the specified directory. Specify the same full path on all servers so that the backup data of other servers can be used to perform recovery.
archive_mode	on	Specify the archive log mode.
archive_command	'cmd /c ""installDir\\bin\\pgx_walcopy.cmd" "%p" "backupDataStorageDestinationDir\\archived_wal\\%f""'	Specify the command and storage destination to save the transaction log.
listen_addresses	Standby server IP address, host name, or "*"	Specify the IP address or host name of the standby server. Specify the IP address or corresponding host name that will be used to connect to the log transfer network. The content specified is also used to allow connections from client applications. To receive the connection and the transaction log from any client or standby server, specify "*".

Parameter	Value set	Explanation
		Refer to "Connections and Authentication" in the PostgreSQL Documentation for details.
max_connections	Number of simultaneous client connections to the instance + superuser_reserved_connections value	The value specified is also used to restrict the number of connections from client applications and the number of connections for the management of instances. Refer to "When an Instance was Created with the initdb Command" in the Installation and Setup Guide for Server, and "Connections and Authentication" in the PostgreSQL Documentation, for details.
superuser_reserved_connections	Add the number of simultaneous executions of mc_ctl status (*1) + 2	Specify the number of connections reserved for connections from database superusers. Add the number of connections from Mirroring Controller processes. Also reflect the added value in the max_connections parameter.
restart_after_crash	off	If "on" is specified, or the default value is used for this parameter, behavior equivalent to restarting FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes end abnormally. However, when database multiplexing monitoring is used, a failover will occur after an error is detected when some server processes end abnormally, and the restart of those server processes is forcibly stopped. Specify "off" to prevent behavior such as this from occurring for no apparent reason.
synchronous_commit	on or remote_apply	Specify up to what position WAL send is to be performed before transaction commit processing returns a normal termination response to a client. The recommended value is "on" or "remote_apply" to prevent data loss caused by operating system or server down immediately after a switch or switch.
primary_conninfo	'*streamingReplication ConnectionDestinationInfo*'	Use single quotation marks (') to enclose the connection destination information of the streaming replication. The default value of this parameter is automatically set to postgresql.auto.conf in the procedure to run pg _ basebackup for instance setup.
recovery_target_timeline	latest	Specify "latest" so that the new standby server (original primary server) will follow the new primary server when a switch occurs. This parameter is required when the original primary server is incorporated as a new standby server after the primary server is switched.

A.3 Network Configuration File

This section explains the network configuration file (network.conf) to be defined individually for the database servers and the arbitration server. Define the same content on the primary server and standby server.

For database multiplexing mode, define the network configuration for the following in network.conf.

- Integration between Mirroring Controller processes
- Integration between a Mirroring Controller process and the Mirroring Controller arbitration process

Items to be defined in network.conf

Format:

```
serverIdentifier hostName[,hostName] portNum[,portNum] [serverType]
Or,
serverIdentifier ipAddr[,ipAddr] portNum[,portNum] [serverType]
```

Specify the server identifier, IP address or host name, port number, and server type, using a space as the delimiter.

The items are explained in the table below.

Table A.3 network.conf file

Item	Description
serverIdentifier	Specify any identifier for the server. The maximum length is 64 bytes. Use ASCII characters excluding spaces and number signs (#) to specify this parameter.
ipAddrOrHostName	Specify the IP address or its corresponding host name that will connect to the admin network that performs communication between the database servers, and to the arbitration network that performs communication between a database server and the arbitration server. When specifying two IP addresses or host names delimited by a comma, do not insert a space after the comma. Use ASCII characters excluding spaces to specify the host name.
portNum	A port number cannot be specified if it exceeds the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. Note that the value specified in this parameter must also be set in the services file. When specifying two port numbers delimited by a comma, do not insert a space after the comma.
serverType	Specify "server" for a database server ("server" can be omitted), or "arbiter" for the arbitration server.

Content to be defined on the database servers

This section explains the network.conf content to be defined on the database servers.

The content to be defined depends on the operation settings at the time a heartbeat abnormality is detected.

When automatic degradation by the arbitration server is selected

- Specify definitions related to the admin network and arbitration network.
- Specify the IP address or host name and port number according to the server type (database server or arbitration server) as shown in the table below.

Server type	IP address or host name		Port number	
	First	Second	First	Second
server	IP address or host name used as the admin network	IP address or host name used as the arbitration network (*1)	Port number used as the admin network	Port number used as the arbitration network (*1)
arbiter	IP address or host name of the arbitration server Specify the same value as that specified in the my_address parameter of arbitration.conf on the arbitration server.	Not required	Port number on the arbitration server Specify the same value as that specified in the port parameter of arbitration.conf on the arbitration server.	Not required

*1: This value can be omitted from definitions not related to the local server. If it is omitted, network.conf must be created on both the primary server and standby server.

Example)

IPv4

```
server1 192.0.2.100,192.0.3.100 27540,27541 server
server2 192.0.2.110,192.0.3.110 27540,27541 server
arbiter 192.0.3.120 27541 arbiter
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea7:559f,2001:258:8404:1217:250:56ff:fea8:559f
27540,27541 server
server2 2001:258:8404:1217:250:56ff:fea7:55a0,2001:258:8404:1217:250:56ff:fea8:55a0
27540,27541 server
arbiter 2001:258:8404:1217:250:56ff:fea8:55a0 27541 arbiter
```

When operation other than automatic degradation by the arbitration server is selected

- Specify definitions related to the admin network.
- Define the same content on the primary server and standby server.
- Define lines for database servers only.
- Specify only one IP address or host name and port number.

IP address or host name		Port number	
First	Second	First	Second
IP address or host name to be used as the admin network	Not required	Port number used as the admin network	Not required

Example)

The literal space represents a space.

IPv4

```
server1 192.0.2.100 27540
server2 192.0.2.110 27540
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea7:559f 27540
server2 2001:258:8404:1217:250:56ff:fea7:55a0 27540
```

Content to be defined on the arbitration server

This section explains the network.conf content to be defined on the arbitration server.

- Specify definitions related to the arbitration network.
- Define lines for database servers only.
- For the IP address or host name, specify the same value as the second IP address or host name specified in the database server line in network.conf of the database server.

- For the port number, specify the same value as the second port number specified in the database server line in network.conf of the database server.

Example)

The literal space represents a space.

IPv4

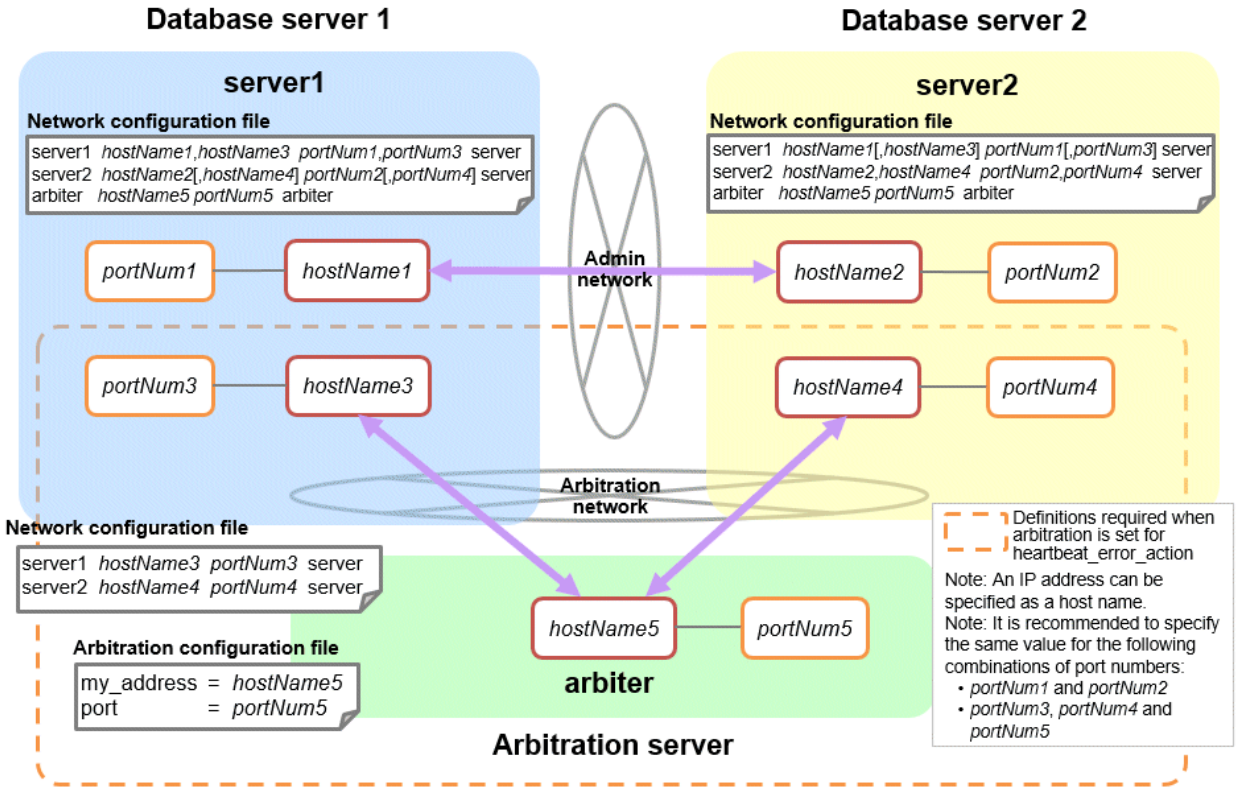
```
server1 192.0.3.100 27541
server2 192.0.3.110 27541
```

IPv6

```
server1 2001:258:8404:1217:250:56ff:fea8:559f 27541
server2 2001:258:8404:1217:250:56ff:fea8:55a0 27541
```

Relationship between network-related definitions

Refer to the diagram below for the relationship between the host names and IP addresses or port numbers specified in the network configuration file (network.conf) and arbitration configuration file (arbitration.conf).



A.4 Server Configuration File

A.4.1 Server Configuration File for the Database Servers

Define the information related to Mirroring Controller monitoring and control in the serverIdentifier.conf file. The maximum length of the server identifier is 64 bytes. Use ASCII characters excluding spaces to specify this parameter.

If the primary server and standby server environments are different, define content that is different, according to the environment.

Table A.4 serverIdentifier.conf file

Parameter	Value set	Explanation
db_instance	*'dataStorageDestinationDir'* [Example] db_instance = 'D:\\database1\\inst1'	Use halfwidth single quotation marks (') to enclose the data storage destination directory that will identify the monitoring target instance. Use ASCII characters, and specify "\\" as the path delimiter.
target_db	postgres or template1	Specify the name of the database to be connected to the database instance. The default is "postgres".
db_instance_username	'*usernameToConnectToDbInstance*'	Specify the username to connect to the database instance. Use ASCII characters to specify this parameter. Specify this parameter if the database administrator user is different from the operating system user who starts Mirroring Controller. Enclose the username of the database superuser in single quotation marks ('). The maximum length of the username is 63 bytes. The default is the operating system user who starts Mirroring Controller.
db_instance_password	'*passwordOfInstanceAdminUser*'	Specify the password used when Mirroring Controller connects to a database instance, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. If password authentication is performed, you must specify this parameter in the settings used when Mirroring Controller connects to a database instance. If you specify this parameter when password authentication is not performed, the parameter will be ignored. If the specified value of this parameter includes ' or \, write \' or \\, respectively.
enable_hash_in_password	on or off	Specify on to treat the # in the db_instance_password specification as a password character, or off to treat it as a comment. The default is "off".
core_file_path	*'coreFileOutputDir'*	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters, and specify "\\" as the path delimiter. If this parameter is omitted, it will be assumed that the Mirroring Controller management directory was specified.
db_instance_service_name	'*registeredServiceNameOfFujitsuEnterprisePostgresInstance*'	Specify the registered service name of the FUJITSU Enterprise Postgres instance in the Windows service. Use ASCII characters to specify this parameter, enclosed in single quotation marks (').
mc_service_name	'*registeredServiceNameOfMirroringController*'	Specify the Mirroring Controller service name registered in the Windows service. Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter, enclosed in single quotation marks (').

Parameter	Value set	Explanation
		The maximum length of the service name is 124 bytes. The default is 'MirroringControllerOpen'.
event_source(*1)	'*eventSourceName*'	Specify the event source name to be used to identify the Mirroring Controller message in the event log, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. The maximum length of the event source name is 255 bytes. The default is 'MirroringControllerOpen'.
remote_call_timeout	Admin communication timeout	Specify the timeout value (milliseconds) of the Mirroring Controller agent process for communication between servers. Specify a value between 0 and 2147483647 to be less than the operation system TCP connection timeout (*2). The value 0 indicates that there is no timeout limit. The default is 70000 milliseconds (70 seconds).
agent_alive_timeout	Timeout for Mirroring Controller process heartbeat monitoring (seconds)	If there is no response for at least the number of seconds specified, the Mirroring Controller process is restarted. Specify 0 or a value between 2 and 2147483647. The value 0 indicates that there is no timeout limit. The default is 0 seconds.
heartbeat_error_action	Operation when a heartbeat abnormality is detected using operating system or server heartbeat monitoring	arbitration: Perform automatic degradation using the arbitration server. command: Call a user exit to determine degradation, and perform automatic degradation if required. message: Notify messages. fallback: Perform automatic degradation unconditionally. The default is "arbitration". Set the same value on the primary server and standby server.
heartbeat_interval	Interval time for abnormality monitoring during heartbeat monitoring of the operating system or server (milliseconds)	Abnormality monitoring of the operating system or server is performed at the interval specified in heartbeat_interval. If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout. Specify a value between 1 and 2147483647. The specified value is used as the default for db_instance_check_interval and disk_check_interval. The default is 800 milliseconds.
heartbeat_timeout	Timeout for abnormality monitoring during heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected.

Parameter	Value set	Explanation
		If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout. Specify a value between 1 and 2147483647. The specified value is used as the default for db_instance_check_timeout. The default is 1 second.
heartbeat_retry	Number of retries for abnormality monitoring during heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. If an error is detected, operation will conform to the value specified for heartbeat_error_action. If "arbitration" is specified in heartbeat_error_action, the error detection time during monitoring of the operating system or server becomes longer than when the arbitration server is not used, by up to the value specified for arbitration_timeout. Specify a value between 0 and 2147483647. The specified value is used as the default for db_instance_check_retry and disk_check_retry. The default is 2 times.
db_instance_check_interval	Database process heartbeat monitoring interval (milliseconds)	Heartbeat monitoring of the database process is performed at the interval specified in db_instance_check_interval. This parameter setting is also used for abnormality monitoring of streaming replication. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_interval.
db_instance_check_timeout	Database process heartbeat monitoring timeout (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_timeout.
db_instance_check_retry	Number of retries for database process heartbeat monitoring (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. However, if it detects that the database process is down, it will immediately switch or disconnect regardless of the setting of this parameter. This parameter setting is also used for abnormality monitoring of streaming replication.

Parameter	Value set	Explanation
		Specify a value between 0 and 2147483647. The default number of retries is the value set for heartbeat_retry.
db_instance_timeout_action	none, message, or failover	Specify the behavior for no-response monitoring of the instance. none: Do not perform no-response monitoring. message: Notify messages if an error is detected during no-response monitoring. failover: Perform automatic degradation if an error is detected during no-response monitoring. The default is "failover".
disk_check_interval	Interval time for disk abnormality monitoring (milliseconds)	Abnormality monitoring of disk failure is performed at the interval (milliseconds) specified in disk_check_interval. If the file cannot be created, it will be assumed that an error has occurred that requires the primary server to be switched, or the standby server to be disconnected. Specify a value between 1 and 2147483647. The default is the value set for heartbeat_interval.
disk_check_retry	Number of retries for disk abnormality monitoring (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server to be switched, or the standby server to be disconnected. If an error is detected in succession more than the specified number of times, switch or disconnection will be performed. Specify a value between 0 and 2147483647. The default number of retries is the value set for heartbeat_retry.
tablespace_directory_error_action	message or failover	Specify the behavior to be implemented if an error is detected in the tablespace storage directory. message: Notify messages. failover: Perform automatic degradation. The default is "failover".
arbiter_alive_interval	Interval time for monitoring connection to the Mirroring Controller arbitration process (milliseconds)	A heartbeat is sent to the Mirroring Controller arbitration process at the specified interval. Specify a value between 1 and 2147483647. The default is 16000 milliseconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_alive_timeout	Timeout for monitoring connection to the Mirroring Controller arbitration process (seconds)	If the heartbeat does not respond within the specified number of seconds, the Mirroring Controller arbitration process is determined to have been disconnected, a message is output, and reconnection is attempted. Specify a value between 1 and 2147483647. The default is 20 seconds.

Parameter	Value set	Explanation
		This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_alive_retry	Number of retries for monitoring connection to the Mirroring Controller arbitration process (number of times)	Specify the number of heartbeat retries to be performed if an error is detected in the heartbeat to the Mirroring Controller arbitration process. If the heartbeat does not respond within the specified number of retries, the Mirroring Controller arbitration process is determined to have been disconnected. Specify a value between 0 and 2147483647. The default is 0 times. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_connect_interval	Attempt interval for connection to the Mirroring Controller arbitration process (milliseconds)	Reconnection is attempted at the specified interval if connection fails at startup of the Mirroring Controller process or if the Mirroring Controller arbitration process is disconnected. Specify a value between 1 and 2147483647. The default is 16000 milliseconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbiter_connect_timeout	Timeout for connection to the Mirroring Controller arbitration process (seconds)	If reconnection at startup of the Mirroring Controller process or after disconnection of the Mirroring Controller arbitration process does not succeed within the specified number of seconds, connection to the Mirroring Controller arbitration process is determined to have failed and reconnection is attempted. Specify a value between 1 and 2147483647. The default is 20 seconds. This parameter does not need to be set for operation that does not use the arbitration server.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\mc\ \fencing_dir\\execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes. Any multibyte characters must use the same encoding as the operating system. This parameter must be specified when "command" is set for heartbeat_error_action.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.

Parameter	Value set	Explanation
arbitration_timeout	Arbitration processing timeout in the Mirroring Controller arbitration process (seconds)	The specified value must be at least equal to the value of fencing_command_timeout in the arbitration configuration file, which is the heartbeat monitoring time of the operating system or server. If there is no response for at least the number of seconds specified, the primary server will not be switched and the standby server will not be disconnected. Therefore, perform degradation manually. If the heartbeat_interval, heartbeat_timeout, and heartbeat_retry values are specified in arbitration.conf for the arbitration server, use the arbitration server values to design arbitration_timeout. Specify a value between 1 and 2147483647. The default is 30 seconds. This parameter does not need to be set for operation that does not use the arbitration server.
arbitration_command	'*arbitrationCmdFilePath*' [Setting example] arbitration_command = 'c:\\mc\ \arbitration_dir\ \execute_arbitration_command.bat'	Specify the full path of the arbitration command to be executed when an abnormality is detected by heartbeat monitoring of the operating system or server. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Any multibyte characters must use the same encoding as the operating system. Specify the path using less than 260 bytes. This parameter must be specified when "command" is set for heartbeat_error_action.
arbitration_command_timeout	Arbitration command timeout (seconds)	If the arbitration command does not respond within the specified number of seconds, it is determined that execution of the arbitration command has failed and a signal (SIGTERM) is sent to the arbitration command execution process. Specify a value between 1 and 2147483647. The default is 30 seconds. This parameter can be specified only when "command" is set for heartbeat_error_action.
shutdown_detached_synchronous_standby	on or off	Specify whether to forcibly stop the instance on the standby server when the standby server is disconnected. on: Stop the instance. off: Do not stop the instance. If "on" is specified and the pre-detach command was created, the pre-detach command is executed and then the instance is stopped. The default is "off".
post_switch_command	'*postSwtchCmdFilePath*' [Setting example]	Specify the full path of the command to be called by Mirroring Controller after a new primary server is promoted during a failover of the primary server.

Parameter	Value set	Explanation
	post_switch_command = 'c:\\mc\ \status_change\ \execute_post_switch.bat'	Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes.
post_attach_command	'*postAttachCmdFilePath*' [Setting example] post_attach_command = 'c:\\mc\ \status_change\ \execute_post_attach.bat'	Specify the full path of the command to be called by Mirroring Controller after the standby server is attached to the cluster system. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes.
pre_detach_command	'*preDetachCmdFilePath*' [Setting example] pre_detach_command = 'c:\\mc\ \status_change\ \execute_pre_detach.bat'	Specify the full path of the command to be called by Mirroring Controller before the standby server is disconnected from the cluster system. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes.
status_change_command_timeout	State transition command timeout (seconds)	Specify the timeout value of the post-switch command, post-attach command, and pre-detach command. If the command does not respond within the specified number of seconds, a signal (SIGTERM) is sent to the execution process of the status change command. Specify a timeout between 1 and 2147483647. The default is 20 seconds.
check_synchronous_standby_names_validation	on or off	Specify whether Mirroring Controller is to periodically check during operations whether the synchronous_standby_names parameter in postgresql.conf was changed by an incorrect user operation. However, it is not recommended to enable this parameter, because performing this check causes Mirroring Controller to use the CPU of the database server redundantly and execute SQL statements at high frequency. This parameter is compatible with operations in FUJITSU Enterprise Postgres 9.6 or earlier. The default is "off".
db_instance_ext_pq_conninfo	*'libpqConnectionSSLParmToConnectToDbinstance'*	Specify, in key-value form, the connection parameter for libpq that Mirroring Controller adds when connecting to a database. The connection parametersyou can specify are those related to SSL. Use ASCII characters to specify this parameter. The connection parameter specified in this parameter must also be specified in the db_instance_ext_jdbc_conninfo.
db_instance_ext_jdbc_conninfo	*'JDBCConnectionSSLParmToConnectToDbinstance'*	Specify, in URI form, the connection parameter for JDBC that Mirroring Controller adds when connecting to a database. The connection parametersyou can specify are those related to SSL. Use ASCII characters to specify this parameter. The connection parameter specified in this parameter must also be specified in the db_instance_ext_pq_conninfo.

*1: By using an event source name that is similar to the specified event_source parameter of the postgresql.conf file, the Mirroring Controller output content can be referenced transparently, so log reference is easy.

*2: The operating system TCP connection timeout period is determined by the TCP global parameters initial RTO and maximum SYN retransmits. The remote_call_timeout parameter must be set to a value that is shorter than the timeout period for the operating system TCP connection timeout, so change either parameter as necessary.

The availability of some parameters depends on the value set for the heartbeat_error_action parameter that sets the operation to be performed if heartbeat monitoring of the operating system or server detects a heartbeat abnormality.

Table A.5 Parameter availability depending on the value set for the heartbeat_error_action parameter

Parameter	Value set			
	arbitration	command	message	fallback
arbiter_alive_interval	Y	N	N	N
arbiter_alive_timeout	Y	N	N	N
arbiter_alive_retry	Y	N	N	N
arbiter_connect_interval	Y	N	N	N
arbiter_connect_timeout	Y	N	N	N
arbitration_timeout	Y	N	N	N
arbitration_command	N	R	N	N
arbitration_command_timeout	N	Y	N	N
fencing_command	Y	R	Y	N
fencing_command_timeout	Y	Y	Y	N
shutdown_detached_synchronous_standby	Y	Y	N	N

R: Required

Y: Can be specified

N: Cannot be specified

A.4.2 Arbitration Configuration File

In arbitration.conf, define the information related to arbitration and control of the Mirroring Controller arbitration process.

Linux

Table A.6 arbitration.conf file (Linux)

Parameter	Value set	Description
port	Port number of the Mirroring Controller arbitration process	The specified value must not exceed the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. For the port number of the arbitration server to be specified in network.conf on the database server, specify the same value as the port number specified in this parameter.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	For the IP address or host name of the arbitration server to be specified in network.conf on the database server, specify the same value as the IP address or host name specified in this parameter. IPv4 and IPv6 addresses can be specified.

Parameter	Value set	Description
		Specify the IP address or host name, enclosed in single quotation marks (').
core_file_path	'*coreFileOutputDir*'	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. If this parameter is omitted, it will be assumed that the Mirroring Controller arbitration process management directory was specified.
syslog_facility	Specify LOCAL0, LOCAL1, LOCAL2, LOCAL3, LOCAL4, LOCAL5, LOCAL6, or LOCAL7.	When the import of logs to the syslog is enabled, the value of this parameter will be used for "facility" of the syslog. The default is "LOCAL0".
syslog_ident	'*programName*'	Specify using single quotation marks (') to enclose the program name used to identify the Mirroring Controller arbitration process message in the system log. Use ASCII characters excluding spaces to specify this parameter. The default is 'MirroringControllerArbiter'.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = '/arbiter/fencing_dir/execute_fencing.sh'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Enclose the path in single quotation marks ('). Specify the path using less than 1024 bytes.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
heartbeat_interval(*1)	Interval time for heartbeat monitoring of the operating system or server (milliseconds)	The heartbeat monitoring of the database server is checked at the specified interval and arbitration is performed. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_timeout	Timeout for heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server or standby server to be fenced. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server.

Parameter	Value set	Description
		Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_retry	Number of retries for heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server or standby server to be fenced. If an error is detected in succession more than the specified number of times, fencing will be performed. Specify a value between 0 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.

*1:Refer to "2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring" for information on the tuning parameters for operating system or server abnormality monitoring when using an arbitration server.

Windows

Table A.7 arbitration.conf file (Windows)

Parameter	Value set	Description
port	Port number of the Mirroring Controller arbitration process	The specified value must not exceed the range 0 to 65535. Ensure that the port number does not conflict with other software. Do not specify an ephemeral port that may temporarily be assigned by another program. For the port number of the arbitration server to be specified in network.conf on the database server, specify the same value as the port number specified in this parameter.
my_address	'*ipAddrOrHostNameThatAcceptsConnectionFromMirroringControllerProcessOnDbServer*' [Setting example] my_address = '192.0.3.120'	For the IP address or host name of the arbitration server to be specified in network.conf on the database server, specify the same value as the IP address or host name specified in this parameter. IPv4 and IPv6 addresses can be specified. Specify the IP address or host name, enclosed in single quotation marks (').
core_file_path	'*coreFileOutputDir*'	Specify the directory to which the core file is to be output, enclosed in single quotation marks ('). Use ASCII characters, and specify "\\" as the path delimiter. If this parameter is omitted, it will be assumed that the Mirroring Controller arbitration process management directory was specified.
service_name	'*registeredServiceNameOfMirroringControllerArbitrationProcess*'	Specify the Mirroring Controller arbitration process service name to be registered as a Windows service, enclosed in single quotation

Parameter	Value set	Description
		marks ('). Use ASCII characters excluding forward slash (/) and backslash (\) to specify this parameter. The service name is up to 124 bytes. The default is 'MirroringControllerArbiter'.
event_source	*'eventSourceName'*	Specify the event source name to be used to identify the Mirroring Controller arbitration process message in the event log, enclosed in single quotation marks ('). Use ASCII characters to specify this parameter. The maximum length of the event source name is 255 bytes. The default is 'MirroringControllerArbiter'.
fencing_command	'*fencingCmdFilePath*' [Setting example] fencing_command = 'c:\\arbiter\ \fencing_dir\\execute_fencing.bat'	Specify the full path of the fencing command that fences a database server where an error is determined to have occurred. Specify "\\" as the delimiter. Enclose the path in single quotation marks ('). Specify the path using less than 260 bytes. Any multibyte characters must use the same encoding as the operating system.
fencing_command_timeout	Fencing command timeout (seconds)	If the command does not respond within the specified number of seconds, fencing is determined to have failed and a signal (SIGTERM) is sent to the fencing command execution process. Specify a value between 1 and 2147483647. The default is 20 seconds.
heartbeat_interval(*1)	Interval time for heartbeat monitoring of the operating system or server (milliseconds)	The heartbeat monitoring of the database server is checked at the specified interval and arbitration is performed. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.
heartbeat_timeout	Timeout for heartbeat monitoring of the operating system or server (seconds)	If there is no response for at least the number of seconds specified, it will be assumed that an error has occurred that requires the primary server or standby server to be fenced. Specify a value between 1 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.

Parameter	Value set	Description
heartbeat_retry	Number of retries for heartbeat monitoring of the operating system or server (number of times)	Specify the number of retries to be performed when an error has been detected that requires the primary server or standby server to be fenced. If an error is detected in succession more than the specified number of times, fencing will be performed. Specify a value between 0 and 2147483647. The default is the value specified in *serverIdentifier*.conf of the database server. Specify this parameter to perform optimization taking into account differences in the line load to the admin network and the reduction in the time it takes to degrade.

*1:Refer to "2.11.4 Tuning for Optimization of Degradation Using Abnormality Monitoring" for information on the tuning parameters for operating system or server abnormality monitoring when using an arbitration server.

Appendix B Supplementary Information on Building the Primary Server and Standby Server on the Same Server

The primary server and standby server can be pseudo-configured on the same server for system testing, for example. Out of consideration for performance and reliability, do not use this type of configuration for any other purposes. For this reason, do not use this type of configuration in a production environment.

Note that the setup and operations is the same as if the primary and standby servers are built on different servers.

This appendix provides supplementary information explaining how to configure the primary server and standby server on the same server.

Even if automatic degradation by an arbitration server is set when the primary server and standby server are configured on the same server, there will be no effect of it.

B.1 Backup Data Storage Destination Directory

It is not a problem if the same backup data storage destination directory is used on the primary server and standby server.

B.2 Registering Service Names and Event Source Names in the Windows Service

Ensure that the following names of resources to be registered on the operating system by FUJITSU Enterprise Postgres and Mirroring Controller are not duplicated between the primary server and standby server:

- Service name registered in the Windows service
- Event source name

B.3 How to Execute the mc_ctl Command

When executing the mc_ctl command, specify the server identifier in the --local-server option in order to identify the operation destination server.

Below is an example of starting Mirroring Controller of the server "server1" defined in the network.conf file. For mc_ctl command operations using another mode, also specify the --local-server option.

Define two server identifiers for the same IP address with different port numbers in the network.conf file.

```
Example)
```

```
server1 192.0.2.100 27540
server2 192.0.2.100 27541
```

Ensure that the port numbers of both primary server and standby server do not conflict with any other software.

Enabling automatic switch/disconnection

Start Mirroring Controller of the server "server1":

```
Example)
```

```
> mc_ctl start -M D:\mcdir\inst1 --local-server server1
```

Stop Mirroring Controller of the server "server1":

Example)

```
> mc_ctl stop -M D:\mcdir\inst1 --local-server server1
```

Disabling automatic switch/disconnection

Start Mirroring Controller of the server "server1":

Example)

```
> mc_ctl start -M D:\mcdir\inst1 -F --local-server server1
```

Stop Mirroring Controller of the server "server1":

Example)

```
> mc_ctl stop -M D:\mcdir\inst1 --local-server server1
```

Note

To specify the mc_ctl command with register mode, for registering to the Windows service, and the mc_ctl command with unregister mode, for unregistering from the Windows service, add the --local-server option.

Appendix C User Commands

This appendix describes three categories of commands:

- Fencing command
- Arbitration command
- State transition commands

This appendix describes each category of user command.

C.1 Fencing Command

Format

The syntax for calling the fencing command from the Mirroring Controller process or the Mirroring Controller arbitration process is described below.

Fencing command of the database server

```
fencingCmd executionMode mcDegradationOper cmdServerId targetServerId primarycenter
```

Fencing command of the arbitration server

```
fencingCmd executionMode mcDegradationOper targetServerId
```

Input

Fencing command of the database server

Execution mode

monitor: Detect issues via automatic monitoring of the Mirroring Controller process

command: Mirroring Controller command execution (switch mode or detach mode of the mc_ctl command)

Degradation operation to be performed by Mirroring Controller

switch: Switch

detach: Disconnect

cmdServerId

ID of the database server that called the command

targetServerId

ID of the database server to be fenced

primarycenter

Fixed value

Fencing command of the arbitration server

Execution mode

monitor: Detect issues via automatic monitoring of the Mirroring Controller process

command: Mirroring Controller command execution (switch mode or detach mode of the mc_ctl command)

Degradation operation to be performed by Mirroring Controller

switch: Switch

detach: Disconnect

targetServerId

ID of the database server to be fenced

Output

Return value

0: Mirroring Controller will continue the degradation process.

Other than 0: Mirroring Controller will cancel the degradation process.

Description

Identifies the database server targeted for fencing based on the input server identifier, and implements the process that isolates it from the cluster system.

Notes

- The command is executed by the operating system user who started Mirroring Controller or the Mirroring Controller arbitration process. Therefore, if the command is to be executed by a specific operating system user, change the executing user of the command accordingly.
- The operating system user who started Mirroring Controller or the Mirroring Controller arbitration process must have execution privileges to the command. Otherwise, the degradation process will be canceled.
- From a security point of view, set the access privileges as necessary so that the fencing command is not overwritten and unauthorized operations are not performed by unintended operating system users.
- If the fencing command returns a value other than 0, Mirroring Controller will cancel the degradation process, so it is necessary for the user to check the status of the server, and switch or disconnect it manually.
- Before executing the fencing command, check if the server is already fenced, to avoid the command terminating abnormally.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the degradation process.

Information

The fencing command can be implemented by simply stopping the operating system or server. For example, if stopping the power for the database server, it is possible to use a utility to control the hardware control board in environments equipped with boards compatible with IPMI hardware standard.

Linux

Below is a sample script of a fencing command that powers off the database server using the IPMI tool.

Sample shell script

```
/installDir/share/mcarb_execute_fencing.sh.sample
```

Windows

Below is a sample script of a fencing command that powers off the database server using IPMIUTIL.

Sample shell script

```
installDir\share\mcarb_execute_fencing.bat.sample
```

C.2 Arbitration Command

Format

The syntax for calling the arbitration command from the Mirroring Controller process is described below.

```
arbitrationCmd cmdServerId targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

targetServerId

ID of the database server to arbitrate

primarycenter

Fixed value

Output

Return value

0: The database server to arbitrate has an issue, and Mirroring Controller will continue the degradation process.

Other than 0: The database server to arbitrate is normal, and Mirroring Controller will cancel the degradation process.

Description

Identifies the database server to arbitrate based on the input server identifier, and checks the status of the server.

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called, and the degradation process will be canceled.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the degradation process.

C.3 State Transition Commands

State transition commands include the three types of user commands below. Any of the commands can be implemented by Mirroring Controller in conjunction with database server status transitions.

- Post-switch command
- Pre-detach command
- Post-attach command

C.3.1 Post-switch Command

Format

The syntax for calling the post-switch command from the Mirroring Controller process is described below.

```
postswitchCmd serverIdentifier primarycenter
```

Input

serverIdentifier

ID of the database server (new primary server) that was switched

primarycenter

Fixed value

Output

Return value

None

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

C.3.2 Pre-detach Command

Format

The syntax for calling the pre-detach command from the Mirroring Controller process is described below.

```
predetachCmd cmdServerId serverRole targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

Server role

Role of the database server that called the command

primary: Primary

standby: Standby

targetServerId

ID of the standby server to be disconnected from the cluster system

primarycenter

Fixed value

Output

Return value

None

Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called, however, Mirroring Controller will output an error message and continue the process.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

C.3.3 Post-attach Command

Format

The syntax for calling the post-attach command from the Mirroring Controller process is described below.

```
postattachCmd cmdServerId serverRole targetServerId primarycenter
```

Input

cmdServerId

ID of the database server that called the command

Server role

Role of the database server that called the command

primary: Primary

standby: Standby

targetServerId

ID of the standby server to be attached to the cluster system

primarycenter

Fixed value

Output

Return value

None

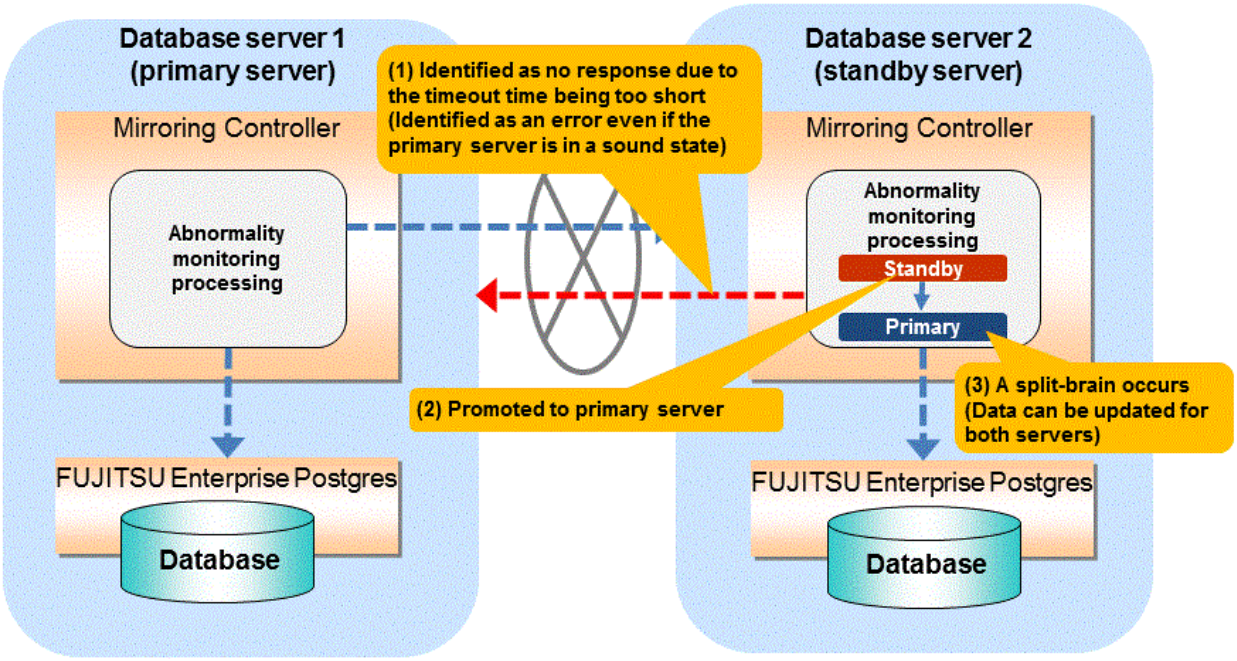
Notes

- The command is executed by the operating system user who started Mirroring Controller.
- The operating system user who started Mirroring Controller must have execution privileges to the command. Otherwise, the command will not be called.
- If the command times out, Mirroring Controller will stop the command, output an error message, and cancel the process.

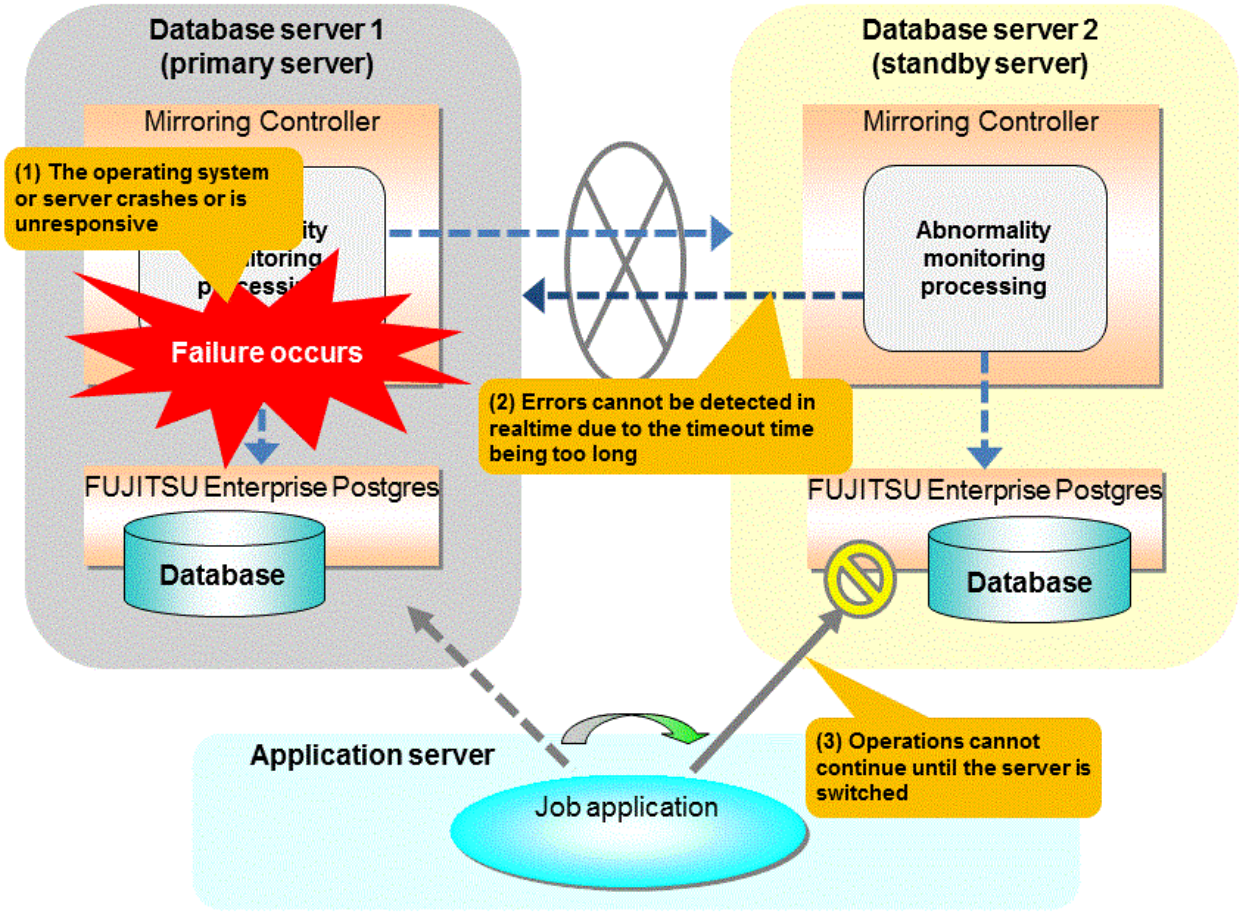
Appendix D Notes on Performing Automatic Degradation Immediately after a Heartbeat Abnormality

The type of issue below occurs if automatic degradation is performed unconditionally after an issue is detected during heartbeat monitoring of an operating system or server, and heartbeat monitoring was not properly tuned.

● If the timeout time is too short



● If the timeout time is too long



Notes on monitoring when the operating system or server crashes or is unresponsive

As illustrated in the diagram above, timeout is used to monitor whether the operating system or server crashes or is unresponsive. Therefore, if tuning has not been performed correctly, there is a risk of a split-brain mistakenly occurring even if the server is in a sound state.

Split-brain is a phenomenon in which both servers temporarily operate as primary servers, causing data updates to be performed on both servers.

Split-brain detection method

It can be confirmed that split-brain occurs under the following conditions:

1. When the mc_ctl command is executed in status mode on both servers, the "host_role" of both servers is output as "primary", and
2. The following message is output to the system log of one of the servers:

```
promotion processing completed (MCA00062)
```

How to recover from a split-brain

Use the procedure described below. Note that the new primary server is the server that was confirmed in step 2 of the aforementioned detection method.

1. Stop all applications that are running on the old and new primary servers.
2. Investigate and recover the database.
   Investigate the update results that have not been reflected to the new primary server from the database of the old primary server, and apply to the new primary server as necessary.
3. Stop the old primary server instance and the Mirroring Controller.

4. Resume the applications that were stopped in step 1.

5. Recover the old primary server.
   While referring to "2.5 Setting Up the Standby Server", build (set up) the old primary server as the new standby server, from the new primary server.

Appendix E Supplementary Procedure on Configuring for Operation in Database Multiplexing Mode

This appendix explains a supplementary procedure on the configuration required for operation in database multiplexing mode.

E.1 Security Policy Settings

This section explains how to configure the security settings to enable an operating system user account designated as an instance administrator user to log on as a service.

1. Displaying the [Local Security Policy] window

   In Windows, select [Administrative Tools], and then click [Local Security Policy].

2. Setting up security

   1. In the [Local Security Policy] window, select [Security Settings], select [Local Policies], and then click [User Rights Assignment].
   2. Under [Policy] in the [User Rights Assignment] window, double-click [Log on as a service].
   3. In the [Log on as a service Properties] window, set the following:
      a. Select the [Local Security Setting] tab.
      b. On the [Local Security Setting] tab, click [Add User or Group].
      c. In the [Select Users or Groups] window, enter the operating system user account of the instance administrator user in [Enter the object names to select].
      d. Click [OK].
   4. In the [Log on as a service Properties] window, click [OK].
   5. From the [Local Security Policy] tree, click [Local Policies], and then double-click [Security Options].
   6. Scroll down and double-click [User Account Control: Behavior of the elevation prompt for administrators in Admin Approval Mode].
   7. From the drop-down menu, select the "Elevate without prompting" in the [Local Security Setting] tab.
   8. Click [OK].

E.2 Windows Firewall Settings

This section explains how to enable the port number used by Mirroring Controller, if the Windows firewall feature is enabled.

Windows Server(R) 2019:

1. In the [Windows Defender Firewall] window, click [Advanced settings] on the left side of the window.
2. In the [Windows Defender Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
3. Click [New Rule] on the right side of the window.
4. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
5. Select [TCP] and [Specific local ports], then specify the port number defined in the network definition file, and then click [Next].
6. Select [Allow the connection], and then click [Next].
7. Select the profiles for which this rule applies, and then click [Next].
8. In [Name], specify the desired name, and then click [Finish].
9. In the [Windows Defender Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

Other than above:

1. In the [Windows Firewall] window, click [Advanced settings] on the left side of the window.
2. In the [Windows Firewall with Advanced Security] window, click [Inbound Rules] on the left side of the window.
3. Click [New Rule] on the right side of the window.
4. In the [New Inbound Rule Wizard] window, select [Port], and then click [Next].
5. Select [TCP] and [Specific local ports], then specify the port number defined in the network definition file, and then click [Next].
6. Select [Allow the connection], and then click [Next].
7. Select the profiles for which this rule applies, and then click [Next].
8. In [Name], specify the desired name, and then click [Finish].
9. In the [Windows Firewall with Advanced Security] window, check if the added rule is enabled under [Inbound Rules] in the center of the window.

Appendix F WebAdmin Disallow User Inputs Containing Hazardous Characters

WebAdmin considers the following as hazardous characters, which are not allowed in user inputs.

```
| (pipe sign)

& (ampersand sign)

; (semicolon sign)

$ (dollar sign)

% (percent sign)

@ (at sign)

' (single apostrophe)

" (quotation mark)

\' (backslash-escaped apostrophe)

\" (backslash-escaped quotation mark)

<> (triangular parenthesis)

() (parenthesis)

+ (plus sign)

CR (Carriage return, ASCII 0x0d)

LF (Line feed, ASCII 0x0a)

, (comma sign)

\ (backslash)
```

Appendix G Collecting Failure Investigation Data

If the cause of an error that occurs while building the environment or during operations is unclear, data must be collected for initial investigation.

This appendix describes how to collect data for initial investigation.

Use FJQSS (Information Collection Tool) to collect data for initial investigation.

See

Refer to the following manual for information on how to use FJQSS.

- In the [Apps] menu, select [FJQSS (Information Collection Tool)], and then click [FJQSS User's Guide].

Note

Using a database server to collect data

- When using FJQSS to collect data for initial investigation, a window will be displayed for you to set the following environment variables:
  - Environment variable required for collecting data from the database

    Refer to "Collecting Failure Investigation Data" in the Operation Guide.
  - MCCONTROLDIR

    Set the Mirroring Controller management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller management directory.
- FJQSS operations must be performed by the instance administrator user.

Using an arbitration server to collect data

Linux

- When using FJQSS to collect data for initial investigation, you must set the following environment variables:
  - ARBCONTROLDIR

    Set the Mirroring Controller arbitration process management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller arbitration server management directory.
  - ARBUSER

    Specify the operating system user who started the Mirroring Controller arbitration process.
  - FSEP_SA_HOME

    Set the Server Assistant installation directory.

Windows

- When using FJQSS to collect data for initial investigation, a window will be displayed for you to set the following environment variables:
  - ARBCONTROLDIR

    Set the Mirroring Controller arbitration process management directory.
    Refer to "1.2.1 Mirroring Controller Resources" for information on the Mirroring Controller arbitration server management directory.

Information

FJQSS corresponds the required operating system of FUJITSU Enterprise Postgres described below.

- "Required Operating System" in the Installation and Setup Guide for Server.
- "Required Operating System" in the Installation and Setup Guide for Server Assistant.

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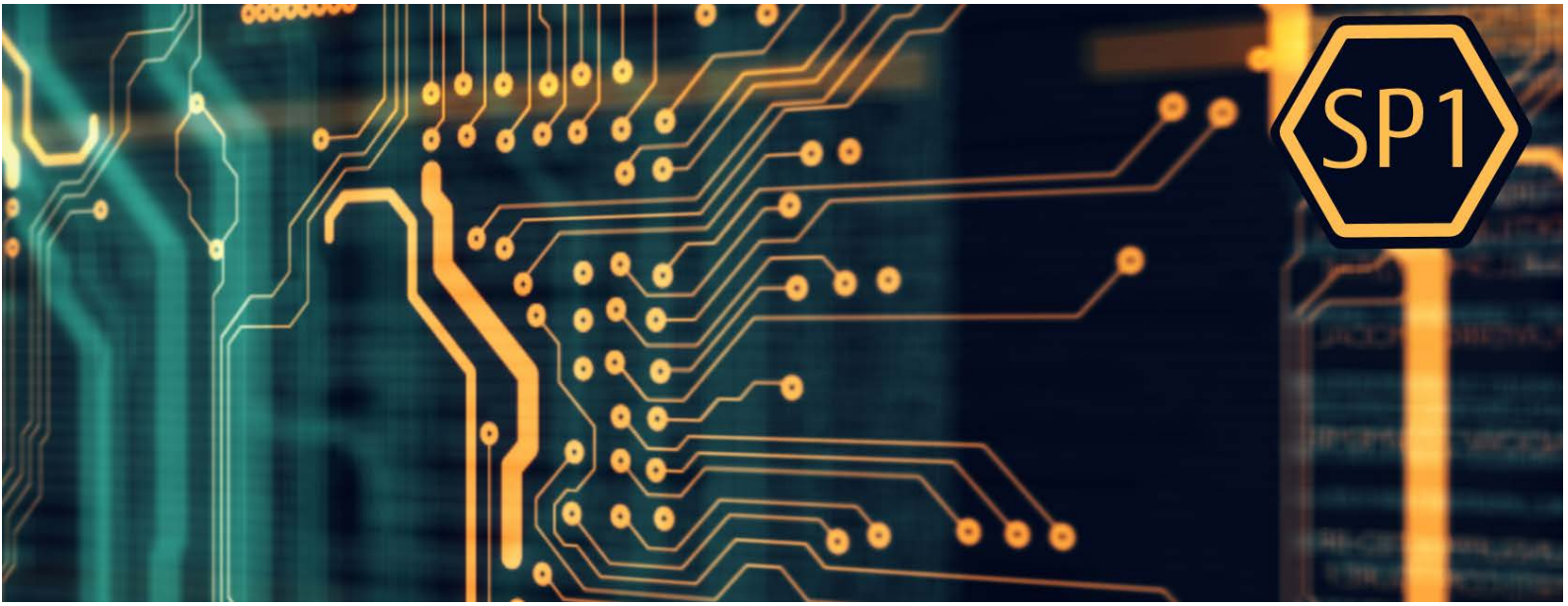

Cluster Operation Guide
PRIMECLUSTER

Linux

J2UL-2679-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document explains the items required to operate FUJITSU Enterprise Postgres on a cluster system that uses PRIMECLUSTER.

Intended readers

This document is aimed at people who install and operate FUJITSU Enterprise Postgres on a cluster system that uses PRIMECLUSTER. Readers of this document are also assumed to have general knowledge of:

- PRIMECLUSTER
- PostgreSQL
- SQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Failover Operation

Provides an overview of failover operation.

Chapter 2 Setting Up Failover Operation

Explains how to set up failover operation.

Chapter 3 Failover Operation

Explains the procedures involved in failover operation.

Chapter 4 Procedures Required after a Failover Error

Explains the procedures required after an abnormality occurs during failover operation.

Appendix A Creating Resources and Creating/Modifying Cluster Applications

Explains how to create and modify cluster applications that include FUJITSU Enterprise Postgres resources.

Appendix B Command Reference

Explains for details in command.

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Chapter 1 Overview of Failover Operation

This chapter provides an overview of failover operation in FUJITSU Enterprise Postgres.

1.1 Definition of Failover Operation

When an abnormality occurs on any of the multiple server devices that make up the cluster system (hereafter referred to as "nodes"), the failover feature transfers a job operating on such a node to another one. Failover can reduce the time for which jobs are stopped when an abnormality occurs, and allows jobs to continue while the node on which the abnormality occurred is recovered.

In FUJITSU Enterprise Postgres, failover can be integrated with PRIMECLUSTER. In such a configuration, the shared disk (GDS) provided by PRIMECLUSTER is used. A server in the cluster system receives the application processing, acting as the active server (active node).

For example, if the active node fails, another server (standby node) inherits the shared disk content and becomes the active node. Using the PRIMECLUSTER feature, the applications to be run on the active node for the database can also be linked with the database and switched. Therefore, jobs can be continued even during recovery of a node where an abnormality has occurred. There is also no need to send the updated content of the database on the active node to the standby node, so the processing performance will be the same as that of a non-cluster system.

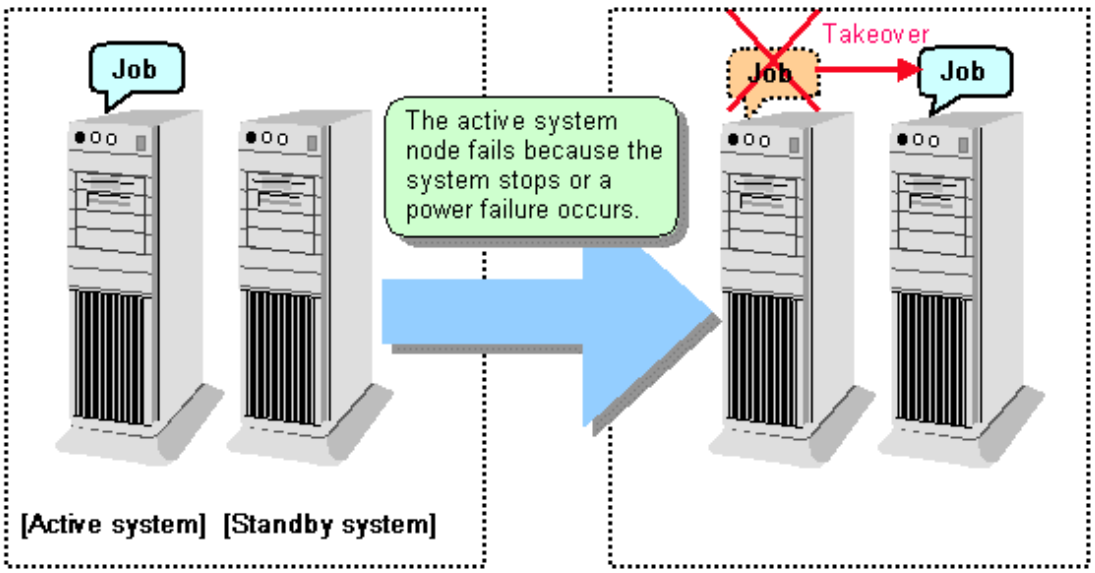
Note

When failover operation is integrated with PRIMECLUSTER, the disk is not referenced by the standby node, and therefore failover operation cannot be used for load distribution.

In addition, failover operation cannot be performed concurrently with database multiplexing.

Hereinafter, failover operation integrated with PRIMECLUSTER is referred to as "failover operation".

Figure 1.1 Concept of failover



Feature of failover operation

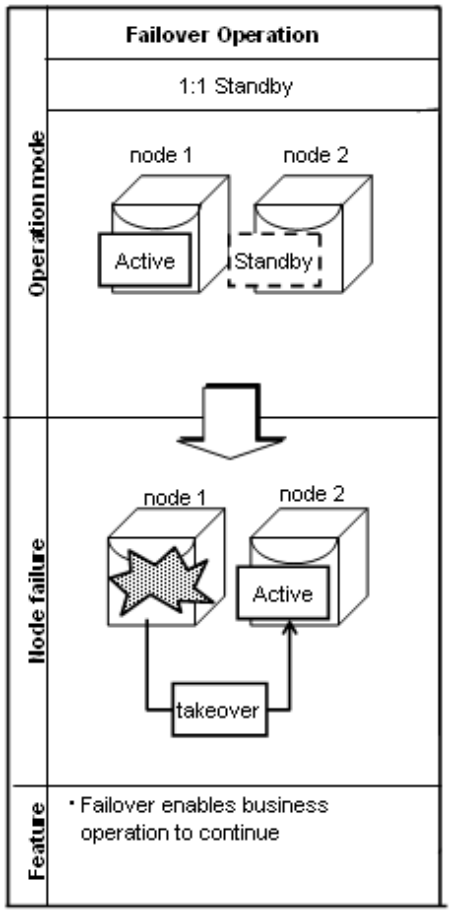
Failover operation in Symfoware Server supports the standby feature.

When an abnormality occurs on a node, the standby feature starts the instance that is the standby system at the time of the switch, and transfers the job to it.

Operation mode of failover operation

The operation mode supported in failover operation in Symfoware Server is 1:1 standby.

1:1 standby is a mode in which one active system or standby system operates on one node. Because failover allows jobs to continue when an abnormality occurs in the active system, this mode allows highly reliable systems to be constructed.



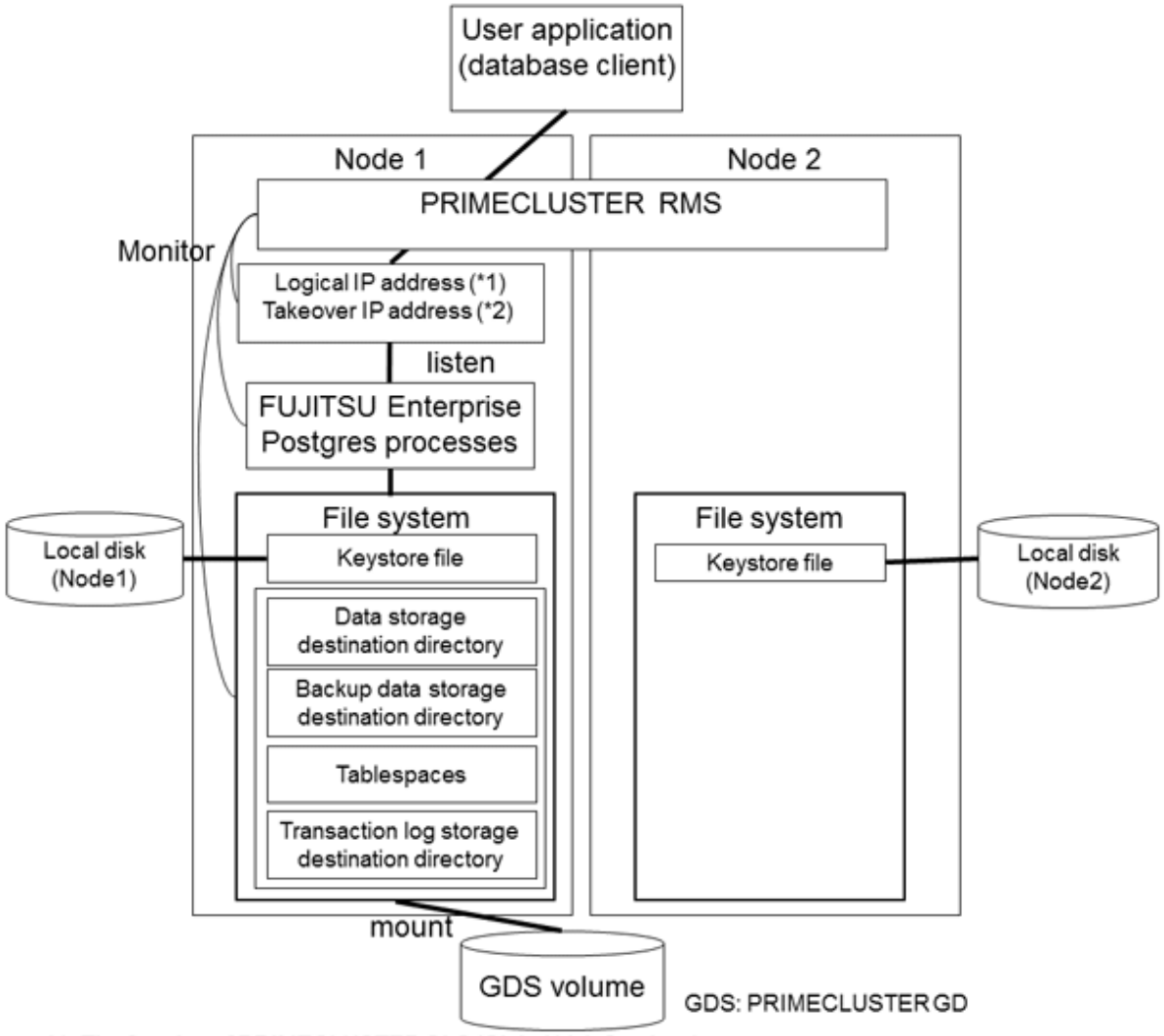
1.2 System Configuration of Failover Operation

In the illustration below, the file system is on a GDS volume (shared disk), mounted on node 1 only.

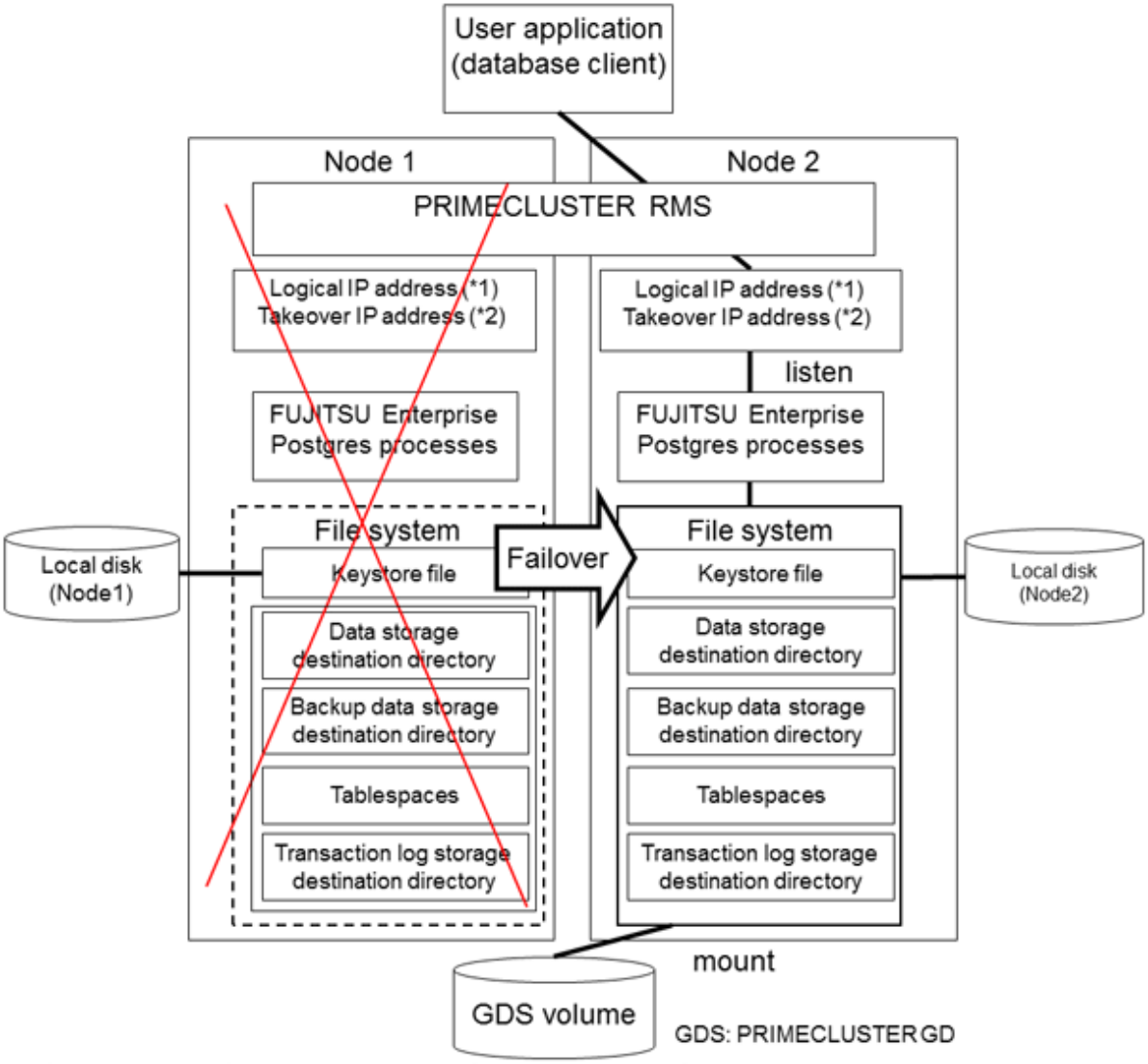
The following FUJITSU Enterprise Postgres resources are located in this file system:

- Data storage destination directory
- Tablespaces
- Backup data storage destination directory
- Transaction log storage destination directory

A FUJITSU Enterprise Postgres process waits for connections of user applications that access the database, on a logical IP address activated on node 1 only or on a takeover IP address.



When an error is detected on node 1, PRIMECLUSTER mounts the file system on node 2, and activates the logical IP address or the takeover IP address on it. The FUJITSU Enterprise Postgres process is also started on node 2. Since the logical IP address or the takeover IP address remains unchanged, the user application can access FUJITSU Enterprise Postgres process on node 2 simply by re-establishing the database connection.



*1: The function of PRIMECLUSTER GLS (Global Link Services)
*2: The function of PRIMECLUSTER Taking over network resource

Chapter 2 Setting Up Failover Operation

Use the procedure in the table below to perform setup:

Step	Work item		Reference
	Active system	Standby system	
1	Installing PRIMECLUSTER and FUJITSU Enterprise Postgres		2.1 Installing PRIMECLUSTER and FUJITSU Enterprise Postgres
2	Configuring PRIMECLUSTER		2.2 Configuring PRIMECLUSTER
3	Creating a GDS volume (*1)		2.3 Creating a GDS Volume
4	Creating a file system (*1)		2.4 Creating a File System
5	Creating a user for the operating system to start FUJITSU Enterprise Postgres		2.5 Creating an Operating System User to Start FUJITSU Enterprise Postgres
6	Mounting the file system		2.6 Mounting the File System
7	Creating a Symfoware database cluster(*1)		2.7 Creating a Symfoware Database Cluster
8	Registering resource information for the FUJITSU Enterprise Postgres database cluster		2.8 Registering Resource Information for the FUJITSU Enterprise Postgres Database Cluster
9	Configuring storage data protection using transparent data encryption (*1)		2.9 Configuring Storage Data Protection Using Transparent Data Encryption
10	Unmounting the file system		2.10 Unmounting the File System
11	Creating a cluster application		2.11 Creating a Cluster Application
12	Application development		2.12 Application Development
13	Checking operation		2.13 Checking Operation

*1: Some settings and operations must also be performed on the standby node. Refer to the relevant sections for details.

Note: GDS: PRIMECLUSTER GD

The sections that follow explain each step.

2.1 Installing PRIMECLUSTER and FUJITSU Enterprise Postgres

Refer to the manual for each product, and then install each product.

See

- Refer to the PRIMECLUSTER Installation and Administration Guide for information on how to install PRIMECLUSTER.
- Refer to the Installation and Setup Guide for Server for information on how to install FUJITSU Enterprise Postgres.

2.2 Configuring PRIMECLUSTER

Configure the initial settings for the cluster.

If using PRIMECLUSTER GL (hereafter referred to as "GLS"), configure the GLS settings.

See

Refer to the PRIMECLUSTER Installation and Administration Guide for information on steps required before setup.

2.3 Creating a GDS Volume

Each of the following FUJITSU Enterprise Postgres resources must be located in a file system on a shared disk:

- Data storage destination directory
- Tablespaces
- Backup data storage destination directory
- Transaction log storage destination directory

Note

- Store data storage destination directories or tablespaces and backup data storage destination directories for these in different GDS classes to guard against file system corruption and the MONITORONLY attribute settings at the time of the Gds resource and Fsystem resource creation.
- It is also recommended that database storage destination directories and transaction log storage destination directories be placed in different groups or different single disks, so that the I/O load is distributed.
- Create a directory for each resource on each node. Ensure that the directories to be mounted have the same path on all nodes.

See

- Refer to the PRIMECLUSTER Installation and Administration Guide for information on GDS volume creation.
- Refer to "Preparing Directories to Deploy Resources" in the Installation and Setup Guide for Server for information on how to create directories.

2.4 Creating a File System

Create a file system.

See

- Refer to the PRIMECLUSTER Installation and Administration Guide for information on how to create a file system on a GDS volume.

2.4.1 Creating a File System

Use the operating system or file system command to create a file system on the GDS volume.

Example)

The example below creates a file system using ext4.

```
# mkfs -t ext4 /dev/sfdsk/class0001/dsk/volume0001
```

2.4.2 Editing Configuration Files

Edit /etc/fstab and /etc/fstab.pcl on each node.

- /etc/fstab

  Comment out each line below by prepending it with "#".

```
#/dev/sfdsk/class0001/dsk/volume0001 /mnt/swdsk1 ext4 noauto 0 0
#/dev/sfdsk/class0001/dsk/volume0002 /mnt/swdsk2 ext4 noauto 0 0
```

- /etc/fstab.pcl

  Copy the entries above, and then replace "#" in each line with "#RMS#", as follows:

```
#RMS#/dev/sfdsk/class0001/dsk/volume0001 /mnt/swdsk1 ext4 noauto 0 0
#RMS#/dev/sfdsk/class0001/dsk/volume0002 /mnt/swdsk2 ext4 noauto 0 0
```

Note

Different files are specified depending on the version of the PRIMECLUSTER. Check the version of PRIMECLUSTER being used and edit appropriate files. Refer to the PRIMECLUSTER Installation and Administration Guide for details.

2.4.3 Checking

Start the GDS volume, and ensure that each file system can be mounted on each node.

```
# mount -t ext4 /dev/sfdsk/class0001/dsk/volume0001 /mnt/swdsk1
# mount -t ext4 /dev/sfdsk/class0001/dsk/volume0002 /mnt/swdsk2
# umount /mnt/swdsk1
# umount /mnt/swdsk2
```

2.5 Creating an Operating System User to Start FUJITSU Enterprise Postgres

Create an operating system user (an OS user that will become the instance administrator) who is to start FUJITSU Enterprise Postgres.

Note

Ensure that the name, UID, and GID of the operating system user (an OS user that will become the instance administrator) who is to start FUJITSU Enterprise Postgres match on all nodes that make up the cluster system.

2.6 Mounting the File System

1. Start the GDS volume if it has not already started.
2. Mount all file systems containing the resources required to create database clusters, such as for the data storage destination directory, as shown below:

```
# mount -t ext4 /dev/sfdsk/class0001/dsk/volume0001 /mnt/swdsk1
```

Note

Create directories in the file system for storing each resource. Each directory must meet certain conditions to be able to create the FUJITSU Enterprise Postgres database cluster. Check the notes in "Preparing Directories to Deploy Resources" in the Installation and Setup Guide for Server.

2.7 Creating a Symfoware Database Cluster

1. Create the database cluster.

   ### Note

   - If the configuration requires password authentication, create a .pgpass file in the home directory of the operating system user who is to start FUJITSU Enterprise Postgres, and then specify a password for the template1 database as this is required. This will be used when PRIMECLUSTER checks the operation of the FUJITSU Enterprise Postgres database server. If authentication fails, a fault will be assumed to have occurred in the database server.
   - The value specified for the port parameter in postgresql.conf needs to be set in the /etc/services files on all nodes.
   - Since postgresql.conf is stored in the data directory, it becomes a common configuration file for each node in the shared disk. Therefore, it must be taken into account that the path set for postgresql.conf must be valid for the FUJITSU Enterprise Postgres server processes started on each node. For example, if a local directory is specified in the core_directory parameter, that local directory must have been created on all nodes.
   - To execute the FUJITSU Enterprise Postgres commands, you must configure the environment variables on each node.
   - Use the initdb command to create a database cluster.
   - Specify "off" for the restart_after_crash parameter in postgresql.conf.
     If "on" is specified, or the default value is used for the restart_after_crash parameter, behaviors equivalent to restarting the FUJITSU Enterprise Postgres, including crash recovery, will be performed when some server processes go down. When linking with PRIMECLUSTER, however, a failover will occur after an error is detected as soon as some server processes go down, and server processes restarting will be forced to stop. This is to inhibit complex behaviors such as processes being canceled in the middle of restarting for no particular meaningful purpose.

2. Check starting, connection, and stopping at each node. The procedure is as follows.

   ### Note

   Queries are issued to monitor the FUJITSU Enterprise Postgres from PRIMECLUSTER. With this connection process, if a password is requested, the monitoring process cannot be continued. For this reason, when checking the connection, ensure that connections can be made without entering a password.

   ### Point

   When monitoring FUJITSU Enterprise Postgres from PRIMECLUSTER, the name of the application that connects to instances is "pgx_wch_svprocess".

1. Check the starting, connection, and stopping at node 1.

   Use the pg_ctl command to start and stop the node.

   For connection, execute the following to ensure that connections can be made without entering a password:

   ```
   su - OsUser
   psql -d template1 -p portNum [ -U dbUser]
   ```

   OsUser: Operating system user to start the FUJITSU Enterprise Postgres
   portNum: Port number specified when the database cluster was created
   dbUser: Database superuser

   If the database superuser is specified at the time of executing the initdb command, or if the database superuser has been changed after the initdb command was executed, specify the user for the -U option. If the database superuser is not specified or changed, omit this.

2. Unmount all file systems containing the resources required to create database clusters (such as the data storage destination directory) on node 1, and stop the GDS volume.

3. Start the GDS volume on node 2, and mount all file systems containing the resources required to create database clusters (such as the data storage destination directory).

4. Check starting, connection, and stopping at node 2.

   Perform the same check as step 1.

5. Unmount all file systems containing the resources required to create database clusters (such as the data storage destination directory) on node 2, and stop the GDS volume.

6. Start the GDS volume on node 1, and mount all file systems containing the resources required to create database clusters (such as the data storage destination directory).

- Refer to "Using the initdb Command" of "Creating an Instance" in the Installation and Setup Guide for Server" for information on how to create a database cluster.
- Refer to "The Password File" in "Client Interfaces" in the PostgreSQL Documentation for information on files for which passwords are set.

2.8 Registering Resource Information for the FUJITSU Enterprise Postgres Database Cluster

1. Use the pgx_pclrsc command to register the database cluster in PRIMECLUSTER - the following is the simplest execution example: The database cluster does not need to be started when executing the command.

   ```
   # pgx_pclrsc -a -c databaseClusterName -u OsUser -D pgData -w workDir -n memberNodes
   ```

Item	Explanation
databaseClusterName	Specify the FUJITSU Enterprise Postgres database cluster name. The database cluster name is case-sensitive. The database cluster name must be as follows: - Up to 16 bytes, and - The first byte must be an ASCII letter, and - The other bytes must be ASCII alphanumeric characters, or underscores (_).

Item	Explanation
OsUser	Specify the operating system user (an OS user that will become the instance administrator) who can start the FUJITSU Enterprise Postgres database server.
pgData	Specify the absolute path of the data storage destination directory specified during database cluster creation.
workDir	Specify the directory for storing the temporary files required for FUJITSU Enterprise Postgres resource monitoring and state transition, and for storing the trace logs required in case of problems. If a parent directory that does not exist is specified, create the directory. The newly created directory path assumes the *OsUser* specified with the -u option as the owner, and 0700 as the privilege Required directory size is twice the size that is specified in the --trace-max-file-size option. If the default value is specified in the --trace-max-file-size option, 10240 KB x 2 is required for the directory size.
memberNodes	Specify the names of all nodes that make up the cluster system. Use a comma (,) to separate each node name. Suffix each cluster node name with the literal "RMS". Specification example: -n node1RMS,node2RMS

Other than the above, the following options can be specified:

Option	Explanation
--db-user=name	Specify the FUJITSU Enterprise Postgres database superuser. The user specified in the -u option is the default.
--response-timeout=seconds	In cluster operations, queries are regularly issued to the server to perform error detection and state monitoring. Specify a timeout time for queries issued for the heartbeat monitoring of the FUJITSU Enterprise Postgres database server. For queries, "SELECT 1" for the database "template1" is used. If 0 is specified, queries will not time out. The default is 0.
--timeout-retry-count=count	Specify the upper limit for the number of retries when queries for monitoring time out. The default is 6 times.
--trace-max-file-size	Specify the maximum size of the trace file. The default is 10240 KB.

Option	Explanation
--watch-interval=seconds	Specify the monitoring interval (the interval with which the queries are issued to the server) for a monitoring program to monitor the FUJITSU Enterprise Postgres database server. The default is 3 seconds.

See

Refer to the "B.1 pgx_pclrsc" for information on the pgx_pclrsc command.

2.9 Configuring Storage Data Protection Using Transparent Data Encryption

If using transparent data encryption, refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide to configure it. Take note on the following when configuring it:

Location of the keystore file

Do not specify a shared disk for the keystore_location parameter in postgresql.conf. Instead, specify a local directory with the same path on all nodes that comprise the cluster application.

If a shared disk is specified, startup from the cluster application will fail. This is because the keystore.aks file, which is generated when automatic opening of the keystore is enabled, is obfuscated so that it can only be read on the node where it was generated, and therefore it cannot be shared across the shared disk.

Distribution of the keystore file

The master encryption key settings must be common across all nodes. For this reason, configure the master encryption key settings on one node, and then copy the keystore file to each node. Also, if the master encryption key or passphrase is changed, you must also copy the keystore file to each node.

Enabling automatic opening of the keystore

Automatic opening of the keystore must be enabled in all nodes that comprise the cluster application. Note that, when enabling the automatic opening of the keystore, only the directory in which the keystore file is stored will be referenced, therefore tasks such as starting and stopping the GDS volume are not required.

If it is not enabled, then startup from the cluster application will fail. This is because the startup process will not finish, since it waits for the manual input of the passphrase that opens the keystore.

2.10 Unmounting the File System

1. Unmount all file systems containing the resources required to create database clusters (such as the data storage destination directory).

```
# umount /mnt/swdsk1
```

2. Stop the GDS volume.

2.11 Creating a Cluster Application

Refer to "Appendix A Creating Resources and Creating/Modifying Cluster Applications".

2.12 Application Development

This section explains points to consider when creating applications during cluster operations.

2.12.1 Precautions when Developing Applications

To specify the IP address specified by the application, specify the IP address specified when creating the Gls resource or creating the takeover network resource. When state transition occurred, the operation can continue only by re-execute without changing the application.

Refer to "A.1.5 Creating Gls or Takeover Network Resources" for details.

2.12.2 Corrective Action with Application when State Transition Occurs

When the application running on the another node such as an application server, access the Symfoware Server, the following describes the error information to be returned when an abnormality or the like occurs in the node where FUJITSU Enterprise Postgres operates, and the actions.

JDBC driver

State		Error information(*1)	Action
Node failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 08006	After the switch is complete, reestablish the connection, or re-execute the application.
	Accessed during node/system failure	08001	
Switch to the standby node	Switched during access	57P01 08006	
	Accessed during switch	08001	

*1: Return value of the getSQLState() of SQLException.

ODBC driver

State		Error information(*1)	Action
Node failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 08S01	After the switch is complete, reestablish the connection, or re-execute the application.
	Accessed during node/system failure	08001	
Switch to the standby node	Switched during access	57P01 08S01	
	Accessed during switch	08001	

*1: Return value of SQLSTATE.

.NET Data Provider

State		Error information	Action
Node failure or	Failure occurs during access	57P01 (*1) Empty string (*1)	After the switch is complete, reestablish the

State		Error information	Action
FUJITSU Enterprise Postgres system failure		NullReferenceException is generated.	connection, or re-execute the application.
	Accessed during node/ system failure	Empty string (*1)	
Switch to the standby node	Switched during access	57P01 (*1) Empty string (*1) NullReferenceException is generated.	
	Accessed during switch	Empty string (*1)	

*1: This is the return value of the PostgresException attribute SqlState.

C library(libpq)

State		Error information	Action
Node failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	After the switch is complete, reestablish the connection, or re-execute the application.
	Accessed during node/system failure	CONNECTION_BAD(*3)	
Switch to the standby node	Switched during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	
	Accessed during switch	CONNECTION_BAD(*3)	

*1: Return value of PQresultStatus().

*2: Return value of PQresultErrorField() PG_DIAG_SQLSTATE.

*3: Return value of PQstatus().

Embedded SQL in C

State		Error information(*1)	Action
Node failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 57P02 YE000 26000 40001	After the switch is complete, reestablish the connection, or re-execute the application.
	Accessed during node/system failure	08001	

State		Error information(*1)	Action
Switch to the standby node	Switched during access	57P01 57P02 YE000 26000 40001	
	Accessed during switch	08001	

*1: Return value of SQLSTATE

Embedded SQL in COBOL

State		Error information(*1)	Action
Node failure or FUJITSU Enterprise Postgres system failure	Failure occurs during access	57P01 57P02 YE000 26000 40001	After the switch is complete, reestablish the connection, or re-execute the application.
	Accessed during node/system failure	08001	
Switch to the standby node	Switched during access	57P01 57P02 YE000 26000 40001	
	Accessed during switch	08001	

*1: Return value of SQLSTATE.

2.13 Checking Operation

To ensure that the environment settings have been configured correctly, start, switch, and stop from Web-Based Admin View, and check the behavior.

To do a failover test, follow the procedure below.

1. Stop the FUJITSU Enterprise Postgres server processes by pg_ctl command with immediate mode.

   Example)

   ```
   # pg_ctl stop -m immediate
   ```

2. Check whether switching was done correctly.

Note

FUJITSU Enterprise Postgres uses the su(1) command to periodically monitor its resources.

Therefore, in a RHEL environment, after a cluster system is built, operating system messages relating to the su(1) command will be periodically output to /var/log/messages during cluster system operation.

Refer to the relevant manual of your operating system for information on how to control these messages.

Chapter 3 Failover Operation

This chapter explains the procedures involved in failover operation.

3.1 Adding Tablespaces

This section explains how to add tablespaces to a new file system.

This procedure is not required when you are adding tablespaces to an existing file system.

Perform the following steps when using a new shared disk class:

- Stop RMS on all nodes.
- Perform setup as described from "2.3 Creating a GDS Volume" to "2.4 Creating a File System".
- Modify the cluster application (refer to "A.2 Modifying Cluster Applications" for details).

Perform the following steps when using a new shared disk class:

- Stop RMS on all nodes.
- Perform the setup as described in "2.4 Creating a File System".

  If a new GDS volume is to be used, the GDS volume must be created in advance.
- Modify the cluster application (refer to "A.2 Modifying Cluster Applications" for details).

3.2 Modifying Database Cluster Resources

This section explains the following operations:

- Displaying database cluster resource information
- Modifying database cluster resource content
- Deleting a database cluster resource

Displaying database cluster resource information

Execute the pgx_pclrsc command as shown below (note that if -c is not specified, the command lists all registered database cluster names):

```
# pgx_pclrsc -p -c databaseClusterName
```

Modifying database cluster resource content

1. Stop RMS.
2. Execute the pgx_pclrsc command as shown below (this is the simplest example):

```
# pgx_pclrsc -d -c databaseClusterName
# pgx_pclrsc -a -c databaseClusterName -u OsUser -D pgData -w workDir -n memberNodes
```

If you are modifying resource content, first delete the FUJITSU Enterprise Postgres resource from the cluster application, and then re-create it.

Refer to "B.1 pgx_pclrsc" for information on the pgx_pclrsc command.

Deleting a database cluster resource

1. Stop RMS.
2. Delete the FUJITSU Enterprise Postgres resource from the cluster application.
3. Execute the pgx_pclrsc command as shown below:

```
# pgx_pclrsc -d -c databaseClusterName
```

Note

The directory specified in the -w option of the pgx_pclrsc command during registration will not be deleted. Use operating system commands to delete it if necessary.

3.3 Operations under Normal Circumstances

Starting and stopping

For cluster operations, perform starting and stopping from the cluster application. If starting and stopping are performed by using the pg_ctl command or WebAdmin during failover operation, the cluster application will misjudge that services have gone down, resulting in unexpected behaviors.

Note

Issuing a query to monitor Fujitsu Enterprise Postgres from PRIMECLUSTER.

If a query is issued during startup or shutdown, the following message may be printed, but this is not a problem.

```
FATAL: Database system is in the process of starting
```

```
FATAL: Database system is shutting down
```

Switching

There are two ways to switch between the active node and the standby node, as shown below.

Under normal circumstances, switch using mutual switch. In an emergency, for example when there is no response from the active node, perform forced switch. Forced switch should only be used in emergency scenarios because the differences in FUJITSU Enterprise Postgres stop modes when the active node is offline will cause the statistics to be initialized, and the load will increase as crash recovery is performed after the switch.

- Mutual switch

  Refer to "3.5.2.4 Mutual Switch".

  FUJITSU Enterprise Postgres is stopped with the "fast" mode of the pg_ctl command.

- Forced switch

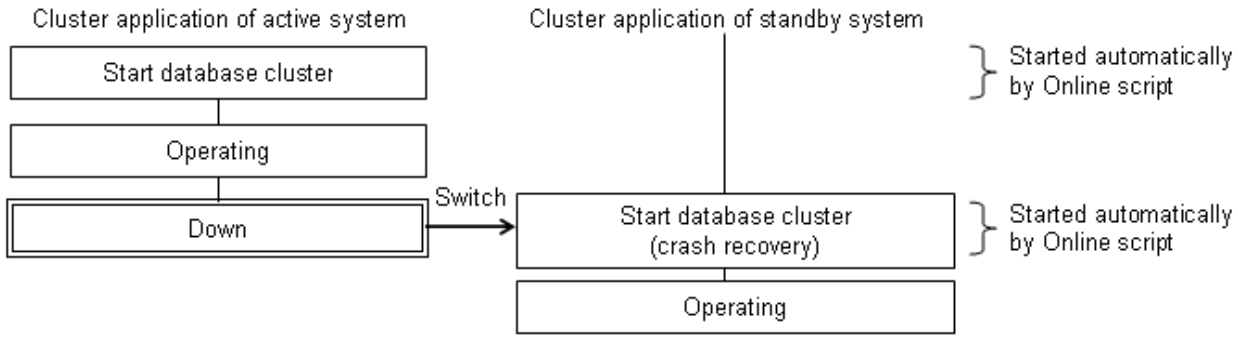
  Right-click the cluster application object, and select [Switch] from the menu. From the switchable nodes displayed in the drop-down menu, select a target node, and switch the cluster application to that node.

  FUJITSU Enterprise Postgres is stopped with the "immediate" mode of the pg_ctl command.

3.4 Operation at State Transition

The workflow for operation at state transition is shown below.

The start operation during failover operation will be performed automatically by the Online script.



Non-transferrable feature

- All transactions being processed by the cluster application on the active system will be rolled back.
- The statistics FUJITSU Enterprise Postgres has collected will be initialized.

  The statistics will be initialized in any of the following cases. Refer to the notes outlined in "Starting and Stopping an Instance" in the Operation Guide for details.

  - When the node goes down because of a kernel panic, for example
  - When forced switch is performed

    Statistics are initialized because the "immediate" mode of the pg_ctl command is used to stop FUJITSU Enterprise Postgres.

    Refer to "3.3 Operations under Normal Circumstances" for details.
  - When an error occurs in the cluster application resources

    Statistics are initialized because the "immediate" mode of the pg_ctl command is used to stop FUJITSU Enterprise Postgres to perform an immediate switch.

Errors during state transition

If an error occurs in a FUJITSU Enterprise Postgres script during cluster application state transition, the following message will be displayed in the switchlog of Cluster Admin (the registered database cluster name will be displayed in the inst1 part shown below):

```
2017-05-14 11:08:22.060:(DET, 3): ERROR: FAULT REASON: Resource <Fsep_inst1> transitioned to a
Faulted state due to a script failure.
```

To display the switchlog, select [Tools] >> [View switchlog] in the [Cluster Admin] window.

If the resource displayed in the error message is a FUJITSU Enterprise Postgres resource name, a message indicating the cause will be output either before the message above or to the system log.

3.5 Maintenance Tasks

When you need to perform tasks such as configuration changes, patch application, and hardware parts replacement that may require restarting, there are two ways of node maintenance. Performing maintenance on both nodes by stopping both active and standby nodes, and performing maintenance on one node at a time by leaving the active node running to perform maintenance on the standby node first, and then switch the active node to perform maintenance on the other node. In this section, the former is referred to as simultaneous stopped node maintenance, whereas the latter is referred to as mutual switch maintenance.

Refer to the tasks outlined below in either "Figure 3.1 Workflow for simultaneous stopped node maintenance" or "Figure 3.2 Workflow for mutual switch maintenance", and perform your maintenance tasks accordingly.

Figure 3.1 Workflow for simultaneous stopped node maintenance

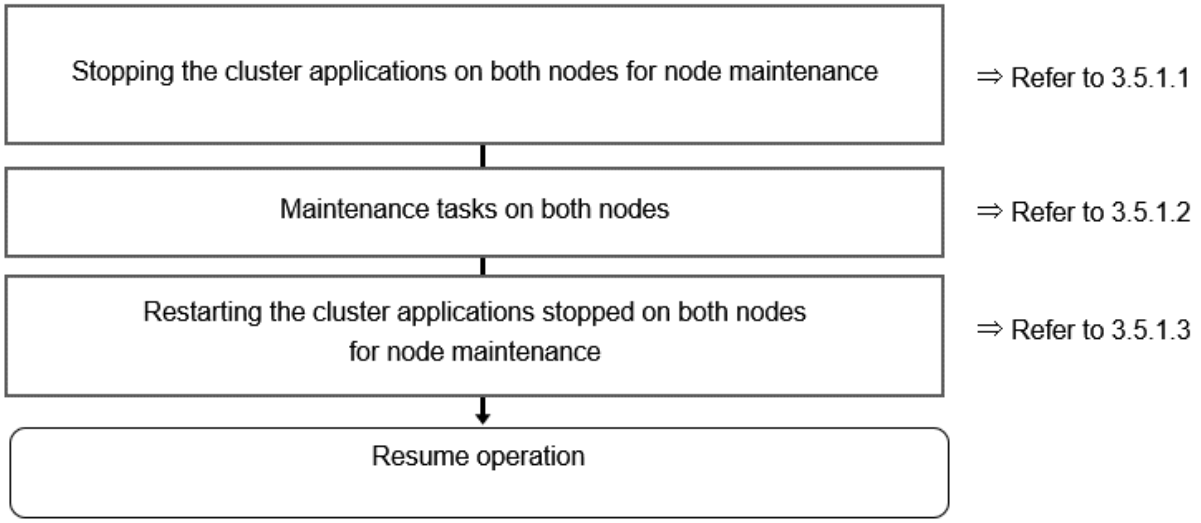
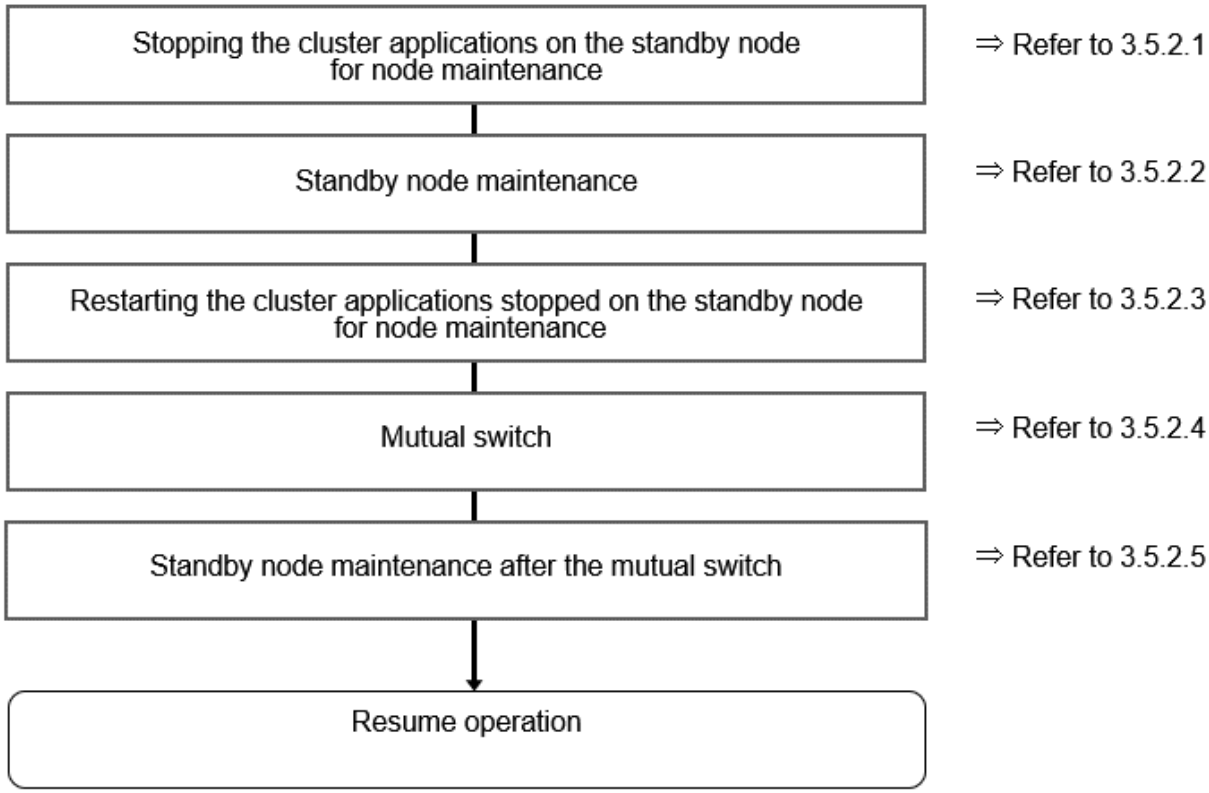


Figure 3.2 Workflow for mutual switch maintenance



3.5.1 Simultaneous Stopped Node Maintenance

This section explains the procedure to perform maintenance on both active and standby nodes simultaneously.

3.5.1.1 Stopping the Cluster Applications on Both Nodes for Node Maintenance

Follow the steps shown below to stop the cluster application on the active and standby nodes:

1. Start the [Cluster Admin] window.

2. Stop the cluster application.

   On the RMS tree in the [Cluster Admin] window, right-click the standby cluster application to be stopped, and select [Offline] from the pop-up menu to stop it.
   Stop the cluster application on both the active and standby nodes.

3. Stop RMS.

   On the RMS tree in the [Cluster Admin] window, right-click the system node where the cluster application to be stopped exists, and select [Shutdown RMS] from the pop-up menu to stop RMS. To perform maintenance without stopping RMS, execute the hvutil -m on command to change the cluster application to maintenance mode.

   Note

   - If applying the FUJITSU Enterprise Postgres update patches, RMS on the node (onto which the patches are applied) must be stopped. This is because the FUJITSU Enterprise Postgres monitoring process that runs when linked with PRIMECLUSTER must be stopped.
   - By stopping RMS, all cluster applications on the system node where RMS is stopped will stop. When you have multiple cluster applications configured, ensure that stopping all other cluster applications will not cause any problems, before stopping RMS.

3.5.1.2 Maintenance Tasks on Both Nodes

Perform maintenance tasks such as configuration changes, patch application, hardware and parts replacement that may require restarting.

3.5.1.3 Restarting the Cluster Applications Stopped on Both Nodes for Node Maintenance

Follow the steps shown below to restart the cluster application on the active and standby nodes.

1. Start the [Cluster Admin] window.
2. If RMS has not been started, select [Tools] >> [Start RMS] in the [Cluster Admin] window, and select the node to be started and click [Ok].

   Note that if the cluster applications were stopped for node maintenance using the hvutil -m on command, execute the hvutil -m off command instead of starting RMS.

3. Start the cluster application.

   On the RMS tree in the [Cluster Admin] window, right-click the standby cluster application, and from the pop-up menu, if you are starting the node as the active node, select [Online], or if you are starting it as the standby node, select [Standby]. If the state is [Fault], then select [Clear fault].

   This operation is not required if the cluster application has been configured to start automatically when RMS is started.

3.5.2 Mutual Switch Maintenance

This section explains the procedure to perform maintenance on the standby node while running the active node at the same time.

3.5.2.1 Stopping the Cluster Applications on the Standby Node for Node Maintenance

Follow the steps shown below to stop the cluster application on the standby node only:

1. Edit the /opt/SMAW/SMAWRrms/bin/hvenv.local file, and add "export HV_RCSTART=0".

   If the hvenv.local file does not exist, then create it.

```
# vi /opt/SMAW/SMAWRrms/bin/hvenv.local
Add export HV_RCSTART=0
```

2. On the RMS tree in the [Cluster Admin] window, right-click the cluster application on the standby node to be stopped, and select [Offline] from the pop-up menu to stop it.

3. On the RMS tree in the [Cluster Admin] window, right-click the system node (where the cluster application on the standby node that was stopped exists), and select [Shutdown RMS]. At this stage, select [Stop all Apps] as the option, and stop RMS.

Note

- Ensure that the steps up to step 3 have been completed properly before performing the maintenance tasks. If the active node goes down at the point when steps 1 and 2 have been completed, FUJITSU Enterprise Postgres will be started on the supposedly stopped standby node, and it becomes the active node instead. As a result, this will compete with the maintenance tasks and unexpected behavior may occur.
- If applying the FUJITSU Enterprise Postgres update patches, RMS on the node (onto which the patches are applied) must be stopped. This is because the FUJITSU Enterprise Postgres monitoring process that runs when linked with PRIMECLUSTER must be stopped.
- By stopping RMS, all cluster applications on the system node where RMS is stopped will stop. When you have multiple cluster applications configured, ensure that stopping all other cluster applications will not cause any problems, before stopping RMS.

3.5.2.2 Standby Node Maintenance

Perform maintenance tasks such as patch application and hardware parts replacement.

3.5.2.3 Restarting the Cluster Applications Stopped on the Standby Node for Node Maintenance

Follow the steps shown below to restart the cluster application on the standby node only (that was stopped for maintenance):

1. Edit the /opt/SMAW/SMAWRrms/bin/hvenv.local file, and delete "export HV_RCSTART=0".

```
# vi /opt/SMAW/SMAWRrms/bin/hvenv.local
Delete export HV_RCSTART=0
```

2. Select [Tools]-[Start RMS] in the [Cluster Admin] window, and select the node to be started and click [Ok].
3. On the RMS tree in the [Cluster Admin] window, right-click the cluster application to be started as the standby node, and select [Standby] from the pop-up menu to start it. If the state is [Fault], then select [Clear fault].

3.5.2.4 Mutual Switch

To perform mutual switch between the active and standby nodes, perform the steps shown below:

1. Select and right-click the cluster application on the active node, and select [Offline] from the pop-up menu to stop it.
2. Select and right-click the cluster application on the standby node, and select [Online] from the pop-up menu to start it.
3. Select and right-click the cluster application that was previously on the active node, and select [Standby] from the pop-up menu to start it as standby.

3.5.2.5 Standby Node Maintenance after the Mutual Switch

To perform maintenance tasks on the new standby node after mutual switch, perform the steps from "3.5.2.1 Stopping the Cluster Applications on the Standby Node for Node Maintenance" to "3.5.2.3 Restarting the Cluster Applications Stopped on the Standby Node for Node Maintenance".

Chapter 4 Procedures Required after a Failover Error

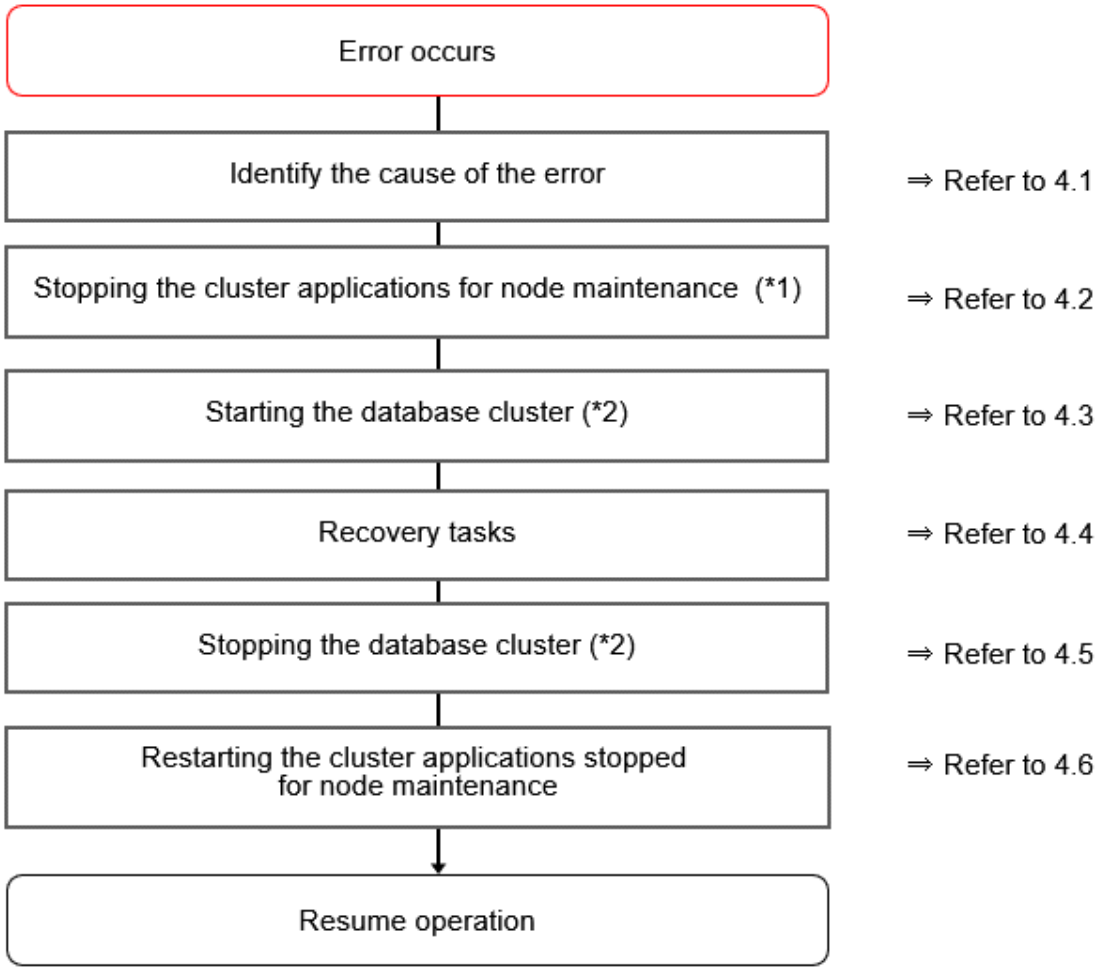
This chapter explains how to perform recovery when an abnormality occurs during failover operation.

When an error occurs during failover operation, refer to the system log to identify the cause and stop the RMS to perform recovery, separately from the RMS management. Normal operations can be resumed by restarting the RMS once the recovery is completed.

Note that the database cluster may be started or stopped without using cluster applications when performing recovery.

Refer to the tasks outlined below in "Figure 4.1 Operation flow when a failover error occurs", and perform recovery.

Figure 4.1 Operation flow when a failover error occurs



*1) If the machine is already stopped when the error occurred, this step is not necessary.

*2) Depending on the recovery tasks, start or stop the database cluster as required.

4.1 Identifying the Cause of an Error

When an error occurs during failover operation, refer to the system log to identify the cause. When cluster applications fail to start, refer to the server.log file to identify the cause.

The server.log file is a file created under the directory specified in the -w option when executing the pgx_pclrsc command. This file has almost the same content as the file specified in the -l option when executing the pg_ctl command to start the database cluster, and errors that are not output to the system log are output to these files, including startup errors.

4.2 Stopping the Cluster Applications for Node Maintenance

When an error occurs during failover operation, stop the RMS to perform recovery, separately from the RMS management. Refer to "3.5 Maintenance Tasks" for information on how to stop cluster applications for node maintenance.

Note that this task is not required in cases such as when the RMS is stopped because the machine is stopped due to an error.

4.3 Starting the Database Cluster

To perform recovery when an error occurs, it is necessary to start the database cluster without using cluster applications.

Follow the procedure below to start the database cluster if required.

Check if the database cluster needs to be started by referring to the recovery tasks written in "Actions When an Error Occurs" in the Operation Guide.

1. Start the GDS volume.
2. Mount the necessary file systems such as those where the data storage destination directory is placed.
3. Start the database cluster by using the pg_ctl command. Refer to "Using Server Commands" in "Starting an Instance and Creating a Database" in the Operation Guide for information on how to start the database cluster.

4.4 Recovery Tasks

Refer to "Actions When an Error Occurs" in the Operation Guide for information on how to perform recovery. If there are two ways available to perform recovery; using WebAdmin or commands, use commands.

4.5 Stopping the Database Cluster

If a database cluster is started, stop the database cluster.

1. Stop the database cluster using the pg_ctl command. Refer to "Using Server Commands" in "Starting an Instance and Creating a Database" in the Operation Guide" for information on how to stop the database cluster.
2. Unmount the file systems such as those where the data storage destination directory is placed.
3. Stop the GDS volume.

4.6 Restarting the Cluster Applications Stopped for Node Maintenance

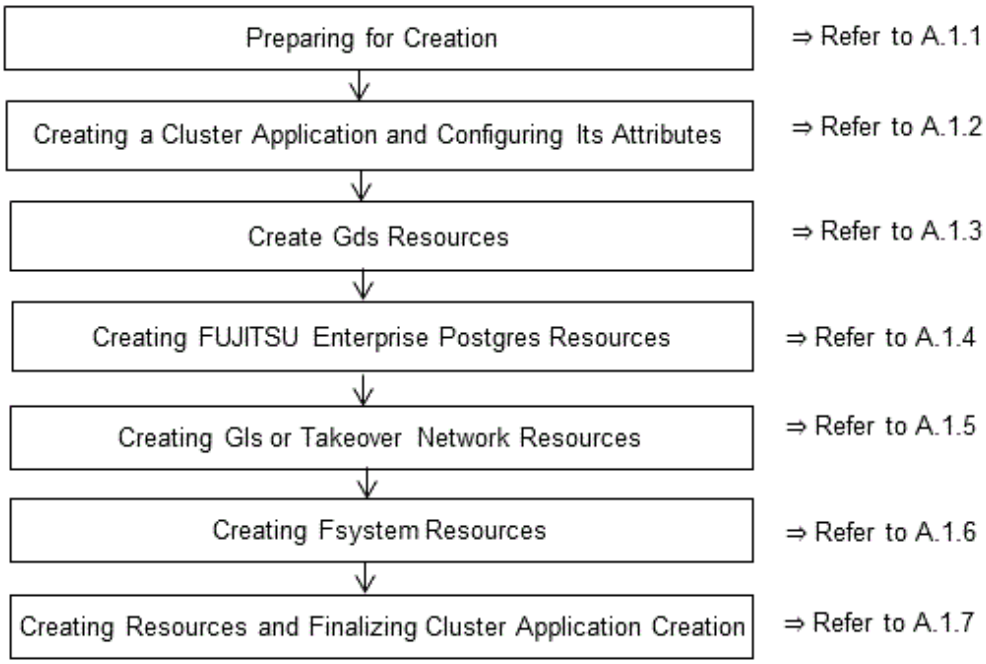
Refer to "3.5 Maintenance Tasks" to restart the cluster applications stopped for node maintenance.

Appendix A Creating Resources and Creating/Modifying Cluster Applications

This appendix explains how to create and modify cluster applications that include FUJITSU Enterprise Postgres resources in PRIMECLUSTER.

A.1 Creating Resources and Cluster Applications

Use the following procedure to create resources and a cluster application:



A.1.1 Preparing for Creation

1. Execute the hvgdsetup command for all shared disk classes to be used by all file systems to be registered in the cluster application.

```
# /opt/SMAW/SMAWRrms/bin/hvgdsetup -a class0001
```

2. From the Web-Based Admin View, stop RMS on all nodes.

3. Execute the hvw command.

```
# /opt/SMAW/SMAWRrms/bin/hvw
```

See

Refer to the PRIMECLUSTER Installation and Administration Guide for information on the hvgdsetup command.

A.1.2 Creating a Cluster Application and Configuring Its Attributes

1. Select [Application-Create].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                10) Configuration-Remove
```

```
 2) QUIT                                11) Configuration-Freeze
 3) Application-Create                  12) Configuration-Thaw
 4) Application-Edit                    13) Configuration-Edit-Global-Settings
 5) Application-Remove                  14) Configuration-Consistency-Report
 6) Application-Clone                   15) Configuration-ScriptExecution
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 3
```

2. Select [STANDBY].

```
Creation: Application type selection menu:
1) HELP                                 7) SCALABLE
2) QUIT                                 8) STANDBY
3) RETURN
4) OPTIONS
5) DEMO
6) GENERIC
Application Type: 8
```

3. Select [Machines+Basics].

```
Settings of turnkey wizard "STANDBY" (APP1:not yet consistent)
1) HELP                                 4) REMOVE+EXIT
2) NO-SAVE+EXIT                         5) ApplicationName=APP1
3) SAVE+EXIT                            6) Machines+Basics(-)
Choose the setting to process: 6
```

Note

Although ApplicationName can be set to any name within the range of constraints of PRIMECLUSTER, do not set it to the database cluster name specified when registering a database cluster to PRIMECLUSTER using the pgx_pclrsc command. If the same name is set, RMS will fail to start.

4. Select [AdditionalMachine].

```
Machines+Basics (app1:consistent)
 1) HELP                                14) (AutoStartUp=no)
 2) -                                   15) (AutoSwitchOver=No)
 3) SAVE+EXIT                           16) (PreserveState=no)
 4) REMOVE+EXIT                         17) (PersistentFault=0)
 5) AdditionalMachine                   18) (ShutdownPriority=)
 6) AdditionalConsole                   19) (OnlinePriority=)
 7) Machines[0]=pcl-vm13RMS             20) (StandbyTransitions=)
 8) (PreCheckScript=)                   21) (LicenseToKill=no)
 9) (PreOnlineScript=)                  22) (AutoBreak=yes)
10) (PostOnlineScript=)                 23) (AutoBreakMaintMode=no)
11) (PreOfflineScript=)                 24) (HaltFlag=no)
12) (OfflineDoneScript=)                25) (PartialCluster=0)
13) (FaultScript=)                      26) (ScriptTimeout=)
Choose the setting to process: 5
```

5. Select a standby node.

```
1) HELP
2) RETURN
3) pcl-vm13RMS
4) pcl-vm14RMS
Choose a machine for this application: 4
```

6. Ensure that all nodes that make up the cluster application are displayed in [Machines]. Note that the item displayed in Machines[0] needs to be the active node, and Machines[1] to be the standby node. If these are not set correctly, modify the setting.

```
Machines+Basics (app1:consistent)
 1) HELP                                15) (AutoStartUp=no)
 2) -                                   16) (AutoSwitchOver=No)
 3) SAVE+EXIT                           17) (PreserveState=no)
 4) REMOVE+EXIT                         18) (PersistentFault=0)
 5) AdditionalMachine                   19) (ShutdownPriority=)
 6) AdditionalConsole                   20) (OnlinePriority=)
 7) Machines[0]=pcl-vm13RMS             21) (StandbyTransitions=)
 8) Machines[1]=pcl-vm14RMS             22) (LicenseToKill=no)
 9) (PreCheckScript=)                   23) (AutoBreak=yes)
10) (PreOnlineScript=)                  24) (AutoBreakMaintMode=no)
11) (PostOnlineScript=)                 25) (HaltFlag=no)
12) (PreOfflineScript=)                 26) (PartialCluster=0)
13) (OfflineDoneScript=)                27) (ScriptTimeout=)
14) (FaultScript=)
Choose the setting to process:
```

7. Configure attributes for cluster applications from step 8.

   Refer to the PRIMECLUSTER Installation and Administration Guide for information on the attributes for cluster applications.

   Configure the attributes as shown below:

Attribute	Value
AutoStartUp (Automatically starts cluster applications when the RMS is started.)	Yes
AutoSwitchOver (Automatically switches nodes when a fault occurs in cluster applications.)	- HostFailure - ResourceFailure - ShutDown
PersistentFault (Selects whether to keep the Faulted state of the cluster application after restarting the RMS.) (*1)	0 or 1
OnlinePriority (Selects whether to use the same online nodes as those used before all clusters were restarted or follow the configured order for nodes, when all clusters were restarted.) (*2)	0 or 1
StandbyTransitions (Timing to perform standby state transition.)	- ClearFaultRequest - StartUp - SwitchRequest
HaltFlag (Selects whether to terminate the node forcibly when another error occurs during the Fault process.)	Yes

*1: If 0 is specified, the Faulted state is automatically canceled when the RMS is started. If 1 is specified, the Faulted state is kept.

*2: If 0 is specified, cluster applications will become Online in accordance with the node setting order when all clusters are restarted. If 1 is specified, cluster applications will become Online on nodes where the cluster applications were Online before the restart.

8. Select [AutoStartUp].

```
Machines+Basics (app1:consistent)
 1) HELP                              15) (AutoStartUp=no)
 2) -                                 16) (AutoSwitchOver=No)
 3) SAVE+EXIT                         17) (PreserveState=no)
 4) REMOVE+EXIT                       18) (PersistentFault=0)
 5) AdditionalMachine                 19) (ShutdownPriority=)
 6) AdditionalConsole                 20) (OnlinePriority=)
 7) Machines[0]=pcl-vm13RMS           21) (StandbyTransitions=)
 8) Machines[1]=pcl-vm14RMS           22) (LicenseToKill=no)
 9) (PreCheckScript=)                 23) (AutoBreak=yes)
10) (PreOnlineScript=)                24) (AutoBreakMaintMode=no)
11) (PostOnlineScript=)               25) (HaltFlag=no)
12) (PreOfflineScript=)               26) (PartialCluster=0)
13) (OfflineDoneScript=)              27) (ScriptTimeout=)
14) (FaultScript=)
Choose the setting to process: 15
```

9. Select [yes].

```
1) HELP
2) RETURN
3) yes
4) no
Set the AutoStartUp mode: 3
```

10. Select [AutoSwitchOver].

```
Machines+Basics (app1:consistent)
 1) HELP                              15) (AutoStartUp=yes)
 2) -                                 16) (AutoSwitchOver=No)
 3) SAVE+EXIT                         17) (PreserveState=no)
 4) REMOVE+EXIT                       18) (PersistentFault=0)
 5) AdditionalMachine                 19) (ShutdownPriority=)
 6) AdditionalConsole                 20) (OnlinePriority=)
 7) Machines[0]=pcl-vm13RMS           21) (StandbyTransitions=)
 8) Machines[1]=pcl-vm14RMS           22) (LicenseToKill=no)
 9) (PreCheckScript=)                 23) (AutoBreak=yes)
10) (PreOnlineScript=)                24) (AutoBreakMaintMode=no)
11) (PostOnlineScript=)               25) (HaltFlag=no)
12) (PreOfflineScript=)               26) (PartialCluster=0)
13) (OfflineDoneScript=)              27) (ScriptTimeout=)
14) (FaultScript=)
Choose the setting to process: 16
```

11. Select [HOSTFAILURE], then [RESOURCEFAILURE], then [SHUTDOWN], and then select [SAVE+RETURN] when the following window is displayed:

```
Set flags for AutoSwitchOver:  Currently set: HOSTFAILURE,RESOURCEFAILURE,SHUTDOWN (HRS)
1) HELP                  4) DEFAULT               7) NOT:RESOURCEFAILURE(R)
2) -                     5) NO(N)                 8) NOT:SHUTDOWN(S)
3) SAVE+RETURN           6) NOT:HOSTFAILURE(H)
Choose one of the flags: 3
```

12. Select [PersistentFault].

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
```

```
 7) Machines[0]=pcl-vm13RMS
 8) Machines[1]=pcl-vm14RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=0)
19) (ShutdownPriority=)
20) (OnlinePriority=)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=no)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process: 18
```

13. Select [0] or [1] (the example below selects [1]).

```
1) HELP
2) RETURN
3) 0
4) 1
Enable persistent fault feature for this application: 4
```

14. Select [OnlinePriority].

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
 7) Machines[0]=pcl-vm13RMS
 8) Machines[1]=pcl-vm14RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=no)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process: 20
```

15. Select [0] or [1] (the example below selects [1]).

```
1) HELP
2) RETURN
3) 0
4) 1
Enable Online Priority (Active Standby) feature for this application: 4
```

16. Select [StandbyTransitions].

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
 7) Machines[0]=pcl-vm13RMS
 8) Machines[1]=pcl-vm14RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=1)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=no)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process: 21
```

17. Select [CLEARFAULTREQUEST], then [STARTUP], then [SWITCHREQUEST], and then select [SAVE+RETURN] when the following window is displayed:

```
Set flags for StandbyTransitions: Currently set: ClearFaultRequst,StartUp,SwitchRequest (CTW)
1) HELP                                5) NOT:CLEARFAULTREQUEST(C)
2) -                                   6) NOT:STARTUP(T)
3) SAVE+RETURN                         7) NOT:SWITCHREQUEST(W)
4) NO(N)
Choose one of the flags: 3
```

18. Select [HaltFlag].

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
 7) Machines[0]=pcl-vm13RMS
 8) Machines[1]=pcl-vm14RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
```

```
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=1)
21) (StandbyTransitions=ClearFaultRequest|StartUp|SwitchRequest)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=no)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process: 25
```

19. Select [yes].

```
1) HELP
2) RETURN
3) yes
4) no
Set the Halt mode: 3
```

20. Ensure that all attributes are displayed as set in the previous steps, and then select [SAVE+EXIT].

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
 7) Machines[0]=pcl-vm13RMS
 8) Machines[1]=pcl-vm14RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=1)
21) (StandbyTransitions=ClearFaultRequest|StartUp|SwitchRequest)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=yes)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process: 3
```

21. The following window will be displayed:

```
Settings of turnkey wizard "STANDBY" (APP1:not yet consistent)
 1) HELP                              10) Enterprise-Postgres(-)
 2) -                                 11) Symfoware(-)
 3) SAVE+EXIT                         12) Procedure:SystemState3(-)
```

```
 4) -                                  13) Procedure:SystemState2(-)
 5) ApplicationName=APP1               14) Gls:Global-Link-Services(-)
 6) Machines+Basics(app1)              15) IpAddresses(-)
 7) CommandLines(-)                    16) LocalFileSystems(-)
 8) Procedure:Application(-)           17) Gds:Global-Disk-Services(-)
 9) Procedure:BasicApplication(-)
Choose the setting to process:
```

A.1.3 Creating Gds Resources

1. Select [Gds:Global-Disk-Services].

```
Settings of turnkey wizard "STANDBY" (APP1:not yet consistent)
 1) HELP                               10) Enterprise-Postgres(-)
 2) -                                  11) Symfoware(-)
 3) SAVE+EXIT                          12) Procedure:SystemState3(-)
 4) -                                  13) Procedure:SystemState2(-)
 5) ApplicationName=APP1               14) Gls:Global-Link-Services(-)
 6) Machines+Basics(app1)              15) IpAddresses(-)
 7) CommandLines(-)                    16) LocalFileSystems(-)
 8) Procedure:Application(-)           17) Gds:Global-Disk-Services(-)
 9) Procedure:BasicApplication(-)
Choose the setting to process:17
```

2. Select [AdditionalDiskClass].

```
Volume management (Gds_APP1:not yet consistent)
1) HELP                  4) REMOVE+EXIT            7) (StandbySupport=no)
2) -                     5) AdditionalDiskClass    8) (AutoRecover=no)
3) SAVE+EXIT             6) (ClassNameFilter=)     9) (Timeout=1800)
Choose the setting to process: 5
```

3. Select a class.

```
1) HELP
2) RETURN
3) FREECHOICE
4) class0001
Choose the disk class: 4
```

4. Follow the steps above for all shared disk classes to be used by all file systems to be registered in the cluster application. When doing so, configure the MONITORONLY attribute as shown in the following table:

Purpose of file system	MONITORONLY attribute
Data storage destination directory	No
Backup data storage destination directory	Yes
Table space	No
Transaction log storage destination directory	No

To set the MONITORONLY attribute to "Yes", select "MONITORONLY".

```
Set a flag for the disk class: class0001
Currently set:
1) HELP                                5) MONITORONLY(M)
2) -
```

```
3) SAVE+RETURN
4) DEFAULT
Choose additionally one of the flags:
```

5. To configure the disk class, select [StandbySupport] and specify "no" - this means that upon failure, the disk will switch according to the purpose of the class.

```
Volume management (Gds_APP1:consistent)
 1) HELP                                6) DiskClasses[0]=class0001
 2) -                                   7) (ClassNameFilter=)
 3) SAVE+EXIT                           8) (StandbySupport=no)
 4) REMOVE+EXIT                         9) (AutoRecover=no)
 5) AdditionalDiskClass                10) (Timeout=1800)
Choose the setting to process: 8
```

6. Select [SAVE+EXIT].

```
Volume management (Gds_APP1:consistent)
 1) HELP                                6) DiskClasses[0]=class0001
 2) -                                   7) (ClassNameFilter=)
 3) SAVE+EXIT                           8) (StandbySupport=no)
 4) REMOVE+EXIT                         9) (AutoRecover=no)
 5) AdditionalDiskClass                10) (Timeout=1800)
Choose the setting to process: 3
```

A.1.4 Creating FUJITSU Enterprise Postgres Resources

1. Select [Enterprise-Postgres].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                               10) Enterprise-Postgres(-)
 2) -                                  11) Symfoware(-)
 3) SAVE+EXIT                          12) Procedure:SystemState3(-)
 4) -                                  13) Procedure:SystemState2(-)
 5) ApplicationName=APP1               14) Gls:Global-Link-Services(-)
 6) Machines+Basics(app1)              15) IpAddresses(-)
 7) CommandLines(-)                    16) LocalFileSystems(-)
 8) Procedure:Application(-)           17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:10
```

2. Select [AdditionalResource].

```
Resource (Fsep_APP1:not yet consistent)
1) HELP                                4) REMOVE+EXIT
2) -                                   5) AdditionalResource
3) SAVE+EXIT
Choose the setting to process: 5
```

3. Select the database cluster name specified in the pgx_pclrsc command in "2.8 Registering Resource Information for the FUJITSU Enterprise Postgres Database Cluster".

```
1) HELP
2) RETURN
3) FREECHOICE
4) inst1
Choose the resource: 4
```

4. Select [SAVE+EXIT].

```
Resource (Fsep_APP1:consistent)
 1) HELP                                6) ResourceName[0]=inst1
 2) -                                   7) Flags[0]=T900
```

```
 3) SAVE+EXIT                          8) OnlineTimeout[0]=3600
 4) REMOVE+EXIT                        9) OfflineTimeout[0]=1800
 5) AdditionalResource                10) FaultScript[0]=''
Choose the setting to process: 3
```

A.1.5 Creating Gls or Takeover Network Resources

Create Gls or takeover network resources to use takeover network resources. This section provides an example for configuring Gl resources.

- Refer to the PRIMECLUSTER Installation and Administration Guide for information on creating takeover network resources.
- Refer to the PRIMECLUSTER Installation and Administration Guide for information on creating Gl resources.

1. Select [Gls:Global-Link-Services].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                               10) Enterprise-Postgres(Fsep_APP1)
 2) -                                  11) Symfoware(-)
 3) SAVE+EXIT                          12) Procedure:SystemState3(-)
 4) -                                  13) Procedure:SystemState2(-)
 5) ApplicationName=APP1               14) Gls:Global-Link-Services(-)
 6) Machines+Basics(app1)              15) IpAddresses(-)
 7) CommandLines(-)                    16) LocalFileSystems(-)
 8) Procedure:Application(-)           17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:14
```

2. Select [AdditionalTakeoverIpaddress].

```
Gls (Gls_APP1:not yet consistent)
1) HELP                                4) REMOVE+EXIT
2) -                                   5) AdditionalTakeoverIpaddress
3) SAVE+EXIT                           6) (Timeout=60)
Choose the setting to process: 5
```

3. Select a takeover IP.

```
1) HELP
2) RETURN
3) FREECHOICE
4) takeoverip
Choose a takeover IP address for Gls: 4
```

4. Select [SAVE+RETURN].

```
Set a flag for takeover IP address: takeoverip
Currently set:
1) HELP                                5) AUTORECOVER(A)
2) -
3) SAVE+RETURN
4) DEFAULT
Choose additionally one of the flags: 3
```

5. Select [SAVE+EXIT].

```
Gls (Gls_APP1:consistent)
1) HELP                                5) AdditionalTakeoverIpaddress
2) -                                   6) TakeoverIpaddress[0]=N,takeoverip
3) SAVE+EXIT                           7) (Timeout=60)
```

```
4) REMOVE+EXIT
Choose the setting to process: 3
```

A.1.6 Creating Fsystem Resources

1. Select [LocalFileSystem].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                              10) Enterprise-Postgres(Fsep_APP1)
 2) -                                 11) Symfoware(-)
 3) SAVE+EXIT                         12) Procedure:SystemState3(-)
 4) -                                 13) Procedure:SystemState2(-)
 5) ApplicationName=APP1              14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)             15) IpAddresses(-)
 7) CommandLines(-)                   16) LocalFileSystems(-)
 8) Procedure:Application(-)          17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:16
```

2. Select [AdditionalMountPoint].

```
File systems (Lfs_APP1:not yet consistent)
1) HELP                  4) REMOVE+EXIT           7) (Timeout=180)
2) -                     5) AdditionalMountPoint
3) SAVE+EXIT             6) (Filter=)
Choose the setting to process: 5
```

3. Select the mount point of the file system.

   For all mount points assigned to the data storage destination directory, the backup data storage destination directory, the tablespace directory, and the transaction log storage destination directory, repeat Steps 3 to 5. Additionally, to register multiple file systems for monitoring, repeat Steps 3 to 5 before proceeding to configure settings for file systems used for the job.

```
1) HELP                              5) /mnt/swdsk1
2) RETURN                            6) /mnt/swdsk2
3) FREECHOICE
4) ALL
Choose a mount point: 5
```

4. Configure the MONITORONLY attribute.

Purpose of the file system	MONITORONLY attribute
Data storage destination directory	No
Backup data storage destination directory	Yes
Table space	No
Transaction log storage destination directory	No

   Select MONITORONLY to specify Yes to the MONITORONLY attribute.

```
Set flags for mount point: /mnt/swdsk1 Currently set: LOCAL,AUTORECOVER (LA)
1) HELP                  4) DEFAULT               7) SHARE(S)
2) -                     5) SYNC(Y)               8) MONITORONLY(M)
3) SAVE+RETURN           6) NOT:AUTORECOVER(A)
Choose one of the flags: 8
```

5. Select [SAVE+RETURN].

```
Set flags for mount point: /mnt/swdsk1 Currently set:
LOCAL,AUTORECOVER, MONITORONLY (LAM)
1) HELP                   4) DEFAULT               7) SHARE(S)
2) -                      5) SYNC(Y)               8) NOT:MONITORONLY(M)
3) SAVE+RETURN            6) NOT:AUTORECOVER(A)
Choose one of the flags: 3
```

6. After configuring all mount points, select [SAVE+EXIT].

```
File systems (Lfs_APP1:consistent)
 1) HELP                                  6) MountPoints[0]=LA:/mnt/monitor1
 2) -                                     7) MountPoints[1]=LA:/mnt/monitor2
 3) SAVE+EXIT                             8) (Filter=)
 4) REMOVE+EXIT                           9) (Timeout=180)
 5) AdditionalMountPoint
Choose the setting to process: 3
```

7. Select [SAVE+EXIT].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                                 10) Enterprise-Postgres(Fsep_APP1)
 2) -                                    11) Symfoware(-)
 3) SAVE+EXIT                            12) Procedure:SystemState3(-)
 4) -                                    13) Procedure:SystemState2(-)
 5) ApplicationName=APP1                 14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)                15) IpAddresses(-)
 7) CommandLines(-)                      16) LocalFileSystems(Lfs_APP1)
 8) Procedure:Application(-)             17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:3
```

See

Refer to the PRIMECLUSTER Installation and Administration Guide for information on creating Fsystem resources.

A.1.7 Creating Resources and Finalizing Cluster Application Creation

1. Select [Configuration-Generate].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                 10) Configuration-Remove
 2) QUIT                                 11) Configuration-Freeze
 3) Application-Create                   12) Configuration-Thaw
 4) Application-Edit                     13) Configuration-Edit-Global-Settings
 5) Application-Remove                   14) Configuration-Consistency-Report
 6) Application-Clone                    15) Configuration-ScriptExecution
 7) Configuration-Generate               16) RMS-CreateMachine
 8) Configuration-Activate               17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 7
```

2. Select [Configuration-Activate].

   If processing is successful, "The activation has finished successfully." will be displayed. If this message is not displayed, there is an issue with the information or configuration that was set. In such a case, review the changed information.

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                 10) Configuration-Remove
```

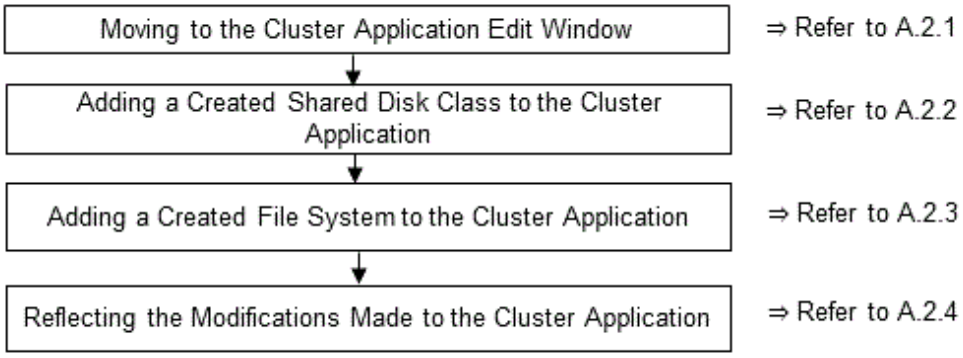
```
 2) QUIT                              11) Configuration-Freeze
 3) Application-Create                12) Configuration-Thaw
 4) Application-Edit                  13) Configuration-Edit-Global-Settings
 5) Application-Remove                14) Configuration-Consistency-Report
 6) Application-Clone                 15) Configuration-ScriptExecution
 7) Configuration-Generate            16) RMS-CreateMachine
 8) Configuration-Activate            17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 8
```

3. Select [QUIT].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                              10) Configuration-Remove
 2) QUIT                              11) Configuration-Freeze
 3) Application-Create                12) Configuration-Thaw
 4) Application-Edit                  13) Configuration-Edit-Global-Settings
 5) Application-Remove                14) Configuration-Consistency-Report
 6) Application-Clone                 15) Configuration-ScriptExecution
 7) Configuration-Generate            16) RMS-CreateMachine
 8) Configuration-Activate            17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 2
```

A.2 Modifying Cluster Applications

Follow the steps shown below to add a new file system to a cluster application. Refer to the PRIMECLUSTER Installation and Administration Guide for information on other modifications on cluster applications. Stop the RMS on all nodes when modifying cluster applications.



A.2.1 Moving to the Cluster Application Edit Window

1. Execute the hvw command.

```
# /opt/SMAW/SMAWRrms/bin/hvw
```

2. Select [Application-Edit].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                              10) Configuration-Remove
 2) QUIT                              11) Configuration-Freeze
 3) Application-Create                12) Configuration-Thaw
 4) Application-Edit                  13) Configuration-Edit-Global-Settings
 5) Application-Remove                14) Configuration-Consistency-Report
 6) Application-Clone                 15) Configuration-ScriptExecution
```

```
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 4
```

3. Select the user application to be used.

```
Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APP1
Application Name: 5
```

A.2.2 Adding a Created Shared Disk Class to the Cluster Application

1. Select [Gds:Global-Disk-Services].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                                10) Enterprise-Postgres(Fsep_APP1)
 2) READONLY                            11) Symfoware(-)
 3) SAVE+EXIT                           12) Procedure:SystemState3(-)
 4) -                                   13) Procedure:SystemState2(-)
 5) ApplicationName=APP1                14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)               15) IpAddresses(-)
 7) CommandLines(-)                     16) LocalFileSystems(Lfs_APP1)
 8) Procedure:Application(-)            17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:17
```

2. Select [AdditionalDiskClass].

```
Volume management (Gds_APP1:consistent)
 1) HELP                                 6) DiskClasses[0]=class0001
 2) NO-SAVE+EXIT                         7) (ClassNameFilter=)
 3) SAVE+EXIT                            8) (StandbySupport=no)
 4) REMOVE+EXIT                          9) (AutoRecover=no)
 5) AdditionalDiskClass                 10) (Timeout=1800)
Choose the setting to process: 5
```

3. Select the created class.

```
1) HELP
2) RETURN
3) FREECHOICE
4) class0001
5) class0002
Choose the disk class: 5
```

4. Select [SAVE+EXIT].

```
Volume management (Gds_APP1:consistent)
 1) HELP                                 7) DiskClasses[1]=class0002
 2) NO-SAVE+EXIT                         8) (ClassNameFilter=)
 3) SAVE+EXIT                            9) (StandbySupport=no)
 4) REMOVE+EXIT                         10) (AutoRecover=no)
 5) AdditionalDiskClass                 11) (Timeout=1800)
 6) DiskClasses[0]=class0001
Choose the setting to process: 3
```

5. Select [SAVE+EXIT] to quit or [LocalFileSystems] to add local file systems.

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                                10) Enterprise-Postgres(Fsep_APP1)
 2) -                                   11) Symfoware(-)
 3) SAVE+EXIT                           12) Procedure:SystemState3(-)
 4) -                                   13) Procedure:SystemState2(-)
 5) ApplicationName=APP1                14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)               15) IpAddresses(-)
 7) CommandLines(-)                     16) LocalFileSystems(Lfs_APP1)
 8) Procedure:Application(-)            17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:
```

A.2.3 Adding a Created File System to the Cluster Application

1. Select [LocalFileSystems].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                                10) Enterprise-Postgres(Fsep_APP1)
 2) -                                   11) Symfoware(-)
 3) SAVE+EXIT                           12) Procedure:SystemState3(-)
 4) -                                   13) Procedure:SystemState2(-)
 5) ApplicationName=APP1                14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)               15) IpAddresses(-)
 7) CommandLines(-)                     16) LocalFileSystems(Lfs_APP1)
 8) Procedure:Application(-)            17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:16
```

2. Select [AdditionalMountPoint].

```
File systems (Lfs_APP1:consistent)
 1) HELP                                 7) MountPoints[1]=LA:/mnt/swdsk2
 2) NO-SAVE+EXIT                         8) (Filter=)
 3) SAVE+EXIT                            9) (Timeout=180)
 4) REMOVE+EXIT
 5) AdditionalMountPoint
 6) MountPoints[0]=LA:/mnt/swdsk1
Choose the setting to process: 5
```

3. After registering the file systems to be used, select [SAVE+EXIT].

```
File systems (Lfs_APP1:consistent)
 1) HELP                                 8) MountPoints[2]=LA:/mnt/swdsk3
 2) NO-SAVE+EXIT                         9) (Filter=)
 3) SAVE+EXIT                           10) (Timeout=180)
 4) REMOVE+EXIT
 5) AdditionalMountPoint
 6) MountPoints[0]= LA:/mnt/swdsk1
 7) MountPoints[1]=LA:/mnt/swdsk2
Choose the setting to process:
```

A.2.4 Reflecting Modifications Made to the Cluster Application

1. Select [SAVE+EXIT].

```
Settings of turnkey wizard "STANDBY" (APP1:consistent)
 1) HELP                                10) Enterprise-Postgres(Fsep_APP1)
 2) -                                   11) Symfoware(-)
 3) SAVE+EXIT                           12) Procedure:SystemState3(-)
 4) -                                   13) Procedure:SystemState2(-)
```

```
 5) ApplicationName=APP1                14) Gls:Global-Link-Services(Gls_APP1)
 6) Machines+Basics(app1)               15) IpAddresses(-)
 7) CommandLines(-)                     16) LocalFileSystems(Lfs_APP1)
 8) Procedure:Application(-)            17) Gds:Global-Disk-Services(Gds_APP1)
 9) Procedure:BasicApplication(-)
Choose the setting to process:3
```

2. Select [RETURN].

```
Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APP1
Application Name: 3
```

3. Select [Configuration-Generate].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                10) Configuration-Remove
 2) QUIT                                11) Configuration-Freeze
 3) Application-Create                  12) Configuration-Thaw
 4) Application-Edit                    13) Configuration-Edit-Global-Settings
 5) Application-Remove                  14) Configuration-Consistency-Report
 6) Application-Clone                   15) Configuration-ScriptExecution
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 7
```

4. Select [Configuration-Activate].

   If processing is successful, "The activation has finished successfully." will be displayed. If this message is not displayed, there is an issue with the information or configuration that was set. In such a case, review the changed information.

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                10) Configuration-Remove
 2) QUIT                                11) Configuration-Freeze
 3) Application-Create                  12) Configuration-Thaw
 4) Application-Edit                    13) Configuration-Edit-Global-Settings
 5) Application-Remove                  14) Configuration-Consistency-Report
 6) Application-Clone                   15) Configuration-ScriptExecution
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 8
```

5. Select [QUIT].

```
pcl-vm13: Main configuration menu, current configuration: config
No RMS active in the cluster
 1) HELP                                10) Configuration-Remove
 2) QUIT                                11) Configuration-Freeze
 3) Application-Create                  12) Configuration-Thaw
 4) Application-Edit                    13) Configuration-Edit-Global-Settings
 5) Application-Remove                  14) Configuration-Consistency-Report
 6) Application-Clone                   15) Configuration-ScriptExecution
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 2
```

Appendix B Command Reference

This appendix explains for details in command.

B.1 pgx_pclrsc

Name

pgx_pclrsc -- Register, unregister, or display FUJITSU Enterprise Postgres database cluster with PRIMECLUSTER as resource of PRIMECLUSTER.

Synopsis

```
pgx_pclrsc  -a  -c  name  -u  osuser  -D directory -w directory
            -n nodes [options...]
pgx_pclrsc -d -c name
pgx_pclrsc -p [-c name]
```

Description

pgx_pclrsc is an utility for registering or unregistering FUJITSU Enterprise Postgres database cluster with PRIMECLUSTER, or displaying settings of FUJITSU Enterprise Postgres database cluster registered with PRIMECLUSTER. Execute the command on a member node of the cluster. Only the super user(root) can execute this command.

Options

-a
--add

Register the specified database cluster with PRIMECLUSTER. If the specified database cluster has already been registered with PRIMECLUSTER, then terminate abnormally.

-c *name*
--db-cluster-name=*name*

Specify database cluster name. name is case-sensitive, and must be within 16 bytes, and an initial letter must be ascii alphabet, and following letters must be ascii alphabet or ascii digit or underscore(_).

-d
--delete

Unregister the specified database cluster from PRIMECLUSTER.

-D directory
--pgdata=*directory*

Specify an absolute path of data directory.

--db-user=*name*

Specify a database super user. Default is the user specified with '-u'.

-n nodes
--member-nodes=*nodes*

Specify names of all member nodes of the cluster. Specfity a cluster node name with uffix "RMS" to the name. Separate names with comma(,). (e.g. -n node1RMS,node2RMS)

-p
--print

Print a list of database clusters registered with PRIMECLUSTER. If -c option is specified, then print settings of the database cluster.

--response-timeout=*seconds*

Specify timeout of the query for health check. It's used with a count specified with '--timeout-retry-num'. The query is "SELECT 1" to the database "template1". If '0', wait infinitely. (default: '0')

--timeout-retry-count=*count*

Specify a limit count of retrying query when timeout is occurred. If retry counter is over the limit, then PRIMECLUSTER considers status of the database server as FAULT. If a query doesn't timeout once, retry counter is reset. (default: '6')

--trace-max-file-size=*size*

Specify max size(KB) of trace file. (default: '10240')

-u osuser
--os-user=*osuser*

Specify an OS user who can start/stop FUJITSU Enterprise Postgres database server.

-w directory
--work-dir=*directory*

Specify a directory for temporary data and trace files. It's used for starting, stopping or checking FUJITSU Enterprise Postgres database server. If the directory doesn't exist, then create it. Owner of the directory created by the command is set to the user specified with '-u'. Permission of the directory created by the command is set to 0700.

--watch-interval=*seconds*

Specify an interval. It's used for the amount of time between health checks. (default: '3')

Diagnostics

0 : On success

otherwise : On error

Notes

Before unregistering a resource, stop RMS of PRIMECLUSTER.

Example

The simplest example of registering a resource.

```
# pgx_pclrsc -a -c inst1 -u postgres -D /mnt/swdsk1/pgdata -w /var/tmp/work -n node1RMS,node2RMS
```

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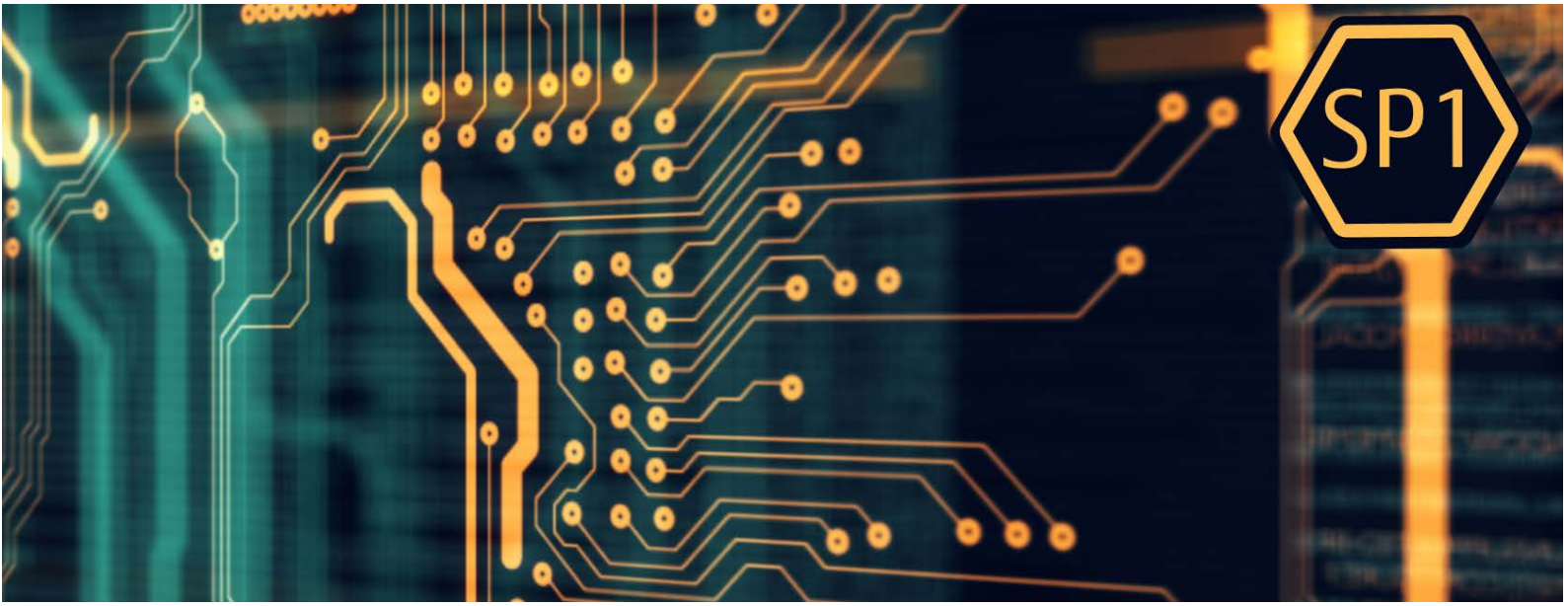

Connection Manager User Guide

Linux

J2UL-2682-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document describes the Connection Manager features of FUJITSU Enterprise Postgres.

Intended readers

This document is aimed at people who use the Connection Manager features.

Readers of this document are also assumed to have general knowledge of:

- FUJITSU Enterprise Postgres
- PostgreSQL
- Linux

Structure of this document

This document is structured as follows:

Chapter 1 Connection Manager Features

Explains the features and Mechanisms of the Connection Manager.

Chapter 2 Setting Up

Explains setting up the Connection Manager.

Chapter 3 Using from an Application

Explains how to use the Connection Manager from an application.

Appendix A System Views

Explains the system view of Connection Manager.

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Chapter 1 Connection Manager Features

The Connection Manager provides the following features:

Heartbeat monitoring feature

Detects kernel panics between the server running the client and the server running the PostgreSQL instance(hereinafter referred to as instance), physical server failures, and inter-server network link downs, and notifies the client or instance. The client is notified as an error event through the SQL connection, and the instance will be notified in the form of a force collection of SQL connections with clients that are out of service.

Transparent connection support feature

When an application wants to connect to an instance of an attribute in a set of instances configured for replication, it can connect to that instance without being aware of which server it is running on.

Information

- The available client drivers for Connection Manager are libpq (C language library) and ECPG (embedded SQL in C).
- The Connection Manager is only available for Linux server and Linux client.

Each function is described below.

1.1 Heartbeat Monitoring Feature

Describes the Connection Manager's heartbeat monitoring feature.

Note

The Connection Manager does not monitor for delays, such as CPU busy occurring in the postmaster process or in the backend processes to which the application connects directly, or for no response, such as due to a software bugs. It also does not monitor application downtime or unresponsiveness. To detect these, use various timeout features provided by PostgreSQL or the client drivers.

1.1.1 Difference from TCP keepalive

A peer of TCP connections cannot automatically detect a link down or server down.

There are two main methods to detect it. One is the operating system (Not all operating systems support it) TCP keepalive feature, and the other is the keepalive-equivalent timeout function implemented at the application layer. Connection Manager's heartbeat monitoring capabilities are categorized as the latter.

The operating system TCP keepalive feature has the following disadvantages, but the Connection Manager's heartbeat monitoring feature does not:

- The keepalive does not work when the TCP layer cannot receive an acknowledgement (ACK) and retransmits the packet repeatedly. This means that it is not possible to detect a down (For example, if a network goes down,) before sending some data and receiving ACK from the other side. There is also a parameter to interrupt retransmissions, which is not supported by some operating systems. The Connection Manager's heartbeat monitoring feature does not have this disadvantage because it is timeout monitoring at the application layer.
- The periodic packets for keepalive are sent per-TCP socket. If a instance accepts too many (For example, a few thousand clients) SQL connections, the load on the instance side cannot be ignored. The Connection Manager's heartbeat monitoring feature greatly reduces the load by allowing packets to be sent to the instance on a per-server basis on which the client runs.

1.1.2 Mechanism of Heartbeat Monitoring Feature

On the client side, the user must start one monitoring process using the cm_ctl command for the set of the instances to be monitored. This process, called the "conmgr process", can only be started by a user who is not an administrator (e.g. superuser(root) on Linux). An instance set is a collection of one or more instances that make up replication. One configuration file (conmgr.conf) for each conmgr process is used to set the information about the set of the instances being monitored and the parameters for monitoring.

On the server side, by installing PostgreSQL's EXTENSION that is called "watchdog", the postmaster will start two processes as background workers at instance startup.

One is the process for sending and receiving packets to and from the conmgr process for heartbeat monitoring. It is called "watchdog process". The other is the process for forcibly terminating SQL connections of the clients for which the watchdog process detects a failure on heartbeat monitorting. It is called "terminator process". SQL connections that do not use Connection Manager is also terminated, because the terminator process terminates them by IP address as key.

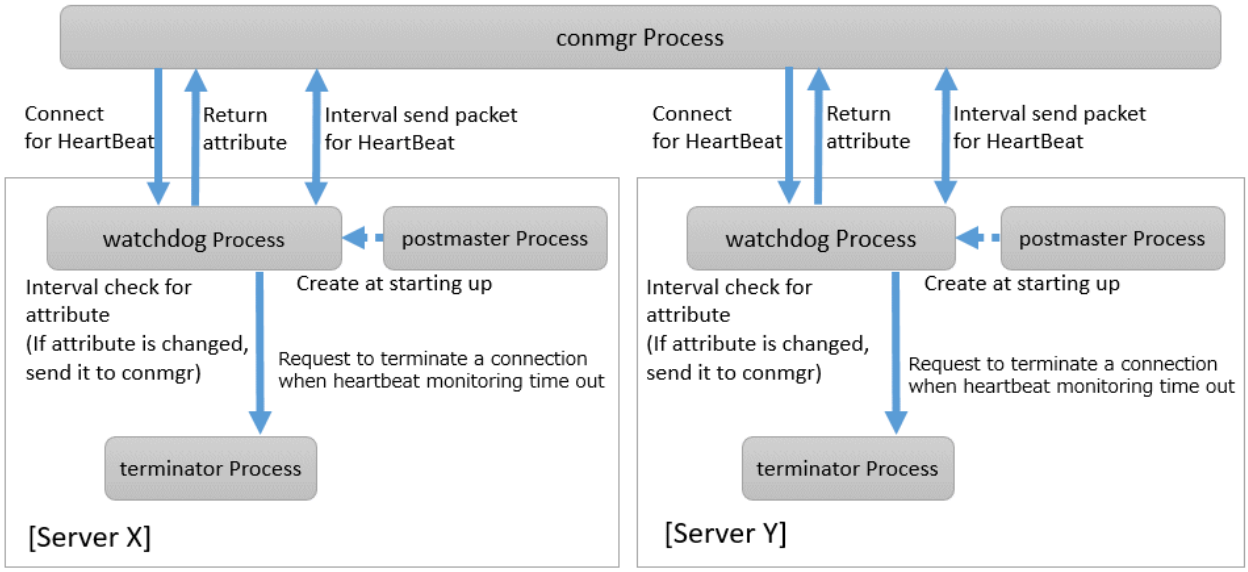
Note

System Configuration Notes

For replication, it is recommended that the instance that connects to the upstream instance of replication and the conmgr process that regards the upstream instance as an instance to be monitored for heartbeart (specified in backend_host parameter or backend_hostaddr parameter that is a configuration parameter of conmgr process) be not placed on the same server. This is because if the conmgr process stops normally or abnormally, the terminator process in the upstream instance will also kill the replication connection. The replication connection will reconnect automatically even if it is forcibly disconnected, so replication will continue without any problems. However, this can be a problem when the replication load is high or on systems that are sensitive to replication delays.

Note that the replication connection have different monitoring feature than the Connection Manager, so there is no need to monitor the Connection Manager for heartbeat. Refer to PostgreSQL documentation for details.

The process relationship is as follows:



See

Refer to "cm_ctl" in the Reference for information on cm_ctl command.

1.2 Transparent Connection Support Feature

The features similar to Connection Manager's transparent connection support feature can be found in PostgreSQL's libpq and other client drivers.

Using libpq as an example, the connection parameter to use that feature is target_session_attrs parameter. If this parameter is used not through Connection Manager, libpq will attempt to find the required instance by connecting sequentially to all instances of the set of instance requested by the host parameter or hostaddr parameter. In the worst case, libpq may find the promoted primary at the connection to the last instance of instance set. This means that you cannot predict how long it will take to complete the switch.

However, when conmbined with the Connection Manager, the conmgr process obtains its attributes via the watchdog process from all servers in a set of servers in advance, so that the connections to that server can be initiated as soon as the application requests it.

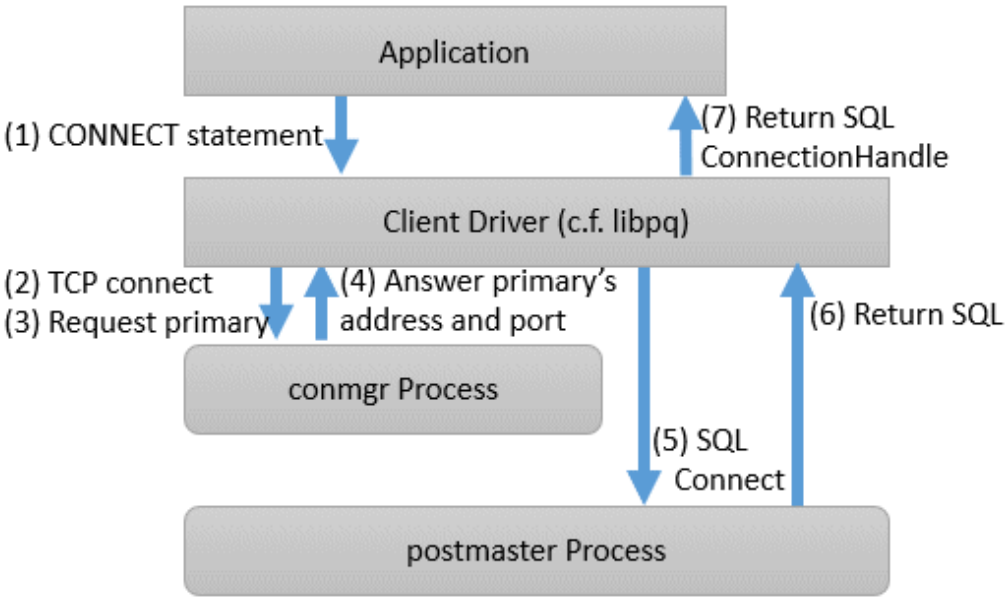
1.2.1 Mechanism of Connections using Transparent Connection Support Feature

A connection using this mechanism actually consists of two steps, but from the perspective of the application, it looks like a single SQL connection. In the application's connection string, specify the IP address or host name (In most cases it is "localhost") and port number where the conmgr process listens, and target_session_attrs parameter. You do not need to explicitly state that the connection is to the conmgr process. This is because the client driver can automatically determine whether the connection is to a instance or a conmgr process.

In the first phase of the connection, the client driver receives a connection request from the application and connects to the location specified in the connection string. Initially, it uses the protocol PostgreSQL requests, and if it learns in the middle that the connection is to a conmgr process, it asks the conmgr process for the IP address and port number that the instance with the attributes specified in the connection parameter target_session_attrs is listening for. If the destination is a backend process rather than a conmgr process, the connection process completes immediately and continues to send and receive data for normal SQL execution. The first stage of processing falls within the scope of timeout monitoring for SQL connection processing by each client driver. For example, the connection_timeout parameter of libpq.

In the second phase of the connection, the client driver connects to the instance using the IP address and port number from the conmgr process.Thereafter, the client driver and the instance directly send and receive the data for SQL execution. This ensures that the Connection Manager does not affect the performance of the SQL execution.

When the client driver is waiting to receive data after the second stage is completed, it monitors the reception of data to the two sockets obtained at each stage of the connection. This allows the client driver to know when, for example, the conmgr process notifies the client of a network link down.



Chapter 2 Setting Up

Describes setting up the Connection Manager.

2.1 Setting Up the Client Side

On the client side, configure settings for the conmgr process.

2.1.1 Creating a Directory for the conmgr Process

You need one conmgr process for each set of instances that you want to configure for replication. Assign a dedicated directory to each conmgr process. This directory must assign read, execute, and write permissions for the user who starts the conmgr process.

This directory is specified when you run the cm_ctl command, which starts and stops the conmgr process. To specify a directory in the cm_ctl command, set it in the environment variable CMDATA or specify it in the -D option.

See

Refer to "cm_ctl" in the Reference for information on cm_ctl.

2.1.2 Configuring conmgr.conf

Place the configuration file conmgr.conf in the directory for the conmgr process.

Syntax for conmgr.conf

- In conmgr.conf, after the symbol(#) are considered comments.
- The parameter name = value" is a set of settings and must be written on one line.
- Set the value in a format that matches the type of each parameter. The types and formats are:
  - integer: Numeric type. Express as a sequence of numbers in decimal number.
  - string: String type. You can also include spaces by enclosing them in quotation marks('). If you include quotation marks, escape them.
  - enum: Enumeration type. Possible values are determined.

Parameters to Set

port (integer)

Specify the port number on which the conmgr process listens for connections from the applications.

The value must be greater than or equal to 1 and less than or equal to 65535. The default is 27546. You must restart conmgr process for this parameter change to take effect.

backend_host* (string)

Specify the host name or IP address of the instance.

You can also use IPv6 address. If you specify the IP address directly, you can save time by using backend_hostaddr parameter. If backend_host parameter and backend_hostaddr parameter are both specified, backend_hostaddr parameter is used. You must restart conmgr process for this parameter change to take effect.

To distinguish multiple instances, append a zero-based number immediately after the parameter name, such as backend_host0, backend_host1,... This number is called the instance number. A parameter identified by the same instance number configures the settings of a single instance. If you want to exclude some instances from your replication configuration, you can simply remove the settings for that instance.

Note

Refer to "System Configuration Notes" in "1.1.2 Mechanism of Heartbeat Monitoring Feature" for details.

Note

If the primary is not included in the instances configured in conmgr.conf, use the -W option when starting Connection Manager with the cm_ctl command. Without the -W option, the cm_ctl command will not return until the primary connection is complete. This includes, for example, starting up conmgr which is set up in advance to connect only to the standby center side of the disaster countermeasure operation.

For example, if two instances are listening on "host name:host0, port number:5432" and "host name:host1, port number:2345", write as follows.

```
backend_host0='host0'
backend_port0=5432
backend_host1='host1'
backend_port1=2345
```

You can also mix different instance number settings:

```
backend_host0='host0'
backend_host1='host1'
backend_port0=5432
backend_port1=2345
```

It does not matter if the instance number is missing as in the following (instance number 1):

```
backend_host0='host0'
backend_host2='host2'
backend_port0=5432
backend_port2=2345
```

If the host name is omitted even if the port is specified, as in the following instance number 1, it is regarded as a missisng number.

```
backend_host0='host0'
backend_host2='host2'
backend_port0=5432
backend_port1=5555
backend_port2=2345
```

backend_hostaddr*(string)

Same as backend_host parameter except no name resolution is used.

backend_port* (integer)

Specify the port number the postmaster of the instance will listen on.

The value must be greater than or equal to 1 and less than or equal to 65535. The default is 27500. Append the instance number as you would for backend_host parameter. You must restart conmgr process for this parameter change to take effect.

watchdog_port* (integer)

Specify the port number on which the watchdog process listens.

The conmgr process connects to this port, but the user application does not. you must set it to the same value as watchdog.port parameter in postgresql.conf. The value must be greater than or equal to 1 and less than or equal to 65535. The default is 27545. Append the instance number as you would for backend_host parameter. You must restart conmgr process for this parameter change to take effect.

heartbeat_interval (integer)

Specify the interval at which heartbeat packets are sent for heartbeat monitoring.

Used in conjunction with heartbeat_timeout parameter. Connection Manager heartbeat monitoring always continues to send packets periodically from both ends of the connection. If a packet is not received from the other side within a certain period of time, the link is considered down.

Note that this method is different from TCP keepalive. TCP keepalive send a keepalive packet only when there is a certain amount of inactivity (idle), and expects to receive an ACK for that packet. If TCP keepalive does not receive an ACK, it repeats this a specified number of times and then assumes that the link is down.

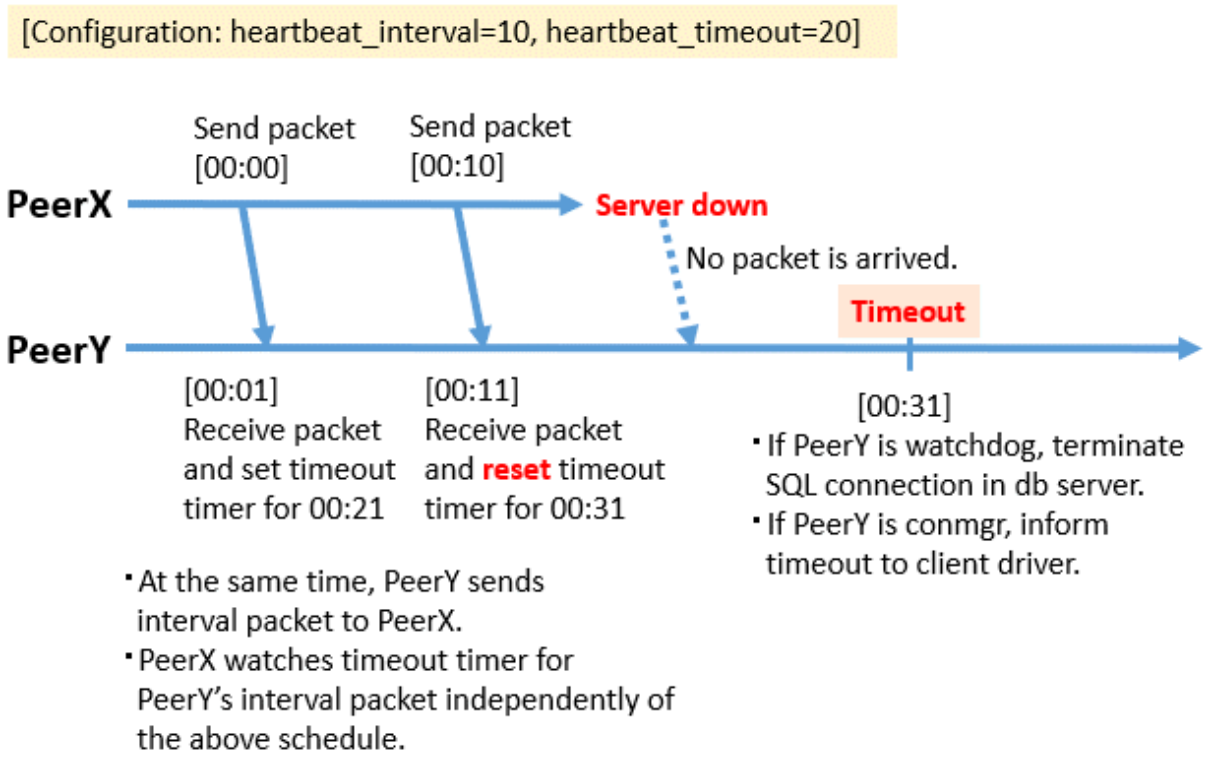
The heartbeat_interval parameter and heartbeat_timeout parameter are propagated from the conmgr process to the watchdog process, and also apply to the interval between the transmissions of heartbeat packets from the watchdog process. If a watchdog process is connected from both a conmgr process with a heartbeat_interval parameter of 3 seconds and a conmgr process with a heartbeat_interval of 5 seconds, it sends heartbeat packets every 3 seconds to the former process and every 5 seconds to the latter process. The unit is seconds. Specify a value equal to or more than 1 second. The default is 10 seconds. You must restart conmgr process for this parameter change to take effect.

heartbeat_timeout (integer)

If a heartbeat packet for heartbeat monitoring cannot be received for more than the time specified by this parameter, an error is assumed to have occurred and the application is notified of the error.

This parameter should be decide of heartbeat_interval parameter as the basis. No error is occured when the configuration file is loaded, but is always considered abnormal by heartbeat monitoring if it is at least not greater than heartbeat_interval parameter. The unit is seconds. Specify a value equal to or more than 1 second. The default is 20 seconds. You must restart conmgr process for this parameter change to take effect.

Refer to the following figure for the relationship between the heartbeat_interval parameter and heartbeat_timeout parameter settings and the heartbeat timeout.



heartbeat_connect_interval (integer)

Specify the interval between attempts to establish heartbeat monitoring again after detecting an abnormality.

This parameter is useful when only the database server is started, but not the instance. In such a situation, the TCP connection fails immediately, and retries cannot be attempted without an interval. If you specify an excessively long value, you may delay noticing the start of the instance. If a connection attempt fails for a long time, it will attempt the next connection after the time specified by heartbeat_connect_interval parameter has elapsed. The unit is seconds. Specify a value equal to or more than 1 second. The default is 1 second. You must restart conmgr for this parameter change to take effect.

heartbeat_connect_timeout (integer)

Specify the connection timeout for establishing heartbeat monitoring.

The connection includes the time it takes to send the TCP connection and the first heartbeat packet to the watchdog process and receive a reply from the watchdog process. This parameter is particularly needed when the other server is down or the network is disconnected. This is because TCP connections are attempted over a long period of time, depending on the operating system configuration, and the connection takes a long time to fail. The unit is seconds. Specify a value equal to or more than 1 second. The default is 10 seconds. You must restart conmgr process for this parameter change to take effect.

log_destination (string)

Specify the destination of the message.

You can specify multiple destinations. Use commas to separate multiple entries and enclose all in single quotation marks. "stderr" and "syslog" can be specified. The default is to print only to stderr. You must restart conmgr process for this parameter change to take effect.

syslog_facility (enum)

Specify the syslog facility.

Valid only if log_destination parameter includes "syslog". LOCAL0, LOCAL1, LOCAL2, LOCAL3, LOCAL4, LOCAL5, LOCAL6, or LOCAL7 can be specified.

The default is "LOCAL0". You must restart conmgr process for this parameter change to take effect.

syslog_ident (string)

Specify the program name used to identify the output from the conmgr process.

The default is "conmgr". You must restart conmgr process for this parameter change to take effect.

log_min_messages (enum)

Specifies the level of messages to output.

It can be DEBUG, INFO, NOTICE, WARNING, ERROR, LOG, FATAL, or PANIC. Messages below the specified level are not output. The default is "WARNING". You must restart conmgr process for this parameter change to take effect.

max_connections (integer)

Specifies the maximum number of simultaneous connections to the conmgr process.

If there are more than this maximum number of client connections, it forces the connection to be closed without sending an error message to the client.

The conmgr process also outputs this fact at level “LOG” to the destination specified by log_destination. Specify a value equal to or more than 0.

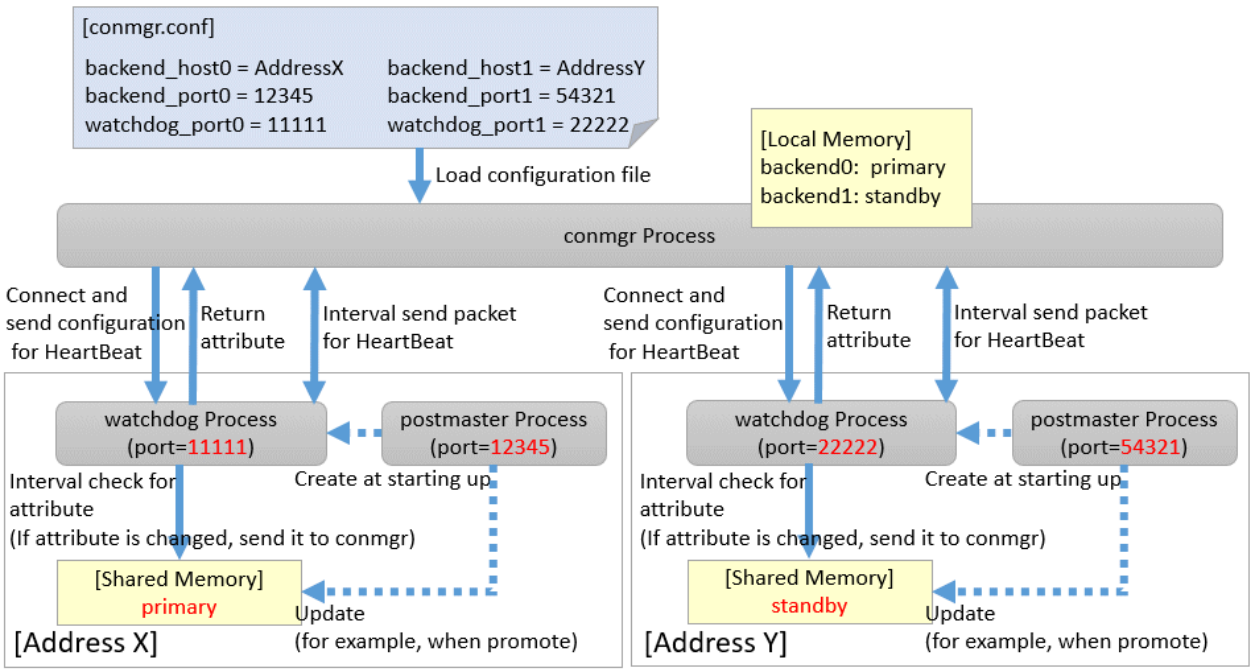
If 0 is specified, there is no limit. The default is 0. You must restart conmgr process for this parameter change to take effect.

The maximum number of file descriptors that can be opened simultaneously (You can check it with -n of the ulimit command.) imposed on a conmgr process by the OS user limit should be greater than the value derived from the following equation:. Otherwise, the conmgr process will abort if the user limit is violated.

```
9 + Number of database instances specified in conmgr.conf x 2  + max_connections specified in
conmgr.conf
```

Overview of connections definitions

The following figure shows the relationship between the IP address or host name and the port number set in conmgr.conf and the processes.



2.2 Setting Up the Server Side

On the server side, configure settings for the watchdog process.

2.2.1 Configuring postgresql.conf

Describes the postgresql.conf parameters that must be set when using the Connection Manager.

Parameters to Set

max_connections

An existing PostgreSQL parameter. Add 2 to the value already set.

Connection to the instance is maintained from the time the instance is started to do the following:

- The watchdog process checks the state of the instance.
- The terminator process forces the client to terminate the SQL connection.

shared_preload_libraries

An existing PostgreSQL parameter. Add a watchdog.

The watchdog process and terminator process start when you add watchdog and restart the instance.

watchdog.port (integer)

Specify the port number on which the watchdog process accepts connections for heartbeat monitoring from the conmgr process.

The value must be greater than or equal to 1 and less than or equal to 65535. The default is 27545. The instance must be restarted for this parameter change to take effect.

watchdog.check_attr_interval (integer)

Specify the interval between checking the attributes of a instance.

watchdog process immediately notifies the conmgr process if the attribute changes.

The unit is milliseconds. Specify a value equal to or more than 1 millisecond. The default is 1000 milliseconds. The instance must be restarted for this parameter change to take effect.

watchdog.max_heartbeat_connections (integer)

Specify the maximum number of conmgr processes that connect to watchdog process.

The default is the value specified in max_connections of postgresql.conf.

There is no upper limit, but about 200 bytes of memory are consumed for 1 connection when PostgreSQL is started.

Note

Normally you do not need to consider, but if you have a heartbeat connection with a very large number of conmgr processes, it may violate on the maximum number of file descriptors (You can check it with -n of the ulimit command.) of the OS user limit. This is because the socket for the heartbeat connection consumes the file descriptor. Set the maximum number of file descriptors of the OS user limit to a value larger than the value calculated below from the max_files_per_process parameter value and watchdog.max_heartbeat_connections parameter value in postgresql.conf.

```
max_files_per_process + watchdog.max_heartbeat_connections x 2
```

2.2.2 Introducing the watchdog extension

Execute the CREATE EXTENSION statement with watchdog.

Example)

```
postgres=# CREATE EXTENSION watchdog;
CREATE EXTENSION
```

This allows you to see the pgx_stat_watchdog view for information about the watchdog process.

2.3 Removing Setup

No work is required on the client side.

On the server side, drop watchdog extension by DROP EXTENSION statement and remove it from shared_preload_libraries.

Example)

```
postgres=# DROP EXTENSION watchdog;
DROP EXTENSION
```

Chapter 3 Using from an Application

Describes how to use the Connection Manager from an application.

3.1 Connection Method

When connecting to the instance using ConnectionManager, specify the following values in the connection parameters of the application. Application connection parameters are parameters that specify the database IP address, host name, port number, etc., which are originally specified when connecting to the database from the application. For example, when using libpq, specify "localhost" for the host parameter and specify the port number on which the conmgr process listens for the port parameter.

Connection parameters not shown here are used directly by the instance in the second stage of the connection, connecting to the instance (connecting to an instance without the Connection Manager), and the conmgr process does not check or use it.

Connection destination address

Specify "localhost". Unix domain sockets are not allowed.

It is possible to connect to a remote conmgr process, but it should not be used for other purposes expect such as testing. This is because there is no mechanism between the application and the conmgr process to detect the remote server down or the network link down, making the Connection Manager meaningless.

Port number

Specify the value specified for the port parameter in conmgr.conf.

Connection destination instance attributes

Follow the "Target server" in the application connection switch feature. Refer to "Taget server" in "Connection Information for the Application Connection Switch Feature" in the "Application Development Guide" for information on the target server in the application connection switch feature.

3.2 How to Detect Instance Errors

Only special if you are using libpq's asynchronous communication method. For additional discovery methods, refer to "Errors when an Application Connection Switch Occurs and Corresponding Actions" of the for each client driver in the "Application Development Guide" . If the conmgr process goes down while accessing it, or if the conmgr process tries to establish a SQL connection while it is down, the same error is returned as if the instance went down.

3.3 How to Use in libpq

libpq provides very detailed communication control. Therefore, to detect a heartbeat error through the conmgr process, you may need to modify the existing application logic.

See

Refer to "libpq - C Library" in the PostgreSQL Documentation on functions described below.

3.3.1 How to Specify Multiple Connection Destinations

The host parameter or hostaddr parameter in the connection string not only specifies the destination of one conmgr process, but can also be a mixture of destinations of other conmgr processes and postmaster. In this case, the connections are tried in the order listed.

For example, if the connection string specifies conmgr1, conmgr2 in that order, and if conmgr1 does not know the server for the attribute specified in target_session_attrs parameter, it queries conmgr2 for the destination. And, for example, if postmaster1, conmgr1 is specified, it will attempt to connect directly to the database instance pointed to by postmaster1. If this fails, query conmgr1 for a connection.

3.3.2 Using the Asynchronous Connection Method

An asynchronous connection method is to use a function like PQconnectStart() instead of a function like PQconnectdb (). PQconnectStart() returns without synchronizing the completion of the connection to the database. The user application must then monitor the sockets returned by PQsocket() to be readable or writable, for example by using the poll() system call, according to the values required by the return value of PQconnectPoll().

With the Connection Manager, the socket returned by PQsocket() may change after a call to PQconnectPoll(), so be sure to reacquire the socket that you want to give to the poll() system call using PQsocket(). This behavior is similar to simply specifying multiple hosts in the connection string without using the Connection Manager.

3.3.3 Using an Asynchronous Communication Method

An asynchronous communication method is one in which the application returns control without waiting for a response from the database, and PQsetnonblocking() is used to asynchronize completion of transmission or completion of receipt of all results. Instead of using a function like PQexec(), use a function like PQsendQuery(). In this method, the user application monitors the socket that connects to the database returned by PQsocket(), for example, by using the poll() system call.

For example, if the link to the database goes down, simply monitoring the socket returned by PQsocket with the poll() system call will not detect it.

However, it is possible to detect the reception of database anomaly detection packets sent from the conmgr process, for example, by monitoring the reception of data on the socket (POLLIN) connecting to the conmgr process returned by PQcmSocket(). Once a reception is detected, the user application need not directly manipulate the packet. By calling something like PQgetResult() or PQcosumeInput() according to the existing application logic, it behaves as if the connection were disconnected. Refer to "Errors when an Application Connection Switch Occurs and Corresponding Actions" in the Application Development Guide on SQLSTATE returned,etc. If you are not using the Connection Manager, PQcmSocket() returns -1.

3.3.4 Behavior of PQhost() or PQhostaddr() or PQport()

PQhost(), PQhostaddr() or PQport() typically return a host parameter or hostaddr parameter or port parameter specified in the connection string by the user application. However, if you specify a connection destination for the conmgr process, the destination for the conmgr process you specify will be changed to the database connection destination information provided by the conmgr process before the connection is completed. This behavior is similar to simply specifying multiple hosts in the connection string without using the Connection Manager.

3.3.5 Behavior of PQstatus()

If you are using an asynchronous connection method, you can monitor the intermediate state of the connection to the database with PQstatus(). If you are using the Connection Manager, the enum value returned by PQstatus() is appended with the following:

```
CONNECTION_AWAITING_CMRESPONSE
/ * Waiting for a response from the conmgr process * /
```

3.3.6 PQcmSocket()

You can get a socket that leads to the conmgr process. It returns a value equal to or more than 0 for a valid socket, or -1 if you are not connected to the conmgr process.

```
int PQcmSocket(const PGconn *conn);
```

Appendix A System Views

A.1 pgx_stat_watchdog

A row in this view corresponds to conmgr process, which is connected to watchdog process. Additional columns may be added in future versions versions.

Column	Type	Description
conmgr_addr	inet	IP address of conmgr process.
conmgr_port	integer	The conmgr (ephemeral) port number that conmgr process is using to communicate with watchdog process. This is not the port number to be set in conmgr.conf.
heartbeat_interval	integer	The interval at which heartbeat packets are sent to and from this conmgr process. The unit is seconds.
heartbeat_timeout	integer	The timeout value for the heartbeat to and from this conmgr process. The unit is seconds.

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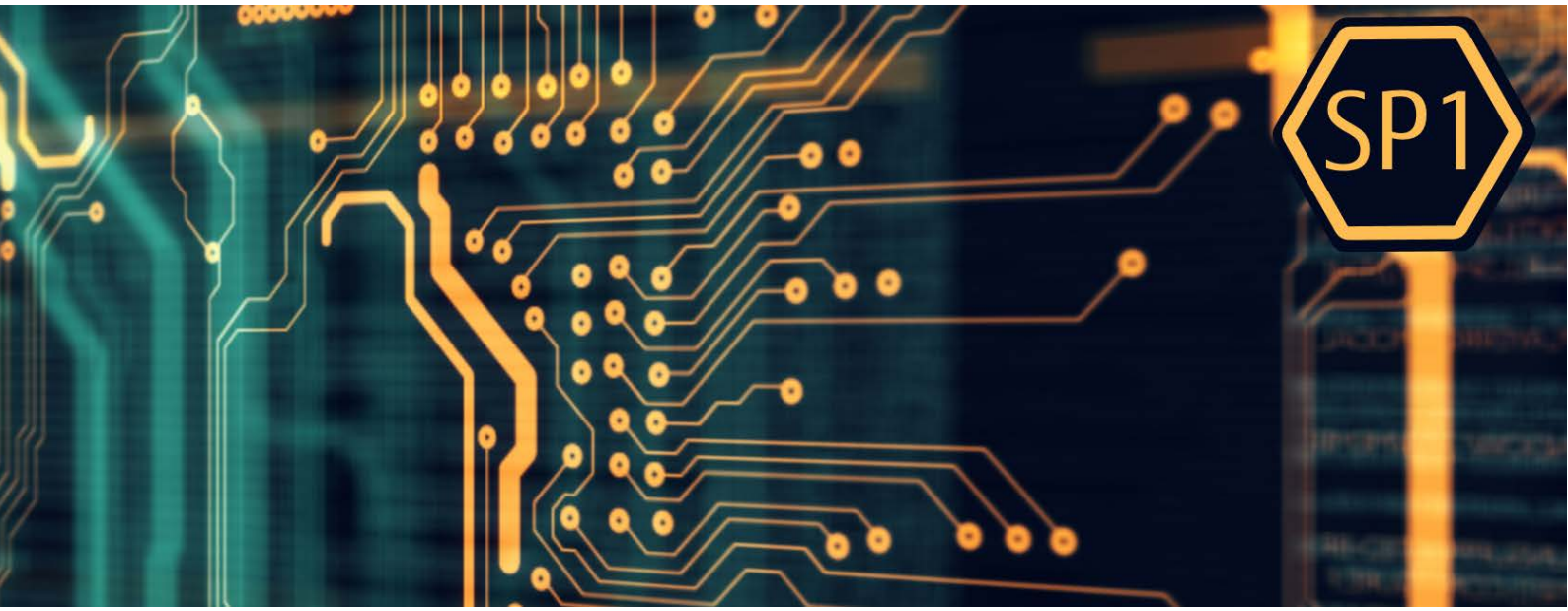

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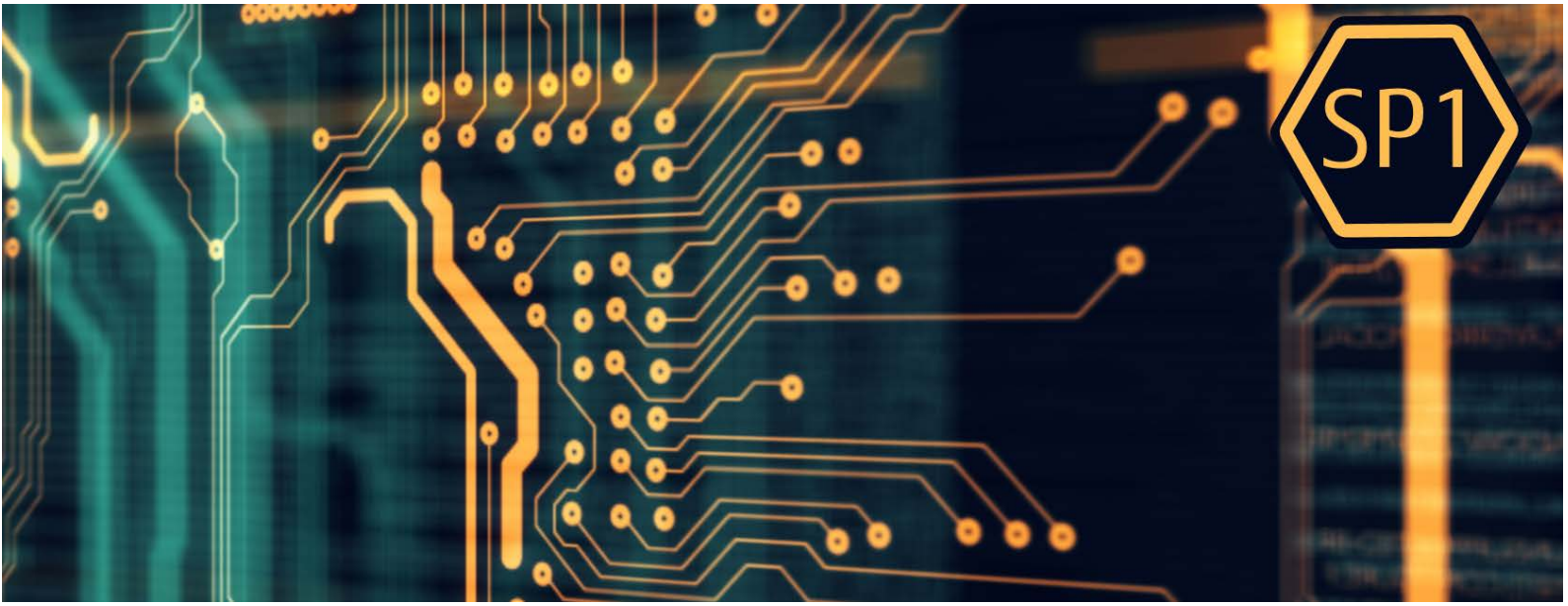

Glossary

Windows/Linux

J2UL-2686-02ENZ0(00)
August 2021

Preface

Purpose of this document

This document explains FUJITSU Enterprise Postgres terminology.

Intended readers

This document is aimed at all users of FUJITSU Enterprise Postgres.

Export restrictions

Exportation/release of this document may require necessary procedures in accordance with the regulations of your resident country and/or US export control laws.

Issue date and version

```
Edition 2.0: August 2021
Edition 1.0: April 2021
```

Copyright

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Glossary

Arbitration command

A user exit (user command) called when an abnormality is detected using operating system/server heartbeat monitoring in database multiplexing mode.

Arbitration server

A dedicated server on which the Server Assistant program is installed.

Archive log

Contains the history of updates made to the database, and is used during recovery.

Backup data storage destination

The directory that stores the backup data.

Client command

A command that is executed from the client machine and used. Also known as a client application.

Connection Manager

The replication operation to continue without knowing where the application is connected.

The Connection Manager feature improves the availability.

Data storage destination

The directory that stores the database clusters.

Database cluster

The database storage area on the database storage disk. Database clusters are a collection of databases managed by an instance.

Data masking

A feature that can change the returned data for queries generated by applications, to prevent exposing actual data.

Database multiplexing

Mechanism in which a database is made redundant on multiple servers, by transferring transaction logs (WAL) via the network to enable application jobs to be continued.

Database superuser

A user defined in the database with access privileges for all database objects.

Encoding

Indicates the character set.

Fencing

A process that isolates a database server with an unstable status from the cluster system in database multiplexing mode. This process is implemented as a fencing command.

Fencing command

A user exit (user command) that implements fencing in database multiplexing mode.

Global Meta Cache

The Global Meta Cache feature cache the informations about system catalogs information (catalog meta cache) in shared memory. The catalog meta cache on shared memory is called the Global Meta Cache (GMC).

Instance

A series of server processes for managing database clusters.

Instance administrator

The OS user account that owns the database cluster files and operates the database server processes.

Instance name

Indicates the instance name.

Local Meta Cache Limit

The ability to limit the size by removing the Local Meta Cache that has not been accessed for a long time.

Local Meta Cache is a meta cache (system catalog and table definition information) held in local memory.

Masking policy

A method of changing data under specific conditions when it is returned for a query from an application. You can configure masking target, masking type, masking condition and masking format.

Mirrored transaction log

The log that mirrors the transaction log at the backup data storage destination.

Mirroring Controller arbitration process

A process that performs arbitration and fencing on the arbitration server.

Mirroring Controller monitoring process

A process that performs heartbeat monitoring of the Mirroring Controller process. If the Mirroring Controller process returns no response or is down, the Mirroring Controller monitoring process is restarted automatically.

Mirroring Controller process

A process that performs operating system/server and process heartbeat monitoring and disk abnormality monitoring between database servers. Additionally, the process issues arbitration requests to the arbitration server and executes arbitration commands.

Pgpool-II connection pooling

The connection pooling feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

This feature maintains the connection established with the database server and reuses that connection each time a new connection with the same properties (user name, database, and protocol version) arrives. By reducing the connection overhead for the database server, throughput of the whole system is improved.

Pgpool-II failover

The automatic failover feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

If any of the database servers crashes or can no longer be reached, this feature disconnects the server and continues operation on the remaining servers. The streaming replication feature of PostgreSQL is combined with Pgpool-II to achieve a high-availability system.

Pgpool-II load balancing

The load balancing feature of Pgpool-II supported by FUJITSU Enterprise Postgres.

This feature distributes reference queries to multiple database servers, improving throughput of the whole system. The database multiplexing feature or PostgreSQL streaming replication feature is combined with Pgpool-II to reduce the load on the database server.

Pgpool-II server

A server for using the failover, connection pooling, and load balancing features of Pgpool-II. It is a dedicated server that has a server program installed for using these features.

Primary server

The server that processes the main database jobs during multiplexed database operation.

Server Assistant

A feature that objectively determines the status of database servers as a third party, and if necessary, isolates affected databases if the database servers are unable to accurately ascertain their mutual statuses in database multiplexing mode, such as due to a network error between database servers, or server instability.

Server Assistant program

A program to be installed on the arbitration server.

Server command

A command used on the database server. Also known as a server application.

Standby server

A server that generates a replicated database synchronized with the primary server, and that can run as an alternative server in case the primary server fails during multiplexed database operation.

State transition command

A user exit (user command) called when Mirroring Controller performs a state transition of a database server in database multiplexing mode. State transition commands include the post-switch command, pre-detach command, and post-attach command.

Transaction log

Contains the history of updates made to the database by transactions. Also known as the WAL (Write-Ahead Log).

Transaction log storage destination

The directory that stores the transaction log.

VCI (Vertical Clustered Index)

An index with columnar data structure suitable for aggregation.

WAL (Write-Ahead Log)

Has the same meaning as 'transaction log'.

WebAdmin program

A GUI-based program installed on a database server or a dedicated WebAdmin server, used to manage database instances.

WebAdmin server

By using the WebAdmin program on a different server to the database server, instances on multiple database servers can be managed from a dedicated WebAdmin server on which the WebAdmin program is installed.

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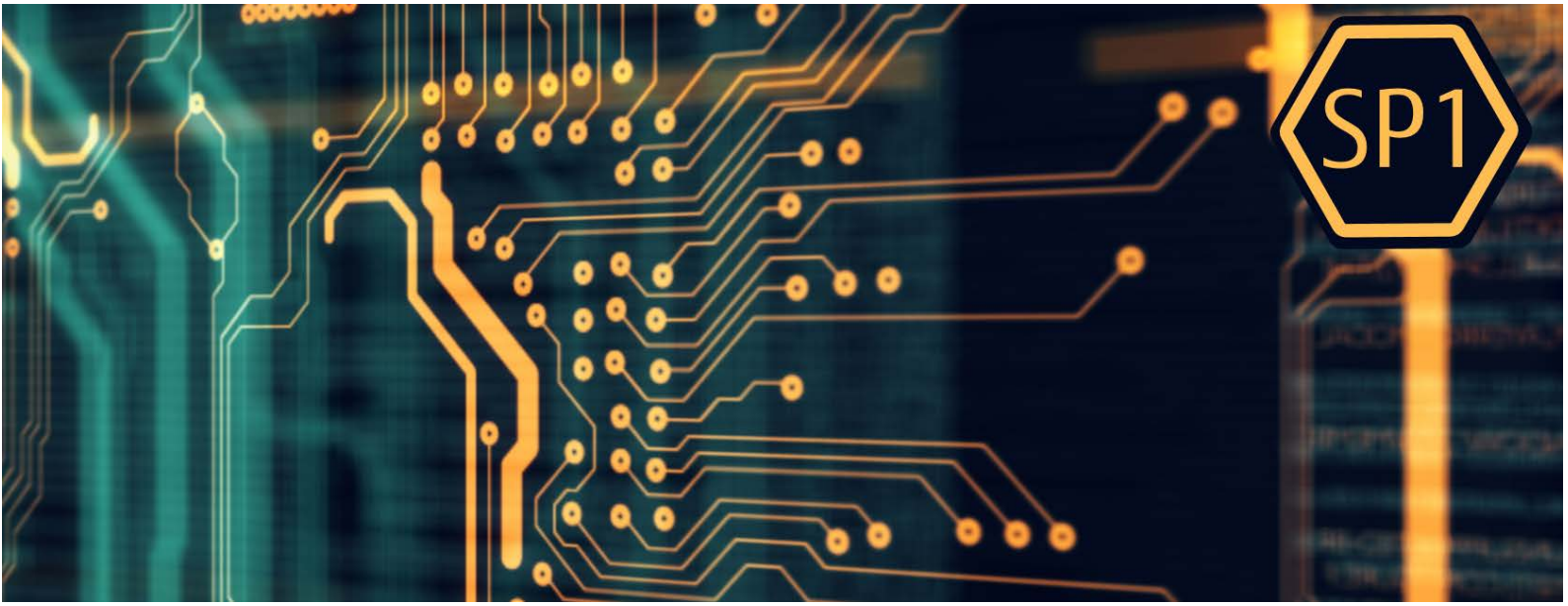

Reference Guide

Windows/Linux

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Preface

Purpose of this document

This document is a command reference, and explains FUJITSU Enterprise Postgres commands and options with features expanded on from PostgreSQL.

Intended readers

This document is aimed at people who manage and operate FUJITSU Enterprise Postgres. Readers of this document are also assumed to have general knowledge of:

- PostgreSQL
- SQL
- Linux
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Command List and Specification Format

Lists commands and describes their specification format.

Chapter 2 Client Commands

Explains options not listed in "PostgreSQL Client Applications" in the PostgreSQL Documentation.

Chapter 3 Server Commands

Explains commands and options not listed in "PostgreSQL Server Applications" in the PostgreSQL Documentation.

Chapter 4 Mirroring Controller Commands

Explains the Mirroring Controller commands.

Chapter 5 Connection Manager Commands

Explains the Connection Manager commands.

How to read this document

Examples in this document are predominantly for UNIX/Linux.

For Windows, replace values (such as paths in the examples) as appropriate.

Export restrictions

If this document is to be exported or provided overseas, confirm legal requirements for the Foreign Exchange and Foreign Trade Act as well as other laws and regulations, including U.S. Export Administration Regulations, and follow the required procedures.

Issue date and version


```
Edition 2.0: August 2021
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```


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Chapter 1 Command List and Specification Format

This chapter lists commands and describes their specification format.

1.1 Command List

This chapter lists commands and options not explained in "PostgreSQL Client Applications" or in "PostgreSQL Server Applications" in the PostgreSQL Documentation.

1.1.1 Client Commands

The commands below have options not explained in "PostgreSQL Client Applications" in the PostgreSQL Documentation.

Command	Functional overview
pg_dumpall	Extract a PostgreSQL database cluster into a script file

The command below is not explained in "Client Applications" in the PostgreSQL Documentation.

Command	Functional overview
pgx_loader	Loads data from an external file into a PostgreSQL table.

1.1.2 Server Commands

The commands below have options not explained in "PostgreSQL Server Applications" in the PostgreSQL Documentation.

Command	Functional overview
pg_ctl	Initialize, start, stop, or control a PostgreSQL server
postgres	PostgreSQL database server

The commands below are not explained in "PostgreSQL Server Applications" in the PostgreSQL Documentation.

Command	Functional overview
pgx_dmpall	Backs up the data directory, tablespaces, and configuration files.
pgx_keystore	Manages keystore
pgx_rcvall	Recovers the data directory, tablespaces, and configuration files.

1.1.3 Mirroring Controller Commands

Mirroring Controller has the following commands:

Command	Functional overview
mc_arb	L Start, stop and display the status of the Mirroring Controller arbitration process. W Start, stop and display the status of the Mirroring Controller arbitration process, or register and unregister as a Windows service.

Command	Functional overview
mc_ctl	L Start and stop Mirroring Controller, switch/ disconnect the server, or display the server status. W Start and stop Mirroring Controller, switch/ disconnect the server, display the server status, or register and unregister as a Windows service.

L

1.1.4 Connection Manager Commands

Connection Manager has the following commands:

Command	Functional overview
cm_ctl	Start, stop or display the status of the conmgr process

1.2 Command Specification Format

The table below shows the command specification format.

Item	Explanation
[ ]	Indicates optional element.
...	Indicates that the item can be specified repeatedly.

Chapter 2 Client Commands

This chapter explains options not listed in "PostgreSQL Client Applications" in the PostgreSQL Documentation.

2.1 pg_dumpall

Name

pg_dumpall -- Extract a PostgreSQL database cluster into a script file

Synopsis

```
pg_dumpall [connectionOption...] [option...]
```

Options

--no-tablespace-encryption

Do not output commands to encrypt tablespaces. Running the generated SQL script will restore the originally encrypted data without being encrypted.

See

Refer to "pg_dumpall" in the PostgreSQL Documentation for details.

2.2 pgx_loader

Name

pgx_loader --Loads data from a file into a PostgreSQL table.

Overview

```
pgx_loader load -c command [options...]
```

```
pgx_loader recovery -t table
```

Description

The pgx_loader command loads data from an external file into PostgreSQL tables, and commits or rolls back transactions prepared during data load.

In load mode, data is loaded at high speed by executing the COPY FROM command specified in *command* at a certain degree of parallelism. If load is completed successfully, the message below is output to the standard output.

```
LOAD count
Note: count is the number of rows loaded.
```

In recovery mode, commit or rollback of transactions prepared during data load is performed.

Options

-a
--echo-sql

Display the executed command in the standard output.

-c *command*
--copy-command=*command*

Specify the COPY FROM command to be executed. If STDIN is specified for the FROM clause, data will be loaded from the standard input. In this case, SQL superuser privileges (or having one of the roles pg_read_server_files or

pg_execute_server_program) are not required, because local user access privileges will be used for external files and external programs, instead of database server access privileges.

"binary" cannot be specified for the FORMAT option of the COPY FROM command specified in this option. Therefore, input files in binary format cannot be specified.

The FREEZE option cannot be specified for the COPY FROM command specified in this option.

See

Refer to "COPY" in the PostgreSQL Documentation for information on the COPY FROM command.

-j *number-of-jobs*
--jobs=*number-of-jobs*

Specify the number of background workers (parallel workers) that the COPY COMMAND should use to simultaneously perform data conversion, table creation, and index creation. This option can dramatically reduce the time for loading a large amount of data on instances that runs on multiple processor machines.

The optimal value depends on the server, client, and network configurations. The number of CPU cores and disk configuration also affect the optimal value. The number of CPU cores of the server is recommended as the initial value to try. Naturally, if a value that is too large is used, performance degradation will occur due to thrashing and context switching.

Specify a value from 2 to 128. The default is 2.

-t *table*
--table=*table*

Complete the prepared transactions only for the specified table.

-?
--help

Show how to use pgx_loader command line arguments, and exit.

The command line options below control the database connection parameters.

-d *connstr*
--dbname=*connstr*

Specify the database name to connect to.

If this option is not specified, the PGDATABASE environment variable will be used. If the environment variable is not set, your operating-system user name will be used.

-h *host*
--host=*host*

Specify the host name of the machine the database server runs on. If the specified value starts with a slash, it will be used as the directory for a Unix domain socket.

If this option is not specified, the PGHOST environment variable will be used. If the environment variable is not set, it will be considered a Unix domain socket connection.

-p *port*
--port=*port*

Specify the TCP port to be used by the server to monitor the connection, or extension of the local Unix domain socket file.

If this option is not specified, the PGPORT environment variable will be use. If the environment variables is not set, 27500 will be used.

-U *username*
--username=*username*

User name for connection to the database.

-w
--no-password

Never prompt for the password. If the server requires password authentication but other means (such as a .pgpass file) are not available, the connection attempt will fail. This option can be useful in batch jobs, scripts, and so on, where no user is present to enter a password.

-W
--password

Force pgx_loader to prompt for the password before connecting to the database. This option is never essential, since pgx_loader will automatically prompt for the password if the server demands password authentication. However, pgx_loader will waste a connection attempt finding out if the server requires a password. In some cases it is worth specifying this option to avoid the extra connection attempt.

Diagnostics

load mode

0: Normal exit

Other than 0: Abnormal exit

recovery mode

0: There are no prepared transactions that must be completed

3: A prepared transaction was committed

4: A prepared transaction was rolled back

Other than the above: Abnormal exit

The order of the table rows loaded by pgx_loader may not match the order of the file lines. This is because the file lines will have been inserted into the table in parallel, by multiple parallel workers.

Example

The example below loads the file /path/to/data.csv (2000 records) into table tbl using a degree of parallelism of 3.

```
$ pgx_loader load -j 3 -c "COPY tbl FROM '/path/to/data.csv' WITH CSV"
LOAD 2000
```

The example below reads the file /path/to/data.csv (2000 records) from the standard input and loads into table tbl using a degree of parallelism of 3.

```
$ pgx_loader load -j 3 -c "COPY tbl FROM STDIN WITH CSV" < /path/to/data.csv
LOAD 2000
```

The example below completes the transactions prepared for table tbl.

```
$ pgx_loader recovery -t tbl
```

Chapter 3 Server Commands

This chapter explains commands and options not listed in "PostgreSQL Server Applications" in the PostgreSQL Documentation.

3.1 pg_ctl

Name

pg_ctl -- Initialize, start, stop, or control a PostgreSQL server

Synopsis

```
pg_ctl start [-D datadir] [-l filename] [-W] [-t seconds] [-s]
           [-o options] [-p path] [-c] [--keystore-passphrase]

pg_ctl restart [-D datadir] [-m s[mart] | f[ast] | i[mmediate] ]
             [-W] [-t seconds] [-s] [-o options] [-c]
             [--keystore-passphrase]
```

Options

--keystore-passphrase

Prompt for the passphrase to open the keystore.

See

Refer to "pg_ctl" in the PostgreSQL Documentation for details.

3.2 pgx_dmpall

Name

pgx_dmpall - Backs up the data directory, tablespaces, and configuration files.

Synopsis

```
pgx_dmpall  [option...]
```

Description

The pgx_dmpall command backs up the data directory, tablespaces, and configuration files. The backup data is stored in the directory specified by backup_destination parameter of postgresql.conf. The pgx_dmpall command also deletes archived Write Ahead Logs (WAL) that are no longer necessary for recovery when the backup completes successfully.

Options

-c

This option only backs up configuration files. The configuration files are as follows:

- postgresql.conf (postgresql.conf)
- File for host-based authentication (pg_hba.conf)
- Configuration file for ident authentication (pg_ident.conf)

If an external reference, such as 'include' in postgresql.conf, is set, the reference destination files are also backed up.

-C fast|spread
--checkpoint=fast|spread

Sets checkpoint mode to fast or spread (default).
If fast is specified, the checkpoint processing at the start of backup becomes quick, but the impact on performance of running applications gets larger due to intense I/O. In spread mode, the impact on applications is smaller but the backup takes longer, because the checkpoint is performed slowly.

-D *datadir*

Specify the data directory. If this option is omitted, the value of the environment variable PGDATA is used.

-f *configFile*

Specify the postgresql.conf configuration file. This option is set if the data directory and the configuration file set in the 'data_directory' parameter of the postgresql.conf file are running in separate directories.

-P *tablespacesListFile*
--tablespaces-list-file=*tablespacesListFile*

Specify the full path of the file containing the names of the tablespaces to be backed up using the copy command, using less than 1024 bytes.

The file format is described below:

tablespaceName<newline>
tablespaceName<newline>
...

Tablespaces not listed in the specified file are backed up to the backup storage directory. If this option is not specified, all tablespaces are backed up using the copy command.
This option can be specified if the -Y option has been specified, and it is used to limit the tablespaces backed up using the copy command.

-U *username*
--username=*username*

Specify the user name of the database superuser. This defaults to the name of the effective user running pgx_dmpall.

-Y *copyCommandFile*
--copy-command=*copyCommandFile*

Specify the full path of the file of the copy command for backup, using less than 1024 bytes. This option cannot be specified together with the -c option.

-w
--no-password

Never issue a password prompt. If the server requires password authentication and a password is not available by other means such as a .pgpass file, the connection attempt will fail. This option can be useful in batch jobs and scripts where no user is present to enter a password.

-W
--password

Force pgx_dmpall to prompt for a password before connecting to a database.

This option is never essential, since pgx_dmpall will automatically prompt for a password if the server demands password authentication. However, pgx_dmpall will waste a connection attempt finding out that the server wants a password. In some cases it is worth typing -W to avoid the extra connection attempt.

--maintenance-db=*dbname*

Specifies the name of the database to connect to. If not specified, the postgres database will be used; if that does not exist, template1 will be used.

Any database can be specified as long as it can be connected to.

--exclude-copy-cluster

Excludes a database cluster from backup via the copy command. This option can be specified if the -Y option has been specified. If this option is not specified, the database cluster will be backed up using the copy command.

Environment

PGDATA

Specify the data directory. You can overwrite using the -D option.

Diagnostics

0: Normal end

Other than 0: Abnormal end

Notes

This command can only be executed when the database server is running.

Execute this command as a PostgreSQL user account.

Do not update or delete files in the backup storage directory. Otherwise, you may not be able to recover the database.

Do not store other files in the backup storage directory.

This command uses one database connection. To establish a connection, this command uses the IPv4 loopback address 127.0.0.1 on Windows, and the UNIX domain socket on other operating systems. Therefore, permit these connections in pg_hba.conf.

This command cannot be executed on the standby server.

Example

In the following example, the data directory, tablespaces, and configuration files are backed up. At this time, stored WALs are no longer necessary because the backups are destroyed.

```
$ pgx_dmpall
```

Related item

pgx_rcvall

3.3 pgx_keystore

Name

pgx_keystore -- Manages keystore

Synopsis

```
pgx_keystore [option...] keystore_location
```

Description

pgx_keystore enables auto-open of a keystore.

Options

-a
--enable-auto-open

Enables auto-open of a keystore. This allows the keystore to open automatically without entering the passphrase when the database server starts.

When auto-open is enabled, an obfuscated copy keystore.aks is created in the same directory where the keystore file keystore.ks is stored. To disable auto-open, delete keystore.aks.

-P *passphrase*
--passphrase=*passphrase*

Specify the passphrase to open the keystore. If this option is omitted, the prompt to enter the passphrase is displayed.

keystore_location

Specify the absolute or relative path of the keystore file.

Diagnostics

0: Normal exit

Other than 0: Abnormal exit

Notes

This command can be executed whether the database server is running or stopped. It does not connect to the database server.

Example

Enables auto-open of a keystore.

```
$ pgx_keystore -a /key/store/location/keystore.ks
```

3.4 pgx_rcvall

Name

pgx_rcvall - Recovers the data directory, tablespaces, and configuration files.

Synopsis

```
pgx_rcvall [option...]
```

Description

The pgx_rcvall command recovers the data directory, tablespaces, and configuration files using the data that was backed up with pgx_dmpall command and archived Write-Ahead-Log (WAL). If none of the options that indicate the recovery point is specified, all archived WAL are applied and the data will be recovered to the latest point.

Options

-B *backupdir*

Specify the backup storage directory. If the data directory is damaged, this option cannot be omitted.

-D *datadir*

Specify the data directory. If this option is omitted, the value of the environment variable PGDATA is used.

-e *targetTime*

Specify this option to recover the data as of the specified date and time.

targetTime

Specify the time at which the data is recovered. The format is as follows:

```
"YYYY-MM-DD HH:MM:SS"
```

-l

This option displays a list of the backup data information in the backup storage directory that was obtained using the pgx_dmpall command. If the pgx_dmpall command was executed using the copy command (-Y option) for backup, the resources backed up using the copy command will also be listed. This cannot be specified together with -p, -e or -n option.

-n *restorePoint*

Specify this option to recover the data to the specified restore point. Restore points are created with SQL function pg_create_restore_point. If multiple restore points with the same names were created, the first one after the backup was taken is used for recovery. If the specified restore point does not exist, the recovery fails. This cannot be specified together with -e or -p option.

-p

Specify this option to recover the data as of the time when the last backup completed. This cannot be specified together with -e or -n option.

-x

Specify this option if you do not want to include transactions committed at the time specified in the -e option as part of the recovery.

-Y *copyCommandFile*
--copy-command=*copyCommandFile*

Specify the full path of the file of the copy command for recovery, using less than 1024 bytes. This option cannot be specified together with the -l option.

--keystore-passphrase

Prompt for the passphrase to open the keystore.

--view-results-of-copying

Output the backup information file that was written by the copy command executed via the pgx_dmpall command. This option cannot be specified together with the -l, -p, -e, -n, or -Y option.

Environment

PGDATA

Specify the data directory. You can overwrite using the -D option.

PGPORT

Specify the port number for connecting to the database.

PGUSER

Specify the user name of the database superuser. This defaults to the name of the effective user running pgx_dmpall.

Diagnosis

0: Normal exit

Other than 0: Abnormal exit

Backup data information

Date

Date the backup data was created using the pgx_dmpall command.

Dir

This is the name of the directory in the backup storage directory that is used to store the backup data.
Directory naming format: Time format (YYYY-MM-DD_HH-MM-SS)

Status

This is the status of the pgx_dmpall command backup data.

COMPLETE: Complete

INCOMPLETE: Incomplete

Resources backed up by the copy command

List of resources that were backed up by the copy command executed via the pgx_dmpall command.

If there are resources that were backed up by the copy command, then database clusters ('pg_data') or tablespace names will be listed, delimited by header and halfwidth comma.

Notes

This command can only be executed when the database server is stopped, except when it is executed with -l option.

Execute this command as a PostgreSQL user account.

Use backup data that was taken from the recovery target data directory.

Before executing this command, disconnect all application database connections. Additionally, do not connect to the database during recovery.

The configuration files are restored from those files that were taken by the last pgx_dmpall (including -c option).

This command connects to the database to determine whether the recovery has completed. So ensure that you set the port number with PGPORT environment variable in the environment where multiple instances exist.

Match the OS timezone setting when running pgx_dmpall/pgx_rcvall to the timezone specified by timezone parameter in postgresql.conf.

Otherwise, data might be recovered to an unexpected time when -e or -p is specified.

If you recover to a past point, a new timeline (history of database updates) begins at that point. That recovery point is the latest point in the new timeline when the recovery is completed. If you subsequently recover to the latest point, the database updates in the new timeline will be replayed.

Valid restore points are the ones that were created in the timeline where the backup had been taken. That means that if you recover to a past point, those restore points created thereafter are unavailable. Therefore, take a backup when you have restored the past data desired.

If the pgx_dmpall command was executed using the copy command (-Y option) for backup, it is necessary to execute this command using the copy command (-Y option) for recovery. However, because the list of resources (database cluster or tablespace) that were backed up using the copy command is recorded in the backup directory, there is no need to specify the target resources when executing this command. The -I option can be used to check the target resources for which a backup is retrieved using the copy command.

Example

In the following example, the data directory, tablespaces, and configuration files are recovered.

```
$ pgx_rcvall -B /home/pgsql/Backupdir
```

In the following example, the data directory and tablespaces are recovered at 10:00:00 on 01-05-2017. The configuration files are recovered at the point at which the last of the data is obtained.

```
$ pgx_rcvall -B /home/pgsql/Backupdir -e "2017-05-01 10:00:00"
```

In the following example, the data directory and tablespaces are recovered up to the time of restore point "before_match_20170510_1". The configuration files are restored from the latest backup.

```
$ pgx_rcvall -B /home/pgsql/Backupdir -n before_match_20170510_1
```

In the following example, the obtained backup data information in the backup storage directory is displayed in a list.

```
$ pgx_rcvall -l
```

Related item

pgx_dmpall

3.5 postgres

Name

postgres -- PostgreSQL database server

Synopsis

```
postgres [option...]
```

Options

-K

Prompt for the passphrase to open the keystore. This option works in single-user mode only, so you must also specify the --single option, as shown below:

postgres --single -K

See

Refer to "postgres" in the PostgreSQL Documentation for details.

Chapter 4 Mirroring Controller Commands

This chapter explains the Mirroring Controller commands.

4.1 mc_arb

Name

L

mc_arb - Start, stop, and display the status of the Mirroring Controller arbitration process

W

mc_arb - Start, stop, and display the status of the Mirroring Controller arbitration process, or register and unregister it as a Windows service

Overview

```
mc_arb start [-M mcdir] [-w| -W]

mc_arb stop [-M mcdir] [-e]

mc_arb status [-M mcdir]
```

W

```
mc_arb register [-M mcdir] [-w| -W] -P password [-S a[uto] | d[emand]]
mc_arb unregister [-M mcdir]
```

Description

L

mc_arb starts, stops, and displays the status of the Mirroring Controller arbitration process.

W

mc_arb starts, stops, and displays the status of the Mirroring Controller arbitration process, or registers and unregisters it as a Windows service.

The start mode starts the Mirroring Controller arbitration process.

The stop mode stops the Mirroring Controller arbitration process.

The status mode displays the connection status of the Mirroring Controller arbitration process with the Mirroring Controller processes of the primary server and standby server.

W

The register mode registers the Mirroring Controller arbitration process as a Windows service. The -w and -W options can be used to start/stop the Mirroring Controller arbitration process through the Windows service, and when it executes the mc_arb command, the specified option will take effect.

The unregister mode unregisters the Mirroring Controller arbitration process as a Windows service.

If the Mirroring Controller arbitration process has not been started on the server executing the command, stop mode and status mode will terminate with an error.

Additionally, if Mirroring Controller is forcibly stopped on the database server, it may take a few moments until the status mode displays the status of the server connection as offline.

L

This command can be executed by any user.

W

Execute this command as a user with administrator privileges (operating system user that belongs to the "Administrators" group).

Options

-e

Specify this option to forcibly stop the Mirroring Controller arbitration process on the active server.

Specify this option to stop the Mirroring Controller arbitration process but keep Mirroring Controller running (to stop both, first stop Mirroring Controller of the database server, and then the Mirroring Controller arbitration process). This option can also be specified to halt the arbitration process (by stopping the Mirroring Controller arbitration process) when the fencing command called by the arbitration process becomes unresponsive.

-M *mcdir*

Specify the Mirroring Controller arbitration process management directory.

ASCII characters can be specified in the directory path.

If this option is omitted, the value of the environment variable ARBCONTROLDIR is used.

-P *password*

For the register mode, specify the password for the user who executed the command.

-S a[uto] | d[emand]

Specify the start type for the Windows service to be registered. You can choose auto or demand as the start type by specifying the entire word or just its first letter. The default is auto.

-w

Waits for operations to finish.

This option is the default of start mode.

This option is the default of start mode and register mode.

-W

Does not wait for operations to finish.

Environment

ARBCONTROLDIR

Specify the Mirroring Controller arbitration process management directory.

ASCII characters can be specified in the directory path.

You can specify the -M option to override this value.

Diagnostics

0: Normal end

Other than 0: Abnormal end

Notes

If the Mirroring Controller arbitration process is forcibly stopped or communication between the command and the Mirroring Controller arbitration process is interrupted while the Mirroring Controller arbitration process is being stopped, a message that the command is being executed may be output and stopping may terminate in error, even though no other instances of the mc_arb command are being executed.
To solve this issue, ensure that other instances of the mc_arb command are not being executed before forcibly stopping the Mirroring Controller arbitration process.

Use the start mode and stop mode to start and stop the Windows service. Before being able to use these modes, use the register mode to register the Mirroring Controller arbitration process as a Windows service.
The mc_arb command must be executed from "Administrator: Command Prompt". Right-click [Command Prompt], and then select [Run as administrator] from the context menu to display the [Administrator: Command Prompt] window.

Example

Start the Mirroring Controller arbitration process.

```
$ mc_arb start -M /mcarb_dir/arbiter1
```

Start the Mirroring Controller arbitration process.

```
> mc_arb start -M D:\mcarb_dir\arbiter1
```

Display details of mc_arb status

```
server_id   host            status
(1)         (2)             (3)
```

```
(1) Server identifier
(2) Host name or IP address
(3) Server connection status
    online   : Connected
    offline  : Disconnected
```

4.2 mc_ctl

Name

mc_ctl - Start and stop Mirroring Controller, switch/disconnect the server, or display the server status.

mc_ctl - Start and stop Mirroring Controller, switch/disconnect the server, display the server status, or register and unregister as a Windows service.

Overview

```
mc_ctl start [-M mcdir] [-w| -W] [-f| -F] [--mc-only] [--async-connect-arbiter] [--local-server server_id]

mc_ctl stop [-M mcdir] [[-a] [--mc-only]| [-e][--local-server server_id]]

mc_ctl status [-M mcdir] [--arbiter] [--local-server server_id]

mc_ctl switch [-M mcdir] [--force [--no-fencing ]] [--local-server server_id]

mc_ctl detach [-M mcdir] [--no-fencing] [--local-server server_id]

mc_ctl enable-failover [-M mcdir] [--local-server server_id]

mc_ctl disable-failover [-M mcdir] [--local-server server_id]
```

```
mc_ctl register [-M mcdir] [-w| -W] [-f| -F] [--mc-only] -P password
                [-S a[uto] | d[emand]] [--async-connect-arbiter] [--local-server server_id]
```

```
mc_ctl unregister [-M mcdir] [--local-server server_id]
```

Description

mc_ctl starts and stops Mirroring Controller, switches/disconnects the server, or displays the server status.

mc_ctl starts and stops Mirroring Controller, switches/disconnects the server, displays the server status, or registers and unregisters as a Windows service.

The start mode starts Mirroring Controller. If the --mc-only option is omitted, the command starts a database instance.

The stop mode stops Mirroring Controller. If the --mc-only option is omitted, the database instance is stopped. If --mc-only option is not specified, database instance is also stopped. When executes on standby server without --mc-only, standby server will be detached from primary server.

The status mode displays the status of the servers, database instance processes, and disks monitored by Mirroring Controller. Additionally, if the --arbiter option is specified, Mirroring Controller arbitration process connection status is displayed.

The switch mode switches the primary server. When the server is switched, the database instance on the primary server stops, and the database instance on the standby server is upgraded to primary server and begins degrading operation. This mode can be executed on the primary server and standby server in an environment where the Mirroring Controller process can communicate with the Mirroring Controller process on the other server.

The detach mode forcibly disconnects the standby server. This mode is used to forcibly disconnect the other server when stopping of Mirroring Controller cannot be performed using stop mode (which requires login to the standby server). It can only be executed on the primary server.

The enable-failover mode enables automatic switching and disconnection.

The disable-failover mode disables automatic switching and disconnection.

W

The register mode registers Mirroring Controller as a Windows service. The -w, -W, -f, -F, --mc-only, --async-connect-arbiter, and --local-server options are used when Mirroring Controller is started and stopped as a Windows service. If the mc_ctl command is used to start and stop Mirroring Controller, the option specified in the command will be valid.

The unregister mode unregisters Mirroring Controller as a Windows service.

L

If Mirroring Controller has not been started on the server that executes the command, commands for any mode other than the start mode, and status mode.

Execute this command as an instance administrator.

W

If Mirroring Controller has not been started on the server that executes the command, commands for any mode other than the start mode, status mode, register mode, and unregister mode terminate with an error.

Execute this command as a user with the "Administrator" privilege (operating system user ID that belongs to the Administrator group).

Until you start Mirroring Controller of standby server after starting Mirroring Controller of the primary server, operation can be started with only the primary server. Standby server is incorporated when you start the Mirroring Controller of standby server, and you should be able to operate in the multiplexing configuration.

Options

-a

Specify this option to stop Mirroring Controller on all servers.

-e

Specify this option to forcibly stop Mirroring Controller on the active server.

-f

Specify this option to enable automatic switching and disconnection of Mirroring Controller immediately after startup.

L

This option is the default of start mode.

W

This option is the default of start mode and register mode.

-F

Specify this option to disable automatic switching and disconnection immediately after startup of Mirroring Controller.

--async-connect-arbiter

Specify this option to connect the Mirroring Controller start process asynchronously to the Mirroring Controller arbitration process. This option can be specified to forcibly start Mirroring Controller if the Mirroring Controller arbitration process is not started.

Specify this option if using the Mirroring Controller arbitration server.

--arbiter

Specify this option to display the connection status of the Mirroring Controller arbitration process. This option can be specified if using status mode.

Specify this option if using the Mirroring Controller arbitration server.

--local-server *server_id*

If you run a simulation build of the primary and standby servers in a single server (for system testing, for example), specify this option to identify the server to be operated.

For *server_id*, specify the server identifier specified in the network.conf file. ASCII characters other than single-byte space can be specified in the server identifier. The operations will be executed as if the user has logged in to *server_id*.

--mc-only

Specify this option to start and stop only Mirroring Controller processes. At the start mode, this option can be specified only while the database instance is running. If this option is omitted, the database instance is simultaneously started and stopped.

-M *mcdir*

Specify the Mirroring Controller management directory.

ASCII characters can be specified in the directory path.

If this option is omitted, the value of the environment variable MCCONTROLDIR is used.

--force

Switching with this option specified can only be specified on the standby server. This option is used to perform switching forcibly after performing fencing on the primary server if communication with the Mirroring Controller process of the other server is not possible (due to a network issue between database servers or unresponsive server, for example), thus preventing normal switching. However, if the --no-fencing option is specified, fencing will not be performed on the primary server.

--no-fencing

When switching or disconnection is executed with the --force option specified, fencing of the server to be degraded is circumvented. Therefore, it is necessary for the user to isolate the server to be degraded from the cluster system in advance.

-P *password*

For the register mode, specify the password for the user who executed the command.

-S a[uto] | d[emand]

Specify the start type for the Windows service to be registered. You can choose auto or demand as the start type by specifying the entire word or just its first letter. The default is auto.

-w

Waits for operations to finish.

This option is the default of start mode.

This option is the default of start mode and register mode.

-W

Does not wait for operations to finish.

Environment variable

MCCONTROLDIR

Specifies the Mirroring Controller management directory.

ASCII characters can be specified in the directory path.

You can specify the -M option to override this value.

Diagnostics

0: Normal end

Other: Abnormal end

Notes

The message under execution might be output though the mc_ctl command is not being executed and, besides, it terminate abnormally when the server is downed while processing execution of this command, an automatic switch, and an automatic separation, and the communication between a primary server and the standby server is cut off. Besides, restart Mirroring Controller to solve this problem after confirming that the mc_ctl command is not in progress. Afterwards, execute a necessary operation.

If a time-out error occurs when the mc_ctl command is in progress, the messages may be different from the processes. Take the actions described in the "Action" section of the message.

Automatic switching and disconnection by the enable-failover mode, the disable-failover mode, and the start mode can be enabled/disabled only while Mirroring Controller is running. Therefore, if you want to enable/disable automatic switching and disconnection on starting, specify the -f option or -F option each time you start Mirroring Controller.

W

Use the start mode and stop mode to start and stop the Windows service. To do this, use the register mode to register Mirroring Controller as a Windows service in advance.

In case of postgresql.conf has any incorrect parameter when this command is executed, this command may be abnormally terminated. If this is the case, re-execute it again after correct the parameter in postgresql.conf.

If the arbitration server of Mirroring Controller is used, connection with the arbitration server will be performed on startup even if startup using start mode is executed with the -F option specified, or if executed with --local-server specified.

W

The mc_ctl command must be executed from "Administrator: Command Prompt". Right-click [Command Prompt], and then select [Run as administrator] from the menu to display the [Administrator: Command Prompt] window.

For operation using an arbitration server, the amount of time spent attempting to connect with the arbitration server is calculated, so the Mirroring Controller startup time may take longer.

Example

L

To start Mirroring Controller:

```
$ mc_ctl start -M /mcdir/inst1
```

W

To start Mirroring Controller:

```
> mc_ctl start -M D:\mcdir\inst1
```

Display details of mc_ctl status

```
mirroring status
----------------
(1)

server_id  host_role        host          host_status  db_proc_status       disk_status
(2)        (3)               (4)             (5)          (6)                    (7)
```

```
(1) Multiplexing status
    switchable        : Switchable
    switching         : Switching
    switched        : Switched (displayed when switching has finished and the degrading
operations status has been enabled)
    not-switchable    : Not switchable (displayed when a server is disconnected and
switching is not possible)
    unknown           : Unknown (*1)
    failover-disabled : Failover is disabled
(2) Server identifier
(3) Server role
    primary : Primary
    standby : Standby
    none(inactivated primary): No role
                              (primary is stopped or being defined as primary)
    none(inactivated standby): No role
                               (standby is stopped or being defined as primary)
(4) Host name or IP address
(5) Live/dead state of the server
    normal   : Normal operation
    abnormal : Abnormal
    unknown  : Unknown (*1)
(6) DBMS process status
    normal                         : Normal
    abnormal (abnormal process name (*2)) : Abnormal
    unknown                        : Unknown (*1)
(7) Disk status
    normal                             : Normal
    abnormal (abnormal disk type (*3)) : Abnormal
    unknown                            : Unknown (*1)

*1: Displayed when Mirroring Controller is stop state, the management network is
abnormal, or Mirroring Controller has failed or is unresponsive.

*2: The names of the DBMS processes in which the abnormality was detected are output. The
name has the following meaning: However, if multiple DBMS process issues are detected,
only the DBMS for which the first issue was detected is displayed.
     -postmaster: Process (postmaster) that accepts application connections
     -wal_sender or wal_receiver: Process (WAL sender or WAL receiver) that sends and
receives transaction logs
*3: The types of disks where the abnormality was detected are output separated by a
comma. The type has the following meaning:
     -data: Data storage disk
     -tran_log: Transaction log storage disk
     -tablespace: Tablespace storage disk
```

Display details of mc_ctl status (with the --arbiter option specified)

```
arbiter_id   host            status
(1)          (2)              (3)
```

```
(1) Arbitration server identifier
(2) Host name or IP address
(3) Mirroring Controller arbitration process connection status
    online  : Connected
    offline : Disconnected (*1)

*1: When Mirroring Controller is stopped, connections to the Mirroring Controller
arbitration process cannot be established, so it will be displayed as "offline".
```

Chapter 5 Connection Manager Commands

This chapter explains the Connection Manager commands.

5.1 cm_ctl

Name

cm_ctl - Start, stop or display the status of the conmgr process

Synopsis

```
cm_ctl start [-D diretory] [-W] [--complete] [-t seconds]

cm_ctl stop [-D diretory] [-W] [-m {smart | fast | immediate}] [-t seconds]

cm_ctl status [-D directory] [-t seconds] [-i {all | instance | application}]
```

Description

The start mode starts the conmgr process. The command returns at least after the heartbeat monitoring connection is completed with the primary server's instance.

When --complete is specified, wait until all instances configured in conmgr.conf have completed their heartbeat monitoring connections. You can set a timeout for these waits. The default of timeout is 60 seconds. Can be changed using the -t option. If it times out, it simply gives up waiting and the conmgr process remains up.

Note

If the primary is not among the instances configured in the cmgr.conf, use the -W option when starting Connection Manager with the cm_ctl command. Without the -W option, the cm_ctl command will not return until the primary connection is complete.

This includes, for example, starting up conmgr which is set up in advance to connect only to the standby center side of the disaster countermeasure operation.

The stop mode sends a signal to the conmgr process to shut down and wait until the process disappeares.

The default of wait time is 60 seconds. Can be changed using the -t option. If it times out, it simply gives up waiting. There are three shutdown methods, "smart", "fast", and "immediate", specify with the -m option. The "smart" waits until all applications using the conmgr process run out of SQL connections before shutting down. The "fast" forces all applications using the conmgr process to disconnect from the conmgr process before shutting it down. As a result, the SQL connection for the application receives an error. The "immediate" terminates the conmgr process immediately. If nothing is specified, it stops in smart mode.

The status mode, if the commgr process exists, queries the conmgr process for instance and application information known to the conmgr process, and display them to standard output along with the state of conmgr itself.

The -i option allows you to specify what information to query. The "instance" queries information about the instance; The "application" queries information about the application; The "all" queries information about both. conmgr's own information is always displayed. The default time to wait for a query to return is 60 seconds. Can be changed using the -t option.

Options

--complete

Wait until all instances configured in conmgr.conf have completed their heartbeat monitoring connections. If the When used with the -W option, the -W option takes precedence.

-D

-- directory=*directory*

Specify the directory where conmgr.conf is located. If omitted, it refers to the directory specified by the environment variable CMDATA. You cannot omit both.

-i {all | instance | application}

Specify the information to display the status.

-m

--mode={smart | fast | immediate}

Specify the mode of shutdown. The default is smart.

-t *seconds*

--timeout=*seconds*

Specify how long to wait for the operation to complete. The unit is seconds. The default is 60 seconds.

-W

--no-wait

In start mode, cm_ctl command returns immediately after forking conmgr process. In stop mode, the cm_ctl command returns without waiting for the process to disappeare.

Diagnostics

start mode or stop mode

0: Normal end

2: Timeout occurred

3: Unable to access the specified directory

Other than the above: None of the above

status mode

0: Normal end

2: Timeout occurred

3: Unable to access the specified directory

4: conmgr process does not exist

Other than the above: None of the above

Privileges

The conmgr process cannot be started by the administrator(e.g. superuser(root) on Linux).

Example

Display details of start mode

The block of information that can be specified with the -i option is used as a unit. There is one blank line between the blocks and no blank lines within the blocks. It includes one or more spaces between columns and between data.

```
$ cm_ctl status -i all
conmgr_status:
status pid
(1)     (2)
ready  3456

instance_information:
addr          port  database_attr
(3)           (4)   (5)
```

```
192.0.2.100   27500 standby
192.0.2.110   27500 primary
192.0.2.120   27500 standby
192.0.2.130   27500 unknown

application_infomation:
addr          port  pid   connected_time
(6)           (7)   (8)   (9)
127.0.0.1     12345 5678  2020-01-15 02:03:04
```

(1) Status of the conmgr process
    starting : The process is starting its startup sequence but is not ready to accept
               connections from clients.
    ready   : Ready to accept connections from clients.
    stopping : It has received an end instruction and is starting the stop sequence.
    inactive : The conmgr process does not exist.
(2) PID of the conmgr process
(3) IP address of the instance
(4) Port number the postmaster listens on
(5) Status of the instance (primary | standby | unknown)
(6) Connection source IP address for conmgr process
(7) Connection source (ephemeral) port number for conmgr process
(8) PID of the connection source
(9) Date and time conmgr process connection
    The ISO 8601 compliant date is followed by a blank, followed by the ISO 8601
    compliant second precision time.
    This representation is a PostgreSQL string representation of type timestamp.

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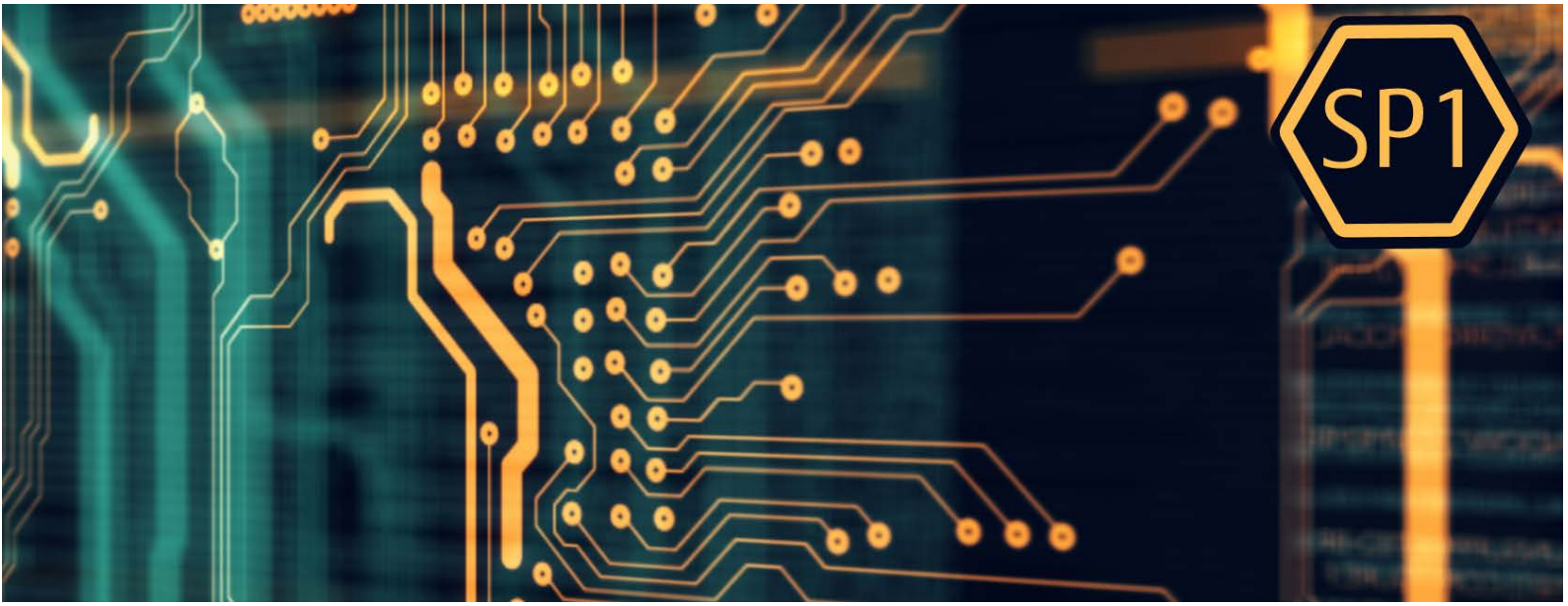

Message Guide

Windows/Linux

J2UL-2687-02ENZ0(00)
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Preface

Purpose of this document

This document explains the messages output by FUJITSU Enterprise Postgres.

Intended readers

This document is intended for the following readers:

- Persons using FUJITSU Enterprise Postgres

Prerequisites

Knowledge of the following topics is required to read this document:

- A general understanding of computers
- Jobs
- PostgreSQL
- Linux
- Windows

Structure of this document

This document is structured as follows:

Chapter 1 Overview of Messages

This chapter explains the format in which messages are output.

Chapter 2 FUJITSU Enterprise Postgres Messages

This chapter explains messages output by FUJITSU Enterprise Postgres.

Chapter 3 Mirroring Controller Messages

This chapter explains messages output by Mirroring Controller.

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Issue date and version


```
Edition 2.0: August 2021
```

```
Edition 1.0: April 2021
```


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Chapter 1 Overview of Messages

This chapter explains the format of messages.

1.1 Message Format

This section explains the format of messages.

- Output format
- Components

1.1.1 Output Format

The message output format is as follows:

Format of messages returned to an application

```
msgType: msgText (msgNumber)
```

Format of messages output to the server message log

```
SQLSTATE: date [processID]: [internalCode-1] user = userName,db = dbName,remote =
clientIpAddress(portNumber) app = appName msgType: msgText (msgNumber)
```

See

Refer to "PostgreSQL Error Codes" under "Appendixes" in the PostgreSQL Documentation for information on SQLSTATE.

Note

- Notes on monitoring messages output to the server message log

  Use SQLSTATE to monitor server messages, noting the following:

  - Configuration method

    Refer to "Error Log Settings" under "Setup" in the Installation and Setup Guide for Server for details.

  - Notes

    - The user name, client IP address (port number), and application name may sometimes be blank.
    - Multiple message numbers may be output.

- Notes on monitoring messages returned to an application

  You can output SQLSTATE to a message to be returned to an application. The following explains how to configure the settings for outputting SQLSTATE and gives cautions to be observed when doing so.

  - How to configure the settings:

    - In the SET statement, set the log_error_verbosity parameter to VERBOSE.
    - For an application that uses the C language library, use the PQsetErrorVerbosity function to set message redundancy to PQERRORS_VERBOSE.

  - Cautions

    - SQLSTATE is output only to messages to be returned to applications that use the C language library.

- In some cases, *userName*, *clientIpAddress*(*portNumber*), and *applicationName* may be blank.
- Multiple message numbers may be output.

- If the email address "pgsql-bugs@postgresql.org" is output to the message and the cause of the error cannot be identified, contact Fujitsu technical support.

Example

Message output to the server message log

```
3D000: 2017-07-10 19:41:05 JST [13899]: [1-1] user = fepuser,db = fep,remote =
127.0.0.1(51902) app = [unknown] FATAL:  database "fep" does not exist (10571)
```

1.1.2 Components

This section explains the components of a message.

Message type

The message type indicates the type of error denoted in the message.

The message type will be one of the following:

- Information (INFO, NOTICE, LOG, DEBUG)

  This message type denotes a notification from the system, not an error. There is no need to take action.

- Warning (WARNING)

  This message type denotes that no error occurred but confirmation or action is required by the user. Take the actions described in the "Action" section of the message.

- Error (ERROR, FATAL, PANIC)

  This message type denotes that an error has occurred. Take the actions described in the "Action" section of the message.

- Supplementary information (DETAIL, HINT, QUERY, CONTEXT, LOCATION, STATEMENT)

  This message type denotes supplementary information relating to the previous message. If the message was output in English, the message type will also be in English. (Detail, hint, query, context, location, statement)

Message text

The text of the message reports the status of the system or an error in the system.

The notation "@numeric character@" that appears in "Chapter 2 FUJITSU Enterprise Postgres Messages" indicates an embedded character string. A character string is output to a message that is actually output.

If a message locale other than 'ja' is specified, messages added by FUJITSU Enterprise Postgres will be output in English.

For other message locales, the messages are output in English.

Message number

The message number uniquely identifies each message. It is output as a string of five single-byte numeric characters. Use the message number that is output to find the explanation of the corresponding message in this document. The message numbers may change, so do not use them as keywords for monitoring.

No message number is assigned to messages output by a PL/pgSQL RAISE statement.

The message number is only output if the message locale is 'ja' or 'en'. For other message locales, the message number is not output.

1.2 Mirroring Controller Message Format

This section explains the format of messages output by the Mirroring Controller.

Mirroring Controller messages are output to the following locations:

L - System log

W - Event log

Output format

```
programName[processId]: msgType: msgText (msgNumber)
```

For *programName*, use the value of the syslog_ident parameter or event_source parameter defined in the *serverIdentifier*.conf file.

L The message types output by Mirroring Controller, their severity, and their corresponding value in the system log are shown in the table below.

L Table 1.1 Message type, severity, and corresponding value in the system log

Message type	Severity	Meaning	System log
INFO	Information	Provides information not categorized as LOG or NOTICE.	INFO
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)	
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	NOTICE
WARNING	Warning	Provides a warning, for example it will soon be impossible to maintain multiplexing capabilities.	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR
FATAL		Reports that an error has been detected requiring system recovery in one of the multiplexed database systems. It also reports the content and cause of the error.	CRIT
PANIC		Reports that an error has been detected requiring immediate system recovery in all multiplexed database systems. It also reports the content and cause of the error.	ALERT

W The message types output by Mirroring Controller, their severity, and their corresponding value in the event log are shown in the table below.

W Table 1.2 Message type, severity, and corresponding value in the event log

Message type	Severity	Meaning	Event log
INFO	Information	Provides information not categorized as LOG or NOTICE.	INFORMATION

Message type	Severity	Meaning	Event log
LOG		Provides information recognized as a particularly important event in tracing the operation history. (Example: Automatic switch is complete)	
NOTICE	Notice	Outputs information that takes into account the user instructions within the program in response to an executed or automatically executed process.	
WARNING	Warning	Provides a warning, for example it will soon be impossible to maintain multiplexing capabilities.	WARNING
ERROR	Error	Reports that an error other than FATAL or PANIC has occurred.	ERROR
FATAL		Reports that an error has been detected requiring system recovery in one of the multiplexed database systems. It also reports the content and cause of the error.	
PANIC		Reports that an error has been detected requiring immediate system recovery in all multiplexed database systems. It also reports the content and cause of the error.	

The message severity has the following meanings:

- Information

  Informational status. A message that was reported by the system is displayed. No action is required.

- Notice

  Informational status, but a message that should be noted is displayed. If necessary, take the actions described in the "Action" section of the message.

- Warning

  No error has occurred, but the user is requested to check, and take action. Take the actions described in the "Action" section of the message.

- Error

  An error has occurred. Take the actions described in the "Action" section of the message.

Output destination server

Mirroring Controller messages are output by the database server. When using an arbitration server, Mirroring Controller messages are also output by the arbitration server.

- Messages with a message number that starts with "MCA" are output by the database server.
- Messages with a message number that starts with "MCR" are output by the arbitration server.

Chapter 2 FUJITSU Enterprise Postgres Messages

This chapter explains messages output by FUJITSU Enterprise Postgres.

2.1 Message Numbers Beginning with 10000

2.1.1 10001

no Snowball stemmer available for language "@1@" and encoding "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.2 10002

multiple StopWords parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.3 10003

multiple Language parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.4 10004

unrecognized Snowball parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.5 10005

missing Language parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.6 10006

could not determine which collation to use for index expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.7 10007

old GIN indexes do not support whole-index scans nor searches for nulls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.8 10008

index row size @1@ exceeds maximum @2@ for index "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.9 10009

"@1@" is an index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.10 10010

could not create archive status file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.11 10011

could not write archive status file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.12 10013

could not write to log file @1@ at offset @2@, length @3@: @4@

[Description]

There are the following cases:

- failed to write transaction log file

- failed to write transaction log file on backup data storage destination

[System Processing]

Processing will be aborted.

[Action]

Lack of storage space or malfunction of storage allocating the file shown in this message is considered.

If it's ture, recover the database system accoring to "Actions when an Error Occurs" of "Operation Guide" or "Cluster Operation Guide (Database Multiplexing)".

If it's not true, identify the cause according to the informations in this message such as errno, and work around.

The following major causes are considered.

- the file has no permission or the permission has been changed

- power of the storage allocating the file has been turned off

- unmounted the storage allocating the file

- another process or human operated the file

- the storage allocating the file has crashed

2.1.13 10014

updated min recovery point to @1@/@2@ on timeline @3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.14 10016

could not create file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.15 10017

could not write to file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.16 10018

could not fsync file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.17 10026

could not read file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.18 10027

could not remove file "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.1.19 10028

archive file "@1@" has wrong size: @2@ instead of @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.20 10029

restored log file "@1@" from archive

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.21 10030

could not restore file "@1@" from archive: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.22 10032

could not open transaction log directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.23 10033

recycled write-ahead log file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.24 10034

removing write-ahead log file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.25 10035

could not rename file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.26 10036

could not remove old transaction log file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.27 10037

required WAL directory "@1@" does not exist

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.28 10038

creating missing WAL directory "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.29 10039

could not create missing directory "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.30 10040

removing WAL backup history file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.31 10043

incorrect resource manager data checksum in record at @1@/@2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.32 10044

invalid record offset at @1@/@2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.33 10045

contrecord is requested by @1@/@2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.34 10048

invalid record length at @1@/@2@: wanted @3@, got @4@

[Description]

invalid record length was found on archive log or transaction log data.

[System Processing]

The following causes could be considered.

- if the log level is information(INFO, NOTICE, LOG, DEBUG)

Continue processing.

- if the log level is error(ERROR, FATAL, PANIC)

Processing will be aborted.

[Action]

If the log level is information(INFO, NOTICE, LOG, DEBUG), no action is required.

When the log level is error(ERROR, FATAL, PANIC), take either of the following actions.

- if this message is output during starting instance

Please restore according to "Deal at the time of abnormality" of "Operation Guide" or "Cluster Operation Guide (Database Multiplexing)".

- if this message is output during recovering

Cannot continue to recover with the current backup data because an archive log in the backup has an error.

Recover from the other backup data.

2.1.35 10049

invalid resource manager ID @1@ at @2@/@3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.36 10050

record with incorrect prev-link @1@/@2@ at @3@/@4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.37 10051

record length @1@ at @2@/@3@ too long

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.38 10052

there is no contrecord flag at @1@/@2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.39 10053

invalid contrecord length @1@ at @2@/@3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.40 10054

invalid magic number @1@ in log segment @2@, offset @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.41 10055

invalid info bits @1@ in log segment @2@, offset @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.42 10056

WAL file is from different database system: WAL file database system identifier is @1@, pg_control database system identifier is @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.43 10057

unexpected pageaddr @1@/@2@ in log segment @3@, offset @4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.44 10058

unexpected timeline ID @1@ in log segment @2@, offset @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.45 10059

out-of-sequence timeline ID @1@ (after @2@) in log segment @3@, offset @4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.46 10060

syntax error in history file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.47 10061

invalid data in history file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.48 10062

invalid data in history file "@1@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.49 10063

new timeline @1@ is not a child of database system timeline @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.50 10064

new target timeline is @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.51 10065

could not rename file "@1@" to "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.52 10066

could not link file "@1@" to "@2@": @3@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.1.53 10073

database files are incompatible with server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.54 10074

incorrect checksum in control file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.55 10075

could not write bootstrap write-ahead log file: @1@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.1.56 10076

could not fsync bootstrap write-ahead log file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.57 10077

could not close bootstrap write-ahead log file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.58 10079

parameter "@1@" requires a Boolean value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.59 10085

must specify restore_command when standby mode is not enabled

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.60 10086

recovery target timeline @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.61 10087

archive recovery complete

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.1.62 10088

recovery stopping after commit of transaction @1@, time @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.63 10089

recovery stopping before commit of transaction @1@, time @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.64 10090

recovery stopping after abort of transaction @1@, time @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.65 10091

recovery stopping before abort of transaction @1@, time @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.66 10092

recovery stopping at restore point "@1@", time @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.1.67 10093

recovery has paused

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.1.68 10095

recovery is in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.69 10096

hot standby is not possible because @1@ = @2@ is a lower setting than on the master server (its value was @3@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.70 10097

WAL was generated with wal_level=minimal, data may be missing

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.1.71 10098

hot standby is not possible because wal_level was not set to "replica" or higher on the master server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.1.72 10099

control file contains invalid checkpoint location

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2 Message Numbers Beginning with 10100

2.2.1 10100

database system was shut down at @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.2 10101

database system was shut down in recovery at @1@

[Description]

Displaying the date and time that the standby server is shut down last time.

[System Processing]

Continues processing.

[Action]

No action is required.

2.2.3 10102

database system shutdown was interrupted; last known up at @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.4 10103

database system was interrupted while in recovery at @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.5 10104

database system was interrupted while in recovery at log time @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.6 10105

database system was interrupted; last known up at @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.7 10106

requested timeline @1@ is not a child of this server's history

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.8 10107

entering standby mode

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.9 10108

starting point-in-time recovery to XID @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.10 10109

starting point-in-time recovery to @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.11 10110

starting point-in-time recovery to "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.12 10111

starting archive recovery

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.13 10112

checkpoint record is at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.14 10113

could not find redo location referenced by checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.15 10114

could not locate required checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.16 10115

could not locate a valid checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.17 10116

using previous checkpoint record at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.18 10121

invalid next transaction ID

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.19 10122

invalid redo in checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.20 10123

invalid redo record in shutdown checkpoint

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.21 10124

database system was not properly shut down; automatic recovery in progress

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.2.22 10125

initializing for hot standby

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.23 10126

redo starts at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.24 10127

redo done at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.25 10128

last completed transaction was at log time @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.26 10129

redo is not required

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.2.27 10130

requested recovery stop point is before consistent recovery point

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.28 10131

WAL ends before end of online backup

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.29 10132

WAL ends before consistent recovery point

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.30 10133

selected new timeline ID: @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.31 10134

consistent recovery state reached at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.32 10135

invalid primary checkpoint link in control file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.33 10136

invalid secondary checkpoint link in control file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.34 10137

invalid checkpoint link in backup_label file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.35 10138

invalid primary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.36 10139

invalid secondary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.37 10140

invalid checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.38 10141

invalid resource manager ID in primary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.39 10142

invalid resource manager ID in secondary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.40 10143

invalid resource manager ID in checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.41 10144

invalid xl_info in primary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.42 10145

invalid xl_info in secondary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.43 10146

invalid xl_info in checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.44 10147

invalid length of primary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.45 10148

invalid length of secondary checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.46 10149

invalid length of checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.47 10150

shutting down

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.48 10151

database system is shut down

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.49 10152

concurrent write-ahead log activity while database system is shutting down

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.50 10153

skipping restartpoint, recovery has already ended

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.51 10154

skipping restartpoint, already performed at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.52 10155

recovery restart point at @1@/@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.53 10156

restore point "@1@" created at @2@/@3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.54 10157

unexpected timeline ID @1@ (after @2@) in checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.55 10158

unexpected timeline ID @1@ (should be @2@) in checkpoint record

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.56 10160

could not fsync write-through log file @1@: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.57 10161

could not fdatasync file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.58 10163

recovery is not in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.59 10164

WAL level not sufficient for making an online backup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.60 10165

backup label too long (max @1@ bytes)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.61 10166

a backup is already in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.62 10167

could not stat file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.2.63 10168

a backup is not in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.64 10169

invalid data in file "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.65 10170

base backup done, waiting for required WAL segments to be archived

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.66 10171

still waiting for all required WAL segments to be archived (@1@ seconds elapsed)

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.2.67 10172

all required WAL segments have been archived

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.68 10173

WAL archiving is not enabled; you must ensure that all required WAL segments are copied through other means to complete the backup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.69 10176

WAL level not sufficient for creating a restore point

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.70 10177

value too long for restore point (maximum @1@ characters)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.71 10179

could not read from log segment @1@, offset @2@: @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.2.72 10180

received promote request

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.73 10181

promote trigger file found: @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.74 10182

database is not accepting commands to avoid wraparound data loss in database "@1@"

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.2.75 10183

database is not accepting commands to avoid wraparound data loss in database with OID @1@

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.2.76 10184

database "@1@" must be vacuumed within @2@ transactions

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.2.77 10185

database with OID @1@ must be vacuumed within @2@ transactions

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.2.78 10186

transaction ID wrap limit is @1@, limited by database with OID @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.2.79 10187

transaction identifier "@1@" is too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.80 10188

prepared transactions are disabled

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.81 10189

transaction identifier "@1@" is already in use

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.82 10190

maximum number of prepared transactions reached

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.83 10191

prepared transaction with identifier "@1@" is busy

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.84 10192

permission denied to finish prepared transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.85 10193

prepared transaction belongs to another database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.86 10194

prepared transaction with identifier "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.2.87 10195

two-phase state file maximum length exceeded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3 Message Numbers Beginning with 10200

2.3.1 10205

could not recreate file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.2 10209

removing future two-phase state file for transaction @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.3 10210

corrupted two-phase state file for transaction @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.4 10211

removing stale two-phase state file for transaction @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.5 10212

recovering prepared transaction @1@ from shared memory

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.3.6 10213

file "@1@" doesn't exist, reading as zeroes

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.7 10214

could not access status of transaction @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.8 10215

could not truncate directory "@1@": apparent wraparound

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.9 10216

removing file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.3.10 10217

cannot have more than 2^32-2 commands in a transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.11 10218

maximum number of committed subtransactions (@1@) exceeded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.12 10220

@1@ cannot run inside a transaction block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.13 10221

@1@ cannot run inside a subtransaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.14 10222

@1@ cannot be executed from a function or multi-command string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.15 10223

@1@ can only be used in transaction blocks

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.16 10224

there is already a transaction in progress

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.17 10225

there is no transaction in progress

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.3.18 10226

no such savepoint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.19 10227

cannot have more than 2^32-1 subtransactions in a transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.20 10228

index "@1@" is not a btree

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.21 10229

version mismatch in index "@1@": file version @2@, code version @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.22 10230

index "@1@" contains unexpected zero page at block @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.23 10231

index "@1@" contains corrupted page at block @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.24 10232

duplicate key value violates unique constraint "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.25 10233

failed to re-find tuple within index "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.3.26 10234

row is too big: size @1@, maximum size @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.27 10235

"@1@" is not an index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.28 10236

"@1@" is a composite type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.29 10237

could not obtain lock on row in relation "@1@"

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.3.30 10238

hash indexes do not support whole-index scans

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.31 10239

index "@1@" is not a hash index

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.32 10240

index "@1@" has wrong hash version

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.33 10241

out of overflow pages in hash index "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.34 10242

index row size @1@ exceeds hash maximum @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.35 10243

column "@1@" cannot be declared SETOF

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.36 10244

number of columns (@1@) exceeds limit (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.37 10245

user-defined relation parameter types limit exceeded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.38 10246

RESET must not include values for parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.39 10247

unrecognized parameter namespace "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.40 10248

unrecognized parameter "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.41 10249

parameter "@1@" specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.42 10250

invalid value for boolean option "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.43 10251

invalid value for integer option "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.44 10252

value @1@ out of bounds for option "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.45 10253

invalid value for floating point option "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.46 10254

unsupported format code: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.47 10255

number of index columns (@1@) exceeds limit (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.48 10256

index row requires @1@ bytes, maximum size is @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.49 10257

picksplit method for column @1@ of index "@2@" failed

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.3.50 10259

index "@1@" contains an inner tuple marked as invalid

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.51 10260

aggregate @1@ needs to have compatible input type and transition type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.52 10261

could not create exclusion constraint "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.53 10262

conflicting key value violates exclusion constraint "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.54 10263

RIGHT JOIN is only supported with merge-joinable join conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.55 10264

FULL JOIN is only supported with merge-joinable join conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.56 10265

could not determine actual type of argument declared @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.57 10266

@1@ is not allowed in a SQL function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.58 10267

@1@ is not allowed in a non-volatile function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.59 10269

set-valued function called in context that cannot accept a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.60 10270

return type mismatch in function declared to return @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.61 10271

return type @1@ is not supported for SQL functions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.62 10272

cannot change sequence "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.63 10273

cannot change TOAST relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.64 10274

cannot insert into view "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.65 10275

cannot update view "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.66 10276

cannot copy from view "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.67 10278

cannot change relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.68 10279

cannot lock rows in sequence "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.69 10280

cannot lock rows in TOAST relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.70 10281

cannot lock rows in view "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.71 10282

cannot lock rows in foreign table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.72 10283

cannot lock rows in relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.73 10284

null value in column "@1@" of relation "@2@" violates not-null constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.74 10285

new row for relation "@1@" violates check constraint "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.75 10286

could not serialize access due to concurrent update

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.76 10287

ON COMMIT can only be used on temporary tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.77 10288

cannot create temporary table within security-restricted operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.78 10289

could not rewind hash-join temporary file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.79 10291

could not read from hash-join temporary file: read only @1@ of @2@ bytes

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.3.80 10292

relation "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.81 10293

cursor "@1@" is not a SELECT query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.82 10294

cursor "@1@" is held from a previous transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.83 10295

cursor "@1@" has multiple FOR UPDATE/SHARE references to table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.84 10296

cursor "@1@" does not have a FOR UPDATE/SHARE reference to table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.85 10297

cursor "@1@" is not positioned on a row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.86 10298

cursor "@1@" is not a simply updatable scan of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.3.87 10299

type of parameter @1@ (@2@) does not match that when preparing the plan (@3@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4 Message Numbers Beginning with 10300

2.4.1 10300

no value found for parameter @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.2 10301

more than one row returned by a subquery used as an expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.3 10302

frame starting offset must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.4 10303

frame starting offset must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.5 10304

frame ending offset must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.6 10305

frame ending offset must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.7 10306

transaction left non-empty SPI stack

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.4.8 10307

subtransaction left non-empty SPI stack

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.4.9 10308

cannot open multi-query plan as cursor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.10 10309

cannot open @1@ query as cursor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.11 10310

DECLARE SCROLL CURSOR ... FOR UPDATE/SHARE is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.12 10311

number of array dimensions (@1@) exceeds the maximum allowed (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.13 10312

array subscript in assignment must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.14 10313

attribute @1@ has wrong type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.15 10314

table row type and query-specified row type do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.16 10315

cannot pass more than @1@ argument to a function
cannot pass more than @2@ arguments to a function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.17 10317

function returning setof record called in context that cannot accept type record

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.18 10318

function return row and query-specified return row do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.19 10319

table-function protocol for materialize mode was not followed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.20 10320

unrecognized table-function returnMode: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.21 10322

rows returned by function are not all of the same row type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.22 10325

cannot merge incompatible arrays

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.23 10326

multidimensional arrays must have array expressions with matching dimensions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.24 10328

domain @1@ does not allow null values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.25 10329

value for domain @1@ violates check constraint "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.26 10330

aggregate function calls cannot be nested

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.27 10331

window function calls cannot be nested

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.28 10332

target type is not an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.29 10333

ROW() column has type @1@ instead of type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.30 10334

could not identify a comparison function for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.31 10335

OFFSET must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.32 10336

LIMIT must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.33 10337

@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.34 10338

could not find array type for data type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.35 10339

cannot assign to system column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.36 10340

cannot set an array element to DEFAULT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.37 10341

cannot set a subfield to DEFAULT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.38 10342

column "@1@" is of type @2@ but default expression is of type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.39 10343

row expansion via "*" is not supported here

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.40 10344

cannot assign to field "@1@" of column "@2@" because its type @3@ is not a composite type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.41 10345

cannot assign to field "@1@" of column "@2@" because there is no such column in data type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.42 10346

array assignment requires type @1@ but expression is of type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.43 10347

column "@1@" is of type @2@ but expression is of type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.44 10348

cannot cast type @1@ to @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.45 10349

column "@1@" of relation "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.46 10350

column name "@1@" specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.47 10351

column reference "@1@" is ambiguous

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.48 10352

cross-database references are not implemented: "@1@.@2@.@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.49 10353

improper qualified name (too many dotted names): @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.50 10354

SELECT * with no tables specified is not valid

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.51 10355

there is no parameter $@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.52 10356

inconsistent types deduced for parameter $@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.53 10357

could not determine data type of parameter $@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.54 10358

identifier "@1@" will be truncated to "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.4.55 10363

aggregate functions are not allowed in DEFAULT expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.56 10365

column name "@1@" appears more than once in USING clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.57 10366

common column name "@1@" appears more than once in left table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.58 10367

column "@1@" specified in USING clause does not exist in left table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.59 10368

common column name "@1@" appears more than once in right table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.60 10369

column "@1@" specified in USING clause does not exist in right table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.61 10370

column alias list for "@1@" has too many entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.62 10371

argument of @1@ must not contain variables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.63 10372

aggregate functions are not allowed in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.64 10374

@1@ "@2@" is ambiguous

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.65 10375

non-integer constant in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.66 10376

@1@ position @2@ is not in select list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.67 10377

window "@1@" is already defined

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.68 10378

schema "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.69 10379

cannot override PARTITION BY clause of window "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.70 10380

cannot override ORDER BY clause of window "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.71 10382

in an aggregate with DISTINCT, ORDER BY expressions must appear in argument list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.72 10383

for SELECT DISTINCT, ORDER BY expressions must appear in select list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.73 10384

SELECT DISTINCT ON expressions must match initial ORDER BY expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.74 10385

"@1@" is not a valid operator name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.75 10386

extension "@1@" already exists, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.4.76 10387

array of serial is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.77 10388

@1@ will create implicit sequence "@2@" for serial column "@3@.@4@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.4.78 10389

conflicting NULL/NOT NULL declarations for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.79 10390

multiple default values specified for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.80 10391

referenced relation "@1@" is not a table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.81 10392

multiple primary keys for table "@1@" are not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.82 10393

cannot use an existing index in CREATE TABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.83 10394

conversion "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.84 10395

index "@1@" is already associated with a constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.85 10396

index "@1@" does not belong to table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.86 10397

index "@1@" is not valid

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.4.87 10399

"@1@" is not a unique index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5 Message Numbers Beginning with 10400

2.5.1 10400

index "@1@" contains expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.2 10401

"@1@" is a partial index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.3 10402

"@1@" is a deferrable index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.4 10403

index "@1@" column number @2@ does not have default sorting behavior

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.5 10404

column "@1@" named in key does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.6 10405

column "@1@" appears twice in primary key constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.7 10406

column "@1@" appears twice in unique constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.8 10408

index expressions and predicates can refer only to the table being indexed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.9 10409

rule WHERE condition cannot contain references to other relations

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.10 10412

rules with WHERE conditions can only have SELECT, INSERT, UPDATE, or DELETE actions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.11 10413

conditional UNION/INTERSECT/EXCEPT statements are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.12 10414

ON SELECT rule cannot use OLD

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.13 10415

ON SELECT rule cannot use NEW

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.14 10416

ON INSERT rule cannot use OLD

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.15 10417

ON DELETE rule cannot use NEW

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.16 10418

cannot refer to OLD within WITH query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.17 10419

cannot refer to NEW within WITH query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.18 10420

misplaced DEFERRABLE clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.19 10421

multiple DEFERRABLE/NOT DEFERRABLE clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.20 10422

misplaced NOT DEFERRABLE clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.21 10423

constraint declared INITIALLY DEFERRED must be DEFERRABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.22 10424

misplaced INITIALLY DEFERRED clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.23 10425

multiple INITIALLY IMMEDIATE/DEFERRED clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.24 10426

misplaced INITIALLY IMMEDIATE clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.25 10427

collations are not supported by type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.26 10428

CREATE specifies a schema (@1@) different from the one being created (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.27 10429

table reference "@1@" is ambiguous

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.28 10430

table reference @1@ is ambiguous

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.29 10431

table name "@1@" specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.30 10432

WITH query "@1@" has @2@ columns available but @3@ columns specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.31 10434

relation "@1@.@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.32 10435

type "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.33 10436

a column definition list is only allowed for functions returning "record"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.34 10437

a column definition list is required for functions returning "record"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.35 10438

function "@1@" in FROM has unsupported return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.36 10439

VALUES lists "@1@" have @2@ columns available but @3@ columns specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.37 10440

tables can have at most @1@ columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.38 10441

WITH query "@1@" does not have a RETURNING clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.39 10442

column @1@ of relation "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.40 10443

invalid reference to FROM-clause entry for table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.41 10444

missing FROM-clause entry for table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.42 10445

unrecognized role option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.43 10446

current database cannot be renamed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.44 10447

time zone interval must be HOUR or HOUR TO MINUTE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.45 10449

MATCH PARTIAL not yet implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.46 10451

CREATE ASSERTION is not yet implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.47 10453

RECHECK is no longer required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.48 10454

missing argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.49 10457

number of columns does not match number of values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.50 10458

LIMIT #,# syntax is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.51 10459

VALUES in FROM must have an alias

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.52 10460

subquery in FROM must have an alias

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.5.53 10461

precision for type float must be at least 1 bit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.54 10462

precision for type float must be less than 54 bits

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.55 10463

UNIQUE predicate is not yet implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.56 10464

RANGE PRECEDING is only supported with UNBOUNDED

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.57 10465

RANGE FOLLOWING is only supported with UNBOUNDED

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.58 10466

frame start cannot be UNBOUNDED FOLLOWING

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.59 10467

frame starting from following row cannot end with current row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.60 10468

frame end cannot be UNBOUNDED PRECEDING

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.61 10469

frame starting from current row cannot have preceding rows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.62 10470

frame starting from following row cannot have preceding rows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.63 10471

type modifier cannot have parameter name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.64 10472

wrong number of parameters on left side of OVERLAPS expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.65 10473

wrong number of parameters on right side of OVERLAPS expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.66 10474

syntax error

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.67 10475

multiple ORDER BY clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.68 10476

multiple OFFSET clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.69 10477

multiple LIMIT clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.70 10478

multiple WITH clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.71 10479

OUT and INOUT arguments aren't allowed in TABLE functions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.72 10480

multiple COLLATE clauses not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.73 10481

operator does not exist: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.74 10482

could not identify an ordering operator for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.75 10483

could not identify an equality operator for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.76 10484

operator requires run-time type coercion: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.77 10485

operator @1@ is not commutative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.78 10486

operator is only a shell: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.79 10487

op ANY/ALL (array) requires array on right side

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.80 10488

op ANY/ALL (array) requires operator to yield boolean

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.81 10489

op ANY/ALL (array) requires operator not to return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.82 10490

column "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.83 10491

column "@1@" not found in data type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.84 10492

could not identify column "@1@" in record data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.85 10493

column notation .@1@ applied to type @2@, which is not a composite type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.86 10494

function @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.87 10495

NULLIF requires = operator to yield boolean

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.5.88 10498

subquery must return only one column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6 Message Numbers Beginning with 10500

2.6.1 10500

subquery has too many columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.2 10501

subquery has too few columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.3 10502

cannot determine type of empty array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.4 10503

could not determine polymorphic type @1@ because input has type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.5 10504

unnamed XML attribute value must be a column reference

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.6 10505

unnamed XML element value must be a column reference

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.7 10506

XML attribute name "@1@" appears more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.8 10507

cannot cast XMLSERIALIZE result to @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.9 10508

unequal number of entries in row expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.10 10509

cannot compare rows of zero length

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.11 10510

row comparison operator must yield type boolean, not type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.12 10511

row comparison operator must not return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.13 10512

could not determine interpretation of row comparison operator @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.14 10513

IS DISTINCT FROM requires = operator to yield boolean

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.15 10515

VALUES lists must all be the same length

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.16 10520

INSERT has more expressions than target columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.17 10521

INSERT has more target columns than expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.18 10525

invalid UNION/INTERSECT/EXCEPT ORDER BY clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.19 10526

INTO is only allowed on first SELECT of UNION/INTERSECT/EXCEPT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.20 10527

UNION/INTERSECT/EXCEPT member statement cannot refer to other relations of same query level

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.21 10528

each @1@ query must have the same number of columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.22 10535

cannot specify both SCROLL and NO SCROLL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.23 10537

DECLARE CURSOR must not contain data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.24 10538

DECLARE CURSOR WITH HOLD ... @1@ is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.25 10539

DECLARE INSENSITIVE CURSOR ... @1@ is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.26 10552

aggregate function calls cannot contain window function calls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.27 10558

window functions are not allowed in JOIN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.28 10562

column "@1@.@2@" must appear in the GROUP BY clause or be used in an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.29 10563

subquery uses ungrouped column "@1@.@2@" from outer query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.30 10564

parameter name "@1@" used more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.31 10565

positional argument cannot follow named argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.32 10566

@1@(*) specified, but @2@ is not an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.33 10567

DISTINCT specified, but @1@ is not an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.34 10568

ORDER BY specified, but @1@ is not an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.35 10569

OVER specified, but @1@ is not a window function nor an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.36 10570

function @1@ is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.37 10571

database "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.38 10572

@1@(*) must be used to call a parameterless aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.39 10573

aggregates cannot return sets

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.40 10574

aggregates cannot use named arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.41 10576

DISTINCT is not implemented for window functions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.42 10577

aggregate ORDER BY is not implemented for window functions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.43 10578

window functions cannot return sets

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.44 10580

extension "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.45 10582

aggregate @1@(*) does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.46 10583

server "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.47 10584

function "@1@" is an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.48 10585

argument of @1@ must be a type name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.49 10586

argument of @1@ must not return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.50 10587

argument of @1@ must be type boolean, not type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.51 10588

@1@ types @2@ and @3@ cannot be matched

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.52 10589

@1@ could not convert type @2@ to @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.53 10590

arguments declared "anyelement" are not all alike

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.54 10591

arguments declared "anyarray" are not all alike

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.55 10592

argument declared @1@ is not an array but type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.56 10593

argument declared @1@ is not consistent with argument declared @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.57 10595

type matched to anynonarray is an array type: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.58 10596

type matched to anyenum is not an enum type: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.59 10597

recursive reference to query "@1@" must not appear within its non-recursive term

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.60 10598

recursive reference to query "@1@" must not appear within a subquery

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.6.61 10599

recursive reference to query "@1@" must not appear within an outer join

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7 Message Numbers Beginning with 10600

2.7.1 10600

recursive reference to query "@1@" must not appear within INTERSECT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.2 10601

recursive reference to query "@1@" must not appear within EXCEPT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.3 10602

WITH query name "@1@" specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.4 10604

WITH clause containing a data-modifying statement must be at the top level

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.5 10605

recursive query "@1@" column @2@ has type @3@ in non-recursive term but type @4@ overall

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.6 10606

recursive query "@1@" column @2@ has collation "@3@" in non-recursive term but collation "@4@" overall

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.7 10607

table "@1@" has @2@ columns available but @3@ columns specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.8 10608

mutual recursion between WITH items is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.9 10609

recursive query "@1@" must not contain data-modifying statements

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.10 10610

recursive query "@1@" does not have the form non-recursive-term UNION [ALL] recursive-term

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.11 10611

ORDER BY in a recursive query is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.12 10612

OFFSET in a recursive query is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.13 10613

LIMIT in a recursive query is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.14 10614

FOR UPDATE/SHARE in a recursive query is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.15 10615

recursive reference to query "@1@" must not appear more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.16 10616

unsafe use of string constant with Unicode escapes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.17 10617

invalid Unicode escape

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.18 10618

unsafe use of \\' in a string literal

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.19 10619

@1@ at end of input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.20 10620

@1@ at or near "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.21 10621

nonstandard use of \\' in a string literal

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.22 10622

nonstandard use of \\\\ in a string literal

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.23 10623

nonstandard use of escape in a string literal

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.24 10624

collation mismatch between implicit collations "@1@" and "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.25 10625

collation mismatch between explicit collations "@1@" and "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.26 10626

target lists can have at most @1@ entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.27 10627

cannot subscript type @1@ because it is not an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.28 10628

array subscript must have type integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.29 10629

array assignment to "@1@" requires type @2@ but expression is of type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.30 10630

improper @1@TYPE reference (too few dotted names): @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.31 10631

improper @1@TYPE reference (too many dotted names): @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.32 10632

type reference @1@ converted to @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.33 10633

return type @1@ is only a shell

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.34 10634

type modifier cannot be specified for shell type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.35 10635

type modifier is not allowed for type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.36 10636

type modifiers must be simple constants or identifiers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.37 10637

invalid type name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.38 10638

canceling the wait for synchronous replication and terminating connection due to administrator command

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.39 10639

canceling wait for synchronous replication due to user request

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.40 10640

standby "@1@" now has synchronous standby priority @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.7.41 10642

could not connect to the primary server: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.7.42 10643

could not receive database system identifier and timeline ID from the primary server: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.7.43 10644

invalid response from primary server

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.7.44 10645

database system identifier differs between the primary and standby

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.45 10646

highest timeline @1@ of the primary is behind recovery timeline @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.7.46 10647

could not start WAL streaming: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.7.47 10651

could not receive data from WAL stream: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.7.48 10652

replication terminated by primary server

[Description]

Primary server has stopped.

[System Processing]

Processing will be aborted.

[Action]

No action is required.

2.7.49 10653

could not send data to WAL stream: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.7.50 10655

base backup could not send data, aborting backup

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.7.51 10656

duplicate option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.52 10658

could not stat file or directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.53 10659

could not remove symbolic link "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.54 10660

skipping special file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.7.55 10663

unexpected EOF on standby connection

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.7.56 10664

invalid standby message type "@1@"

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.7.57 10667

terminating walsender process due to replication timeout

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.7.58 10668

standby "@1@" has now caught up with primary

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.7.59 10670

requested WAL segment @1@ has already been removed

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.7.60 10672

materialize mode required, but it is not allowed in this context

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.61 10673

terminating walreceiver process due to administrator command

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.7.62 10674

cannot continue WAL streaming, recovery has already ended

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.7.63 10675

authentication failed for user "@1@": host rejected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.64 10677

"trust" authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.65 10678

Ident authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.66 10679

Peer authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.67 10680

password authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.68 10681

GSSAPI authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.69 10682

SSPI authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.70 10683

PAM authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.71 10684

LDAP authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.72 10685

certificate authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.73 10686

RADIUS authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.74 10687

authentication failed for user "@1@": invalid authentication method

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.75 10689

connection requires a valid client certificate

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.76 10690

pg_hba.conf rejects replication connection for host "@1@", user "@2@", @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.77 10691

pg_hba.conf rejects replication connection for host "@1@", user "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.78 10692

pg_hba.conf rejects connection for host "@1@", user "@2@", database "@3@", @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.79 10693

pg_hba.conf rejects connection for host "@1@", user "@2@", database "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.80 10694

no pg_hba.conf entry for replication connection from host "@1@", user "@2@", @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.81 10695

no pg_hba.conf entry for replication connection from host "@1@", user "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.82 10696

no pg_hba.conf entry for host "@1@", user "@2@", database "@3@", @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.83 10697

no pg_hba.conf entry for host "@1@", user "@2@", database "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.84 10698

MD5 authentication is not supported when "db_user_namespace" is enabled

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.7.85 10699

expected password response, got message type @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8 Message Numbers Beginning with 10700

2.8.1 10700

invalid password packet size

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.2 10707

GSSAPI is not supported in protocol version 2

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.3 10708

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.8.4 10709

expected GSS response, got message type @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.5 10710

SSPI is not supported in protocol version 2

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.6 10711

expected SSPI response, got message type @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.7 10712

could not create socket for Ident connection: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.8 10713

could not bind to local address "@1@": @2@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.9 10714

could not connect to Ident server at address "@1@", port @2@: @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.10 10715

could not send query to Ident server at address "@1@", port @2@: @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.11 10716

could not receive response from Ident server at address "@1@", port @2@: @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.12 10717

invalidly formatted response from Ident server: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.13 10718

peer authentication is not supported on this platform

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.14 10719

could not get peer credentials: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.15 10720

could not look up local user ID @1@: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.16 10721

empty password returned by client

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.17 10722

error from underlying PAM layer: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.18 10723

could not create PAM authenticator: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.19 10724

pam_set_item(PAM_USER) failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.20 10725

pam_set_item(PAM_CONV) failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.21 10726

pam_authenticate failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.22 10727

pam_acct_mgmt failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.23 10728

could not release PAM authenticator: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.24 10729

could not initialize LDAP: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.25 10730

could not set LDAP protocol version: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.26 10731

could not load wldap32.dll

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.27 10732

could not load function _ldap_start_tls_sA in wldap32.dll

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.28 10733

could not start LDAP TLS session: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.29 10734

LDAP server not specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.30 10735

invalid character in user name for LDAP authentication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.31 10736

could not perform initial LDAP bind for ldapbinddn "@1@" on server "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.32 10737

could not search LDAP for filter "@1@" on server "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.33 10738

LDAP search for filter "@1@" on server "@2@" returned no entries.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.34 10740

could not get dn for the first entry matching "@1@" on server "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.35 10741

could not unbind after searching for user "@1@" on server "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.36 10742

LDAP login failed for user "@1@" on server "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.37 10743

certificate authentication failed for user "@1@": client certificate contains no user name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.38 10744

RADIUS server not specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.39 10745

RADIUS secret not specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.40 10746

could not translate RADIUS server name "@1@" to address: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.41 10747

RADIUS authentication does not support passwords longer than @1@ characters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.42 10748

could not generate random encryption vector

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.43 10749

could not perform MD5 encryption of password

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.44 10750

could not create RADIUS socket: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.45 10751

could not bind local RADIUS socket: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.46 10752

could not send RADIUS packet: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.47 10753

timeout waiting for RADIUS response

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.48 10754

could not check status on RADIUS socket: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.49 10755

could not read RADIUS response: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.50 10756

RADIUS response from @1@ was sent from incorrect port: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.51 10757

RADIUS response too short: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.52 10759

RADIUS response is to a different request: @1@ (should be @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.53 10760

could not perform MD5 encryption of received packet

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.54 10761

RADIUS response from @1@ has incorrect MD5 signature

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.55 10762

RADIUS response from @1@ has invalid code (@2@) for user "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.56 10763

SSL error: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.57 10764

unrecognized SSL error code: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.58 10767

could not create SSL context: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.59 10768

could not load server certificate file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.60 10769

could not access private key file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.61 10770

private key file "@1@" has group or world access

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.62 10771

could not load private key file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.63 10772

check of private key failed: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.64 10774

could not load root certificate file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.65 10776

could not load SSL certificate revocation list file "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.8.66 10777

could not initialize SSL connection: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.67 10778

could not set SSL socket: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.68 10779

could not accept SSL connection: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.69 10780

could not accept SSL connection: EOF detected

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.70 10781

could not accept SSL connection: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.71 10782

SSL certificate's common name contains embedded null

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.72 10783

SSL connection from "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.8.73 10784

could not translate host name "@1@", service "@2@" to address: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.74 10785

could not translate service "@1@" to address: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.75 10786

could not bind to all requested addresses: MAXLISTEN (@1@) exceeded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.76 10787

could not create @1@ socket for address "@2@": @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.77 10788

setsockopt(SO_REUSEADDR) failed for @1@ address "@2@": @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.78 10789

setsockopt(IPV6_V6ONLY) failed for @1@ address "@2@": @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.79 10790

could not bind @1@ address "@2@": @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.80 10791

could not listen on @1@ address "@2@": @3@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.81 10792

type @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.8.82 10793

could not set group of file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.83 10794

could not set permissions of file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.8.84 10795

could not accept new connection: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.8.85 10796

could not set socket to nonblocking mode: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.86 10798

could not receive data from client: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.8.87 10799

unexpected EOF within message length word

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9 Message Numbers Beginning with 10800

2.9.1 10800

invalid message length

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.2 10801

incomplete message from client

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.3 10802

could not send data to client: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.4 10803

authentication file token too long, skipping: "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.9.5 10804

could not open secondary authentication file "@@1@" as "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.6 10806

authentication option "@1@" is only valid for authentication methods @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.7 10807

authentication method "@1@" requires argument "@2@" to be set

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.8 10808

local connections are not supported by this build

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.9.9 10809

hostssl record cannot match because SSL is disabled

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.10 10810

hostssl record cannot match because SSL is not supported by this build

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.9.11 10811

invalid connection type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.12 10812

end-of-line before database specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.13 10813

end-of-line before role specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.14 10814

end-of-line before IP address specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.15 10815

invalid IP address "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.16 10816

specifying both host name and CIDR mask is invalid: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.17 10817

invalid CIDR mask in address "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.18 10818

end-of-line before netmask specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.19 10819

invalid IP mask "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.20 10820

IP address and mask do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.21 10821

end-of-line before authentication method

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.22 10822

invalid authentication method "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.23 10823

invalid authentication method "@1@": not supported by this build

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.9.24 10825

gssapi authentication is not supported on local sockets

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.25 10826

peer authentication is only supported on local sockets

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.26 10827

cert authentication is only supported on hostssl connections

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.27 10828

authentication option not in name=value format: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.28 10829

clientcert can only be configured for "hostssl" rows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.29 10830

client certificates can only be checked if a root certificate store is available

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.9.30 10831

clientcert can not be set to "no-verify" when using "cert" authentication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.31 10832

invalid LDAP port number: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.32 10833

invalid RADIUS port number: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.33 10834

unrecognized authentication option name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.34 10835

cannot use ldapbasedn, ldapbinddn, ldapbindpasswd, ldapsearchattribute, or ldapurl together with ldapprefix

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.35 10836

authentication method "ldap" requires argument "ldapbasedn", "ldapprefix", or "ldapsuffix" to be set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.36 10837

could not open configuration file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.37 10838

invalid regular expression "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.38 10839

regular expression match for "@1@" failed: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.39 10840

regular expression "@1@" has no subexpressions as requested by backreference in "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.40 10841

missing entry in file "@1@" at end of line @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.41 10842

provided user name (@1@) and authenticated user name (@2@) do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.42 10843

no match in usermap "@1@" for user "@2@" authenticated as "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.43 10844

could not open server file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.44 10845

invalid large-object descriptor: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.45 10846

permission denied for large object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.46 10847

large object descriptor @1@ was not opened for writing

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.47 10848

must be owner of large object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.48 10849

must be superuser to use server-side lo_import()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.49 10850

could not read server file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.50 10851

could not create server file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.9.51 10852

must be superuser to use server-side lo_export()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.52 10853

could not write server file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.9.53 10854

could not write file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.9.54 10855

no data left in message

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.55 10856

insufficient data left in message

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.56 10857

invalid string in message

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.57 10858

invalid message format

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.9.58 10859

"@1@" is not a sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.59 10861

cannot drop @1@ because it is required by the database system

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.60 10862

role @1@ was concurrently dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.61 10863

tablespace @1@ was concurrently dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.62 10864

database @1@ was concurrently dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.63 10865

cannot drop objects owned by @1@ because they are required by the database system

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.64 10866

permission denied to create "@1@.@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.65 10867

joins can have at most @1@ columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.66 10868

column name "@1@" conflicts with a system column name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.67 10869

column "@1@" specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.68 10871

column "@1@" has pseudo-type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.69 10872

composite type @1@ cannot be made a member of itself

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.70 10873

no collation was derived for column "@1@" with collatable type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.71 10874

relation "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.72 10875

type "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.73 10876

check constraint "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.74 10877

constraint "@1@" for relation "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.75 10878

merging constraint "@1@" with inherited definition

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.9.76 10879

generation expression is not immutable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.77 10881

cannot use subquery in DEFAULT expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.78 10882

aggregate functions are not allowed in index expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.79 10883

aggregate functions are not allowed in transform expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.80 10884

subfield "@1@" is of type @2@ but expression is of type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.81 10885

only table "@1@" can be referenced in check constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.82 10886

cannot use subquery in check constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.83 10887

aggregate functions are not allowed in check constraints

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.84 10888

window functions are not allowed in check constraints

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.85 10889

unsupported ON COMMIT and foreign key combination

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.86 10890

cannot truncate a table referenced in a foreign key constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.87 10891

invalid type internal size @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.88 10892

alignment "@1@" is invalid for passed-by-value type of size @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.89 10893

internal size @1@ is invalid for passed-by-value type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.90 10894

alignment "@1@" is invalid for variable-length type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.91 10895

fixed-size types must have storage PLAIN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.92 10896

could not form array type name for type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.93 10897

cannot determine transition data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.94 10898

return type of transition function @1@ is not @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.9.95 10899

must not omit initial value when transition function is strict and transition type is not compatible with input type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10 Message Numbers Beginning with 10900

2.10.1 10900

cannot determine result data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.2 10901

unsafe use of pseudo-type "internal"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.3 10902

sort operator can only be specified for single-argument aggregates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.4 10903

function @1@ returns a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.5 10904

function @1@ requires run-time type coercion

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.6 10905

large object @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.7 10906

primary keys cannot be expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.8 10907

user-defined indexes on system catalog tables are not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.9 10908

concurrent index creation on system catalog tables is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.10 10909

shared indexes cannot be created after initdb

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.11 10910

building index "@1@" on table "@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.10.12 10911

cannot reindex temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.13 10912

invalid enum label "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.14 10913

"@1@" is not an existing enum label

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.15 10914

ALTER TYPE ADD BEFORE/AFTER is incompatible with binary upgrade

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.16 10915

"@1@" is already an attribute of type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.17 10916

function "@1@" already exists with same argument types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.18 10917

cannot change return type of existing function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.19 10918

cannot change name of input parameter "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.20 10919

cannot remove parameter defaults from existing function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.21 10920

cannot change data type of existing parameter default value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.22 10921

function "@1@" is not an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.23 10922

"@1@" is an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.24 10923

function "@1@" is a window function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.25 10924

function "@1@" is not a window function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.26 10925

there is no built-in function named "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.27 10926

SQL functions cannot return type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.28 10927

SQL functions cannot have arguments of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.29 10928

invalid fork name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.30 10929

cannot drop @1@ because @2@ requires it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.31 10930

drop auto-cascades to @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.10.32 10931

cannot drop @1@ because other objects depend on it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.33 10932

cannot drop desired object(s) because other objects depend on them

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.34 10934

constraint "@1@" for domain @2@ already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.35 10935

table "@1@" has multiple constraints named "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.36 10936

constraint "@1@" for table "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.37 10937

grant options can only be granted to roles

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.38 10938

no privileges were granted for column "@1@" of relation "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.39 10939

no privileges were granted for "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.40 10940

not all privileges were granted for column "@1@" of relation "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.41 10941

not all privileges were granted for "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.42 10942

no privileges could be revoked for column "@1@" of relation "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.43 10943

no privileges could be revoked for "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.44 10944

not all privileges could be revoked for column "@1@" of relation "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.45 10945

not all privileges could be revoked for "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.46 10946

invalid privilege type @1@ for relation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.47 10947

invalid privilege type @1@ for sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.48 10948

invalid privilege type @1@ for database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.49 10949

invalid privilege type @1@ for domain

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.50 10950

invalid privilege type @1@ for function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.51 10951

invalid privilege type @1@ for large object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.52 10952

invalid privilege type @1@ for language

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.53 10953

invalid privilege type @1@ for schema

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.54 10954

invalid privilege type @1@ for foreign-data wrapper

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.55 10955

invalid privilege type @1@ for foreign server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.56 10956

column privileges are only valid for relations

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.57 10957

conflicting or redundant options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.58 10958

default privileges cannot be set for columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.59 10959

"@1@" is not a domain

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.60 10960

sequence "@1@" only supports USAGE, SELECT, and UPDATE privileges

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.61 10961

invalid privilege type @1@ for table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.62 10962

invalid privilege type @1@ for tablespace

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.63 10963

sequence "@1@" only supports SELECT column privileges

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.10.64 10964

language "@1@" is not trusted

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.65 10965

unrecognized privilege type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.66 10966

permission denied for column @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.67 10967

permission denied for relation @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.68 10968

permission denied for sequence @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.69 10969

permission denied for database @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.70 10970

permission denied for function @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.71 10971

permission denied for operator @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.72 10972

permission denied for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.73 10973

permission denied for language @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.74 10974

permission denied for large object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.75 10975

permission denied for schema @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.76 10976

permission denied for operator class @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.77 10977

permission denied for operator family @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.78 10978

permission denied for collation @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.79 10979

permission denied for conversion @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.80 10980

permission denied for tablespace @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.81 10981

permission denied for text search dictionary @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.82 10982

permission denied for text search configuration @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.83 10983

permission denied for foreign-data wrapper @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.84 10984

permission denied for foreign server @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.85 10985

permission denied for extension @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.86 10986

must be owner of relation @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.87 10987

must be owner of sequence @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.88 10988

must be owner of database @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.89 10989

must be owner of function @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.90 10990

must be owner of operator @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.91 10991

must be owner of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.92 10992

must be owner of language @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.93 10993

must be owner of large object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.94 10994

must be owner of schema @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.95 10995

must be owner of operator class @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.96 10996

must be owner of operator family @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.97 10997

must be owner of collation @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.98 10998

must be owner of conversion @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.10.99 10999

must be owner of tablespace @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11 Message Numbers Beginning with 11000

2.11.1 11000

must be owner of text search dictionary @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.2 11001

must be owner of text search configuration @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.3 11002

must be owner of foreign-data wrapper @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.4 11003

must be owner of foreign server @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.5 11004

must be owner of extension @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.6 11005

permission denied for column "@1@" of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.7 11007

attribute @1@ of relation with OID @2@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.8 11008

relation with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.9 11009

database with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.10 11010

function with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.11 11011

language with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.12 11012

schema with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.13 11013

tablespace with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.14 11014

foreign-data wrapper with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.15 11015

foreign server with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.16 11016

type with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.17 11017

operator with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.18 11018

operator class with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.19 11019

operator family with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.20 11020

text search dictionary with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.21 11021

text search configuration with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.22 11022

collation with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.23 11023

conversion with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.24 11024

extension with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.25 11025

conversion "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.26 11026

default conversion for @1@ to @2@ already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.27 11027

cross-database references are not implemented: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.28 11028

temporary tables cannot specify a schema name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.29 11029

no schema has been selected to create in

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.30 11030

text search parser "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.31 11031

text search dictionary "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.32 11032

text search template "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.33 11033

text search configuration "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.34 11035

cannot move objects into or out of temporary schemas

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.35 11036

cannot move objects into or out of TOAST schema

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.36 11037

language "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.37 11038

improper relation name (too many dotted names): @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.38 11039

collation "@1@" for encoding "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.39 11040

cursor "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.40 11041

permission denied to create temporary tables in database "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.41 11042

cannot create temporary tables during recovery

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.11.42 11045

"@1@" is not a table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.43 11046

"@1@" is not a foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.44 11047

must be owner of type @1@ or type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.45 11048

must be superuser

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.46 11049

must have CREATEROLE privilege

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.47 11050

schema "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.48 11051

@1@ is not a valid encoding name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.49 11052

only binary operators can have commutators

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.50 11053

only binary operators can have join selectivity

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.51 11054

only binary operators can merge join

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.52 11055

only binary operators can hash

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.53 11056

only boolean operators can have negators

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.54 11057

only boolean operators can have restriction selectivity

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.55 11058

only boolean operators can have join selectivity

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.56 11059

only boolean operators can merge join

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.57 11060

only boolean operators can hash

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.58 11061

operator @1@ already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.59 11062

operator cannot be its own negator or sort operator

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.60 11063

cannot remove dependency on @1@ because it is a system object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.61 11064

collation "@1@" for encoding "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.62 11065

collation "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.63 11066

cannot access temporary or unlogged relations during recovery

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.64 11068

could not implement GROUP BY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.65 11069

could not implement DISTINCT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.66 11070

could not implement window PARTITION BY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.67 11071

could not implement window ORDER BY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.68 11072

could not implement recursive UNION

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.69 11073

could not implement @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.70 11074

FULL JOIN is only supported with merge-joinable or hash-joinable join conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.71 11075

unexpected EOF on client connection

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.11.72 11076

invalid frontend message type @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.11.73 11077

statement: @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.74 11078

current transaction is aborted, commands ignored until end of transaction block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.75 11079

duration: @1@ ms

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.76 11080

duration: @1@ ms statement: @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.77 11081

parse @1@: @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.78 11082

cannot insert multiple commands into a prepared statement

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.79 11083

duration: @1@ ms parse @2@: @3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.80 11084

bind @1@ to @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.81 11085

prepared statement "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.82 11086

bind message has @1@ parameter formats but @2@ parameters

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.11.83 11087

bind message supplies @1@ parameters, but prepared statement "@2@" requires @3@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.11.84 11088

incorrect binary data format in bind parameter @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.85 11089

duration: @1@ ms bind @2@@3@@4@: @5@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.86 11090

table "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.87 11091

@1@ @2@@3@@4@: @5@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.88 11092

duration: @1@ ms @2@ @3@@4@@5@: @6@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.89 11094

floating-point exception

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.11.90 11095

terminating autovacuum process due to administrator command

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.91 11096

terminating connection due to conflict with recovery

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.11.92 11097

terminating connection due to administrator command

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.11.93 11098

canceling authentication due to timeout

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.11.94 11099

canceling statement due to statement timeout

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.12 Message Numbers Beginning with 11100

2.12.1 11100

canceling autovacuum task

[Description]

Processing was canceled.

[System Processing]

Processing will be aborted.

[Action]

Check the message text.

2.12.2 11101

canceling statement due to conflict with recovery

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.12.3 11102

canceling statement due to user request

[Description]

Processing was canceled.

[System Processing]

Processing will be aborted.

[Action]

Check the message text.

2.12.4 11103

stack depth limit exceeded

[Description]

The depth of the execution stack exceeded the allowable value during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

If executing a complex SQL, modify it to a simple SQL.

2.12.5 11104

--@1@ requires a value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.6 11105

-c @1@ requires a value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.7 11107

@1@: invalid command-line arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.8 11108

@1@: no database nor user name specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.9 11109

invalid CLOSE message subtype @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.10 11110

invalid DESCRIBE message subtype @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.11 11111

disconnection: session time: @1@:@2@:@3@.@4@ user=@5@ database=@6@ host=@7@@8@@9@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.12 11112

permission denied: "@1@" is a system catalog

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.13 11113

cannot execute @1@ in a read-only transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.14 11114

cannot execute @1@ during recovery

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.15 11115

cannot execute @1@ within security-restricted operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.16 11116

must be superuser to do CHECKPOINT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.17 11117

invalid argument size @1@ in function call message

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.18 11118

fastpath function call: "@1@" (OID @2@)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.19 11119

duration: @1@ ms fastpath function call: "@2@" (OID @3@)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.20 11120

function call message contains @1@ arguments but function requires @2@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.21 11121

function call message contains @1@ argument formats but @2@ arguments

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.22 11122

incorrect binary data format in function argument @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.23 11123

bind message has @1@ result formats but query has @2@ columns

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.24 11124

portal "@1@" cannot be run

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.25 11125

cursor can only scan forward

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.26 11126

could not open usermap file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.27 11127

unexpected delimiter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.28 11128

unexpected end of line or lexeme

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.29 11129

unexpected end of line

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.30 11130

thesaurus sample word "@1@" isn't recognized by subdictionary (rule @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.31 11131

thesaurus sample word "@1@" is a stop word (rule @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.32 11132

thesaurus substitute word "@1@" is a stop word (rule @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.33 11133

thesaurus substitute word "@1@" isn't recognized by subdictionary (rule @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.34 11134

thesaurus substitute phrase is empty (rule @1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.35 11135

multiple DictFile parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.36 11136

multiple Dictionary parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.37 11137

unrecognized Thesaurus parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.38 11138

missing DictFile parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.39 11139

missing Dictionary parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.40 11140

invalid text search configuration file name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.41 11141

could not open statistics file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.42 11142

unrecognized headline parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.43 11143

MinWords should be less than MaxWords

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.44 11144

MinWords should be positive

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.45 11145

ShortWord should be >= 0

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.46 11146

MaxFragments should be >= 0

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.47 11147

string is too long for tsvector (@1@ bytes, max @2@ bytes)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.48 11148

multiple Accept parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.49 11149

unrecognized simple dictionary parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.50 11150

could not open log file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.51 11151

invalid regular expression: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.52 11153

could not open synonym file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.53 11154

Ispell dictionary supports only "default", "long", and "num" flag values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.54 11155

affix file contains both old-style and new-style commands

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.55 11156

unrecognized synonym parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.56 11157

missing Synonyms parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.57 11158

could not open thesaurus file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.58 11159

word is too long to be indexed

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.12.59 11160

conversion from wchar_t to server encoding failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.60 11161

text search parser does not support headline creation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.61 11162

multiple AffFile parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.62 11163

unrecognized Ispell parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.63 11164

missing AffFile parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.64 11166

WAL streaming (max_wal_senders > 0) requires wal_level "replica" or "logical"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.65 11167

invalid list syntax in parameter "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.66 11168

could not create listen socket for "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.12.67 11169

could not create any TCP/IP sockets

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.12.68 11170

could not create Unix-domain socket in directory "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.12.69 11171

no socket created for listening

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.12.70 11172

could not create I/O completion port for child queue

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.12.71 11173

could not load pg_hba.conf

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.72 11174

@1@: could not locate matching postgres executable

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.73 11175

could not open directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.12.74 11176

directory "@1@" does not exist

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.75 11177

could not read permissions of directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.12.76 11178

specified data directory "@1@" is not a directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.77 11179

data directory "@1@" has wrong ownership

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.78 11180

data directory "@1@" has group or world access

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.79 11181

select() failed in postmaster: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.12.80 11182

incomplete startup packet

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.81 11183

invalid length of startup packet

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.82 11184

failed to send GSSAPI negotiation response: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.83 11185

unsupported frontend protocol @1@.@2@: server supports @3@.0 to @4@.@5@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.84 11187

invalid startup packet layout: expected terminator as last byte

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.12.85 11188

no PostgreSQL user name specified in startup packet

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.86 11189

the database system is starting up

[Description]

The database system is starting up.

[System Processing]

Processing will be aborted.

[Action]

This message is output when the startup process or recovery process is operating normally. Restart any necessary the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.12.87 11190

the database system is shutting down

[Description]

The database system is shutting down.

[System Processing]

Processing will be aborted.

[Action]

This message is output when the stopping process is operating normally. Retry any necessary applications or commands after restarting the database system.

2.12.88 11191

the database system is in recovery mode

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.12.89 11192

sorry, too many clients already

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.12.90 11193

wrong key in cancel request for process @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.12.91 11194

PID @1@ in cancel request did not match any process

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.12.92 11195

received SIGHUP, reloading configuration files

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.93 11196

@1@ was not reloaded

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.12.94 11197

received smart shutdown request

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.95 11198

received fast shutdown request

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.12.96 11199

aborting any active transactions

[Description]

Rollback any active transactions because the database system is being requested to shut down.

[System Processing]

Continues processing.

[Action]

Retry any necessary applications or commands after restarting the database system.

2.13 Message Numbers Beginning with 11200

2.13.1 11200

received immediate shutdown request

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.2 11201

aborting startup due to startup process failure

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.3 11202

database system is ready to accept connections

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.4 11203

terminating any other active server processes

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.5 11204

@1@ (PID @2@) exited with exit code @3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.6 11205

@1@ (PID @2@) was terminated by exception 0x@3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.7 11207

@1@ (PID @2@) was terminated by signal @3@: @4@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.8 11208

@1@ (PID @2@) exited with unrecognized status @3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.9 11209

abnormal database system shutdown

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.10 11210

all server processes terminated; reinitializing

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.11 11211

could not fork new process for connection: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.12 11212

connection received: host=@1@ port=@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.13 11213

connection received: host=@1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.14 11214

could not execute server process "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.15 11215

database system is ready to accept read only connections

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.16 11216

could not fork startup process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.17 11217

could not fork background writer process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.18 11218

could not fork WAL writer process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.19 11219

could not fork WAL receiver process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.20 11220

could not fork archiver: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.21 11221

could not duplicate socket @1@ for use in backend: error code @2@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.22 11224

checkpoint request failed

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.23 11225

compacted fsync request queue from @1@ entries to @2@ entries

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.24 11226

could not resolve "localhost": @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.13.25 11227

trying another address for the statistics collector

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.26 11228

could not create socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.27 11229

could not bind socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.28 11230

could not get address of socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.29 11231

could not connect socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.30 11232

could not send test message on socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.31 11233

select() failed in statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.32 11234

test message did not get through on socket for statistics collector

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.13.33 11235

could not receive test message on socket for statistics collector: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.34 11236

incorrect test message transmission on socket for statistics collector

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.35 11237

could not set statistics collector socket to nonblocking mode: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.36 11238

disabling statistics collector for lack of working socket

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.37 11239

could not fork statistics collector: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.38 11241

unrecognized reset target: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.13.39 11243

could not read statistics message: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.13.40 11244

could not open temporary statistics file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.41 11245

could not write temporary statistics file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.42 11246

could not close temporary statistics file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.43 11247

could not rename temporary statistics file "@1@" to "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.44 11248

could not open dictionary file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.45 11249

corrupted statistics file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.46 11250

database hash table corrupted during cleanup --- abort

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.47 11252

could not read from logger pipe: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.13.48 11253

logger shutting down

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.49 11254

could not create pipe for syslog: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.13.50 11255

could not fork system logger: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.51 11256

could not redirect stdout: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.52 11257

could not redirect stderr: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.53 11258

could not open affix file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.54 11259

disabling automatic rotation (use SIGHUP to re-enable)

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.55 11260

could not fork process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.56 11261

archive_mode enabled, yet archive_command is not set

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.57 11262

archiving write-ahead log file "@1@" failed too many times, will try again later

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.58 11263

archive command failed with exit code @1@

[Description]

An error occurred during executing the command specified by archive_command parameter at postgresql.conf.

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the messages shown before this message and the return code shown in this message. And then work around if necessary.

2.13.59 11264

archive command was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.60 11266

archive command was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.61 11267

archive command exited with unrecognized status @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.13.62 11268

archived write-ahead log file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.63 11269

could not open archive status directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.64 11270

could not fork autovacuum launcher process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.65 11271

autovacuum launcher started

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.66 11272

autovacuum launcher shutting down

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.67 11273

could not fork autovacuum worker process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.68 11274

autovacuum: processing database "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.69 11275

autovacuum: dropping orphan temp table "@1@.@2@.@3@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.70 11276

autovacuum: found orphan temp table "@1@"."@2@" in database "@3@"

[Description]

Uncollected garbage of the temporary table was found during automatic vacuuming

[System Processing]

Continues processing.

[Action]

No action required. The garbage of the temporary table will be collected automatically later.

If you want to collect it and obtain the storage space immediately,

drop the schema derived from @1 with the database user having superuser permission.

2.13.71 11277

autovacuum not started because of misconfiguration

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.72 11278

no empty local buffer available

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.73 11279

cannot cluster temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.13.74 11280

unexpected data beyond EOF in block @1@ of relation @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.75 11281

Continues processing past damaged page headers.

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.76 11283

could not write block @1@ of @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.77 11284

could not truncate file "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.13.78 11285

cannot extend file "@1@" beyond @2@ blocks

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.13.79 11287

could not extend file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.80 11288

could not extend file "@1@": wrote only @2@ of @3@ bytes at block @4@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.81 11289

could not read block @1@ in file "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.82 11290

could not read block @1@ in file "@2@": read only @3@ of @4@ bytes

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.83 11291

could not write block @1@ in file "@2@": @3@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.84 11292

could not write block @1@ in file "@2@": wrote only @3@ of @4@ bytes

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.13.85 11293

could not truncate file "@1@" to @2@ blocks: it's only @3@ blocks now

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.86 11294

could not truncate file "@1@" to @2@ blocks: @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.87 11296

could not forward fsync request because request queue is full

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.13.88 11297

could not open file "@1@" (target block @2@): @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.89 11298

could not seek to end of file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.13.90 11299

memory for serializable conflict tracking is nearly exhausted

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14 Message Numbers Beginning with 11300

2.14.1 11300

not enough shared memory for data structure "@1@" (@2@ bytes requested)

[Description]

There was insufficient free space in the database server's shared memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.14.2 11301

deferrable snapshot was unsafe; trying a new one

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.3 11302

out of shared memory

[Description]

There was insufficient free space in the database server's shared memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.14.4 11303

could not serialize access due to read/write dependencies among transactions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.5 11304

deadlock detected

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.14.6 11305

cannot acquire lock mode @1@ on database objects while recovery is in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.7 11307

process @1@ avoided deadlock for @2@ on @3@ by rearranging queue order after @4@.@5@ ms

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.8 11308

process @1@ detected deadlock while waiting for @2@ on @3@ after @4@.@5@ ms

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.9 11309

process @1@ still waiting for @2@ on @3@ after @4@.@5@ ms

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.10 11310

process @1@ acquired @2@ on @3@ after @4@.@5@ ms

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.14.11 11311

process @1@ failed to acquire @2@ on @3@ after @4@.@5@ ms

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.12 11314

getrlimit failed: @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.13 11315

insufficient file descriptors available to start server process

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.14.14 11316

out of file descriptors: @1@; release and retry

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.14.15 11317

temporary file: path "@1@", size @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.14.16 11318

could not read directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.17 11320

could not create directory "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.14.18 11322

could not create ShmemIndex entry for data structure "@1@"

[Description]

There was insufficient free space in the database server's shared memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.14.19 11323

ShmemIndex entry size is wrong for data structure "@1@": expected @2@, actual @3@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.14.20 11324

requested shared memory size overflows size_t

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.21 11325

corrupted page pointers: lower = @1@, upper = @2@, special = @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.22 11326

corrupted line pointer: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.23 11327

corrupted item lengths: total @1@, available space @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.24 11328

corrupted line pointer: offset = @1@, size = @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.25 11331

could not create unique index "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.26 11332

could not find function "@1@" in file "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.27 11333

could not access file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.28 11334

could not load library "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.29 11335

incompatible library "@1@": missing magic block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.30 11336

incompatible library "@1@": version mismatch

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.31 11337

incompatible library "@1@": magic block mismatch

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.32 11338

access to library "@1@" is not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.33 11339

invalid macro name in dynamic library path: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.34 11340

zero-length component in parameter "dynamic_library_path"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.35 11341

component in parameter "dynamic_library_path" is not an absolute path

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.36 11342

could not determine actual result type for function "@1@" declared to return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.37 11343

number of aliases does not match number of columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.38 11344

no column alias was provided

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.39 11345

could not determine row description for function returning record

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.40 11346

internal function "@1@" is not in internal lookup table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.41 11347

unrecognized API version @1@ reported by info function "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.42 11349

cached plan must not change result type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.43 11350

"@1@" is not a type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.44 11351

record type has not been registered

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.45 11352

@1@ is not an enum

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.46 11353

could not create relation-cache initialization file "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.47 11354

cannot PREPARE a transaction that modified relation mapping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.48 11355

could not open file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.49 11357

relation mapping file "@1@" contains invalid data

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.50 11358

relation mapping file "@1@" contains incorrect checksum

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.51 11359

could not write file "@1@\

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.14.52 11360

could not fsync file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.53 11361

could not close file "@1@\

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.54 11362

argument type @1@ is only a shell

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.55 11363

no binary input function available for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.56 11364

no binary output function available for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.57 11365

no input function available for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.58 11366

no output function available for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.59 11367

could not reopen file "@1@" as stderr: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.60 11368

could not reopen file "@1@" as stdout: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.14.61 11369

cursor "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.62 11370

closing existing cursor "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.63 11371

cannot drop active portal "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.64 11372

cannot PREPARE a transaction that has created a cursor WITH HOLD

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.65 11373

word is too long (@1@ bytes, max @2@ bytes)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.66 11374

string is too long for tsvector (@1@ bytes, max @2@ bytes)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.67 11375

argument of ntile must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.68 11376

argument of nth_value must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.69 11379

integer out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.70 11380

argument must be empty or one-dimensional array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.71 11381

cannot concatenate incompatible arrays

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.72 11382

invalid number of dimensions: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.73 11383

could not determine input data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.74 11385

division by zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.75 11387

timestamp out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.76 11391

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.14.77 11398

global tablespace never has databases

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.14.78 11399

@1@ is not a tablespace OID

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.15 Message Numbers Beginning with 11400

2.15.1 11400

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.2 11401

syntax error in tsquery: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.3 11402

syntax error in tsvector: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.4 11403

there is no escaped character: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.5 11404

wrong position info in tsvector: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.6 11405

sequence "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.7 11406

more than one function named "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.8 11407

more than one operator named @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.9 11408

too many arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.10 11409

invalid name syntax

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.11 11410

expected a left parenthesis

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.12 11411

expected a right parenthesis

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.13 11412

expected a type name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.14 11413

improper type name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.15 11414

invalid type modifier

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.16 11415

TIME(@1@)@2@ precision must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.17 11416

TIME(@1@)@2@ precision reduced to maximum allowed, @3@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.15.18 11417

date out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.19 11419

timestamp cannot be NaN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.20 11420

timestamp(@1@) precision must be between @2@ and @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.21 11421

interval out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.22 11422

invalid INTERVAL type modifier

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.23 11423

TIMESTAMP(@1@)@2@ precision must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.24 11424

TIMESTAMP(@1@)@2@ precision reduced to maximum allowed, @3@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.15.25 11425

interval(@1@) precision must be between @2@ and @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.26 11426

cannot subtract infinite timestamps

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.27 11427

timestamp units "@1@" not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.28 11428

"time" units "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.29 11429

timestamp with time zone units "@1@" not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.30 11430

"time with time zone" units "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.31 11431

interval units "@1@" not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.32 11432

timestamp units "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.33 11434

time zone "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.34 11435

interval time zone "@1@" must not include months or days

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.35 11436

step size cannot equal zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.36 11437

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.37 11438

value "@1@" is out of range for type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.38 11439

bigint out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.39 11440

smallint out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.40 11441

OID out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.41 11442

input of anonymous composite types is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.42 11443

malformed record literal: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.43 11444

wrong number of columns: @1@, expected @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.44 11445

wrong data type: @1@, expected @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.45 11446

improper binary format in record column @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.46 11447

cannot compare dissimilar column types @1@ and @2@ at record column @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.47 11448

cannot compare record types with different numbers of columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.48 11449

int2vector has too many elements

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.49 11450

invalid int2vector data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.50 11451

oidvector has too many elements

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.51 11452

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.52 11453

invalid cidr value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.53 11454

could not format inet value: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.54 11455

invalid address family in external "@1@" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.55 11456

invalid bits in external "@1@" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.56 11457

invalid length in external "@1@" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.57 11458

invalid external "cidr" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.58 11459

invalid mask length: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.59 11460

could not format cidr value: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.60 11461

cannot AND inet values of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.61 11462

cannot OR inet values of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.62 11463

input is out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.63 11464

cannot subtract inet values of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.64 11465

invalid Datum pointer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.65 11466

dimension values cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.66 11467

"[" must introduce explicitly-specified array dimensions.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.67 11468

upper bound cannot be less than lower bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.68 11469

Array value must start with "{" or dimension information.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.69 11471

Specified array dimensions do not match array contents.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.70 11472

malformed array literal: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.71 11473

array size exceeds the maximum allowed (@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.72 11474

invalid array flags

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.73 11475

wrong element type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.74 11476

improper binary format in array element @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.75 11477

slices of fixed-length arrays not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.76 11478

wrong number of array subscripts

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.77 11479

array subscript out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.78 11480

cannot assign null value to an element of a fixed-length array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.79 11481

updates on slices of fixed-length arrays not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.80 11482

source array too small

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.81 11483

null array element not allowed in this context

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.82 11484

cannot compare arrays of different element types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.83 11485

could not identify a hash function for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.84 11486

dimension array or low bound array cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.85 11487

wrong range of array subscripts

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.86 11489

value out of range: overflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.87 11490

value out of range: underflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.88 11491

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.89 11492

"@1@" is out of range for type real

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.90 11493

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.91 11494

"@1@" is out of range for type double precision

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.92 11495

cannot take square root of a negative number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.93 11496

zero raised to a negative power is undefined

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.94 11497

a negative number raised to a non-integer power yields a complex result

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.95 11498

cannot take logarithm of zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.15.96 11499

cannot take logarithm of a negative number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16 Message Numbers Beginning with 11500

2.16.1 11500

result is out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.2 11501

count must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.3 11502

operand, lower bound, and upper bound cannot be NaN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.4 11503

lower and upper bounds must be finite

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.5 11504

lower bound cannot equal upper bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.6 11505

requested length too large

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.7 11506

requested character too large

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.8 11507

requested character too large for encoding: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.9 11508

null character not permitted

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.10 11509

typmod array must be type cstring[]

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.11 11510

typmod array must be one-dimensional

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.12 11511

typmod array must not contain nulls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.13 11512

suppress_redundant_updates_trigger: must be called as trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.14 11513

suppress_redundant_updates_trigger: must be called on update

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.15 11514

suppress_redundant_updates_trigger: must be called before update

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.16 11515

suppress_redundant_updates_trigger: must be called for each row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.17 11517

value "@1@" is out of range for type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.18 11518

invalid oidvector data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.19 11519

invalid line specification: must be two distinct points

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.20 11521

date/time field value out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.21 11522

interval field value out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.22 11523

time zone displacement out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.23 11524

unrecognized encoding: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.24 11525

invalid hexadecimal digit: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.25 11526

invalid hexadecimal data: odd number of digits

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.26 11527

unexpected "=" while decoding base64 sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.27 11528

invalid symbol "@1@" while decoding base64 sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.28 11529

invalid base64 end sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.29 11530

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.30 11531

ts_stat query must return one tsvector column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.31 11532

tsvector column "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.32 11533

column "@1@" is not of tsvector type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.33 11534

configuration column "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.34 11535

column "@1@" is not of regconfig type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.35 11536

configuration column "@1@" must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.36 11537

text search configuration name "@1@" must be schema-qualified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.37 11538

column "@1@" is not of a character type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.38 11539

ts_rewrite query must return two tsquery columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.39 11540

encoding conversion from @1@ to ASCII not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.40 11541

"@1@" is not a valid encoding name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.41 11542

@1@ is not a valid encoding code

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.42 11543

insert or update on table "@1@" violates foreign key constraint "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.43 11544

function "@1@" was not called by trigger manager

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.44 11545

function "@1@" must be fired AFTER ROW

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.45 11546

function "@1@" must be fired for INSERT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.46 11547

function "@1@" must be fired for UPDATE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.47 11548

function "@1@" must be fired for INSERT or UPDATE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.48 11549

function "@1@" must be fired for DELETE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.49 11550

no pg_constraint entry for trigger "@1@" on table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.50 11551

referential integrity query on "@1@" from constraint "@2@" on "@3@" gave unexpected result

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.16.51 11552

update or delete on table "@1@" violates foreign key constraint "@2@" on table "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.52 11553

invalid input value for enum @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.53 11554

invalid internal value for enum: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.54 11555

could not determine actual enum type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.55 11556

enum @1@ contains no values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.56 11557

invalid format specification for an interval value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.57 11558

"EEEE" must be the last pattern used

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.58 11559

"9" must be ahead of "PR"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.59 11560

"0" must be ahead of "PR"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.60 11561

multiple decimal points

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.61 11562

cannot use "V" and decimal point together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.62 11563

cannot use "S" twice

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.63 11564

cannot use "S" and "PL"/"MI"/"SG"/"PR" together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.64 11565

cannot use "S" and "MI" together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.65 11566

cannot use "S" and "PL" together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.66 11567

cannot use "S" and "SG" together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.67 11568

cannot use "PR" and "S"/"PL"/"MI"/"SG" together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.68 11569

cannot use "EEEE" twice

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.69 11570

"EEEE" is incompatible with other formats

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.70 11571

"@1@" is not a view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.71 11572

could not determine which collation to use for regular expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.72 11573

could not determine which collation to use for @1@ function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.73 11574

could not determine which collation to use for @1@ function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.74 11575

invalid combination of date conventions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.75 11576

conflicting values for "@1@" field in formatting string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.76 11577

source string too short for "@1@" formatting field

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.77 11578

invalid argument for @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.78 11579

value for "@1@" in source string is out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.79 11581

invalid input string for "Y,YYY"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.80 11582

hour "@1@" is invalid for the 12-hour clock

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.81 11584

cannot calculate day of year without year information

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.82 11585

"EEEE" not supported for input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.83 11586

"RN" not supported for input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.84 11587

could not open directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.85 11588

array of weight must be one-dimensional

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.86 11589

array of weight is too short

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.87 11590

array of weight must not contain nulls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.88 11591

weight out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.89 11592

regular expression failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.90 11593

invalid regular expression option: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.91 11594

invalid escape string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.92 11595

@1@ does not support the "global" option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.93 11596

unsupported XML feature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.94 11597

invalid encoding name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.95 11598

invalid XML comment

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.16.96 11599

not an XML document

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17 Message Numbers Beginning with 11600

2.17.1 11600

invalid XML processing instruction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.2 11601

xmlvalidate is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.3 11602

could not initialize XML library

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.17.4 11603

date out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.5 11604

invalid query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.6 11605

invalid array for XML namespace mapping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.7 11606

empty XPath expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.8 11607

neither namespace name nor URI may be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.9 11608

could not register XML namespace with name "@1@" and URI "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.10 11609

value "@1@" is out of range for type smallint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.11 11610

value "@1@" is out of range for type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.12 11611

value "@1@" is out of range for 8-bit integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.13 11612

gtsvector_in not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.14 11613

identifier too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.15 11615

no operand in tsquery: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.16 11616

value is too big in tsquery: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.17 11617

operand is too long in tsquery: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.18 11618

word is too long in tsquery: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.19 11619

text-search query doesn't contain lexemes: "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.17.20 11620

length for type @1@ must be at least 1

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.21 11621

length for type @1@ cannot exceed @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.22 11622

value too long for type character(@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.23 11623

value too long for type character varying(@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.24 11624

reference to parent directory ("..") not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.25 11625

absolute path not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.26 11626

path must be in or below the current directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.27 11627

could not open file "@1@" for writing: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.17.28 11628

could not seek in file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.17.29 11629

must be superuser to read files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.30 11630

requested length cannot be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.31 11631

must be superuser to get file information

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.32 11632

must be superuser to get directory listings

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.33 11633

too many points requested

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.34 11639

invalid number of points in external "path" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.35 11641

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.36 11642

function "dist_lb" not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.37 11643

function "close_lb" not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.38 11645

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.39 11646

invalid number of points in external "polygon" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.40 11647

function "poly_distance" not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.41 11648

function "path_center" not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.42 11649

open path cannot be converted to polygon

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.43 11650

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.44 11652

invalid radius in external "circle" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.45 11653

cannot convert circle with radius zero to polygon

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.46 11654

must request at least 2 points

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.47 11656

bit string length @1@ does not match type bit(@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.48 11657

"@1@" is not a valid binary digit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.49 11658

"@1@" is not a valid hexadecimal digit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.50 11659

invalid length in external bit string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.51 11660

bit string too long for type bit varying(@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.52 11661

negative substring length not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.53 11662

cannot AND bit strings of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.54 11663

cannot OR bit strings of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.55 11664

cannot XOR bit strings of different sizes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.56 11665

bit index @1@ out of valid range (0..@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.57 11666

new bit must be 0 or 1

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.58 11667

unrecognized key word: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.59 11668

missing name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.60 11669

missing "=" sign

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.61 11670

invalid mode character: must be one of "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.62 11671

a name must follow the "/" sign

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.63 11672

defaulting grantor to user ID @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.17.64 11673

ACL array contains wrong data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.65 11674

ACL arrays must be one-dimensional

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.66 11675

ACL arrays must not contain null values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.67 11676

extra garbage at the end of the ACL specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.68 11677

grant options cannot be granted back to your own grantor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.69 11678

dependent privileges exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.70 11679

aclinsert is no longer supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.71 11680

aclremove is no longer supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.72 11681

unrecognized privilege type: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.73 11682

must be member of role "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.74 11683

view "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.75 11684

INTERVAL(@1@) precision must not be negative

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.76 11685

INTERVAL(@1@) precision reduced to maximum allowed, @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.17.77 11686

timestamp out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.78 11687

cannot subtract infinite dates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.79 11688

date out of range for timestamp

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.80 11690

time out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.81 11691

interval units "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.82 11692

time zone displacement out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.83 11693

timestamp with time zone units "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.84 11695

"@1@" is not a composite type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.85 11696

invalid input syntax for type @1@: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.86 11697

invalid octet value in "macaddr" value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.87 11698

could not determine which collation to use for @1@ function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.17.88 11699

could not convert string to UTF-16: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18 Message Numbers Beginning with 11700

2.18.1 11700

could not compare Unicode strings: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.2 11701

index @1@ out of valid range, 0..@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.3 11702

field position must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.4 11703

unrecognized format() type specifier "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.5 11705

format specifies argument 0, but arguments are numbered from 1

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.6 11706

could not create locale "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.7 11707

collations with different collate and ctype values are not supported on this platform

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.8 11708

ICU is not supported in this build

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.9 11709

invalid multibyte character for locale

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.10 11710

could not determine which collation to use for ILIKE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.11 11711

text-search query contains only stop words or doesn't contain lexemes, ignored

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.18.12 11714

invalid sign in external "numeric" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.13 11715

invalid digit in external "numeric" value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.14 11716

NUMERIC precision @1@ must be between 1 and @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.15 11717

NUMERIC scale @1@ must be between 0 and precision @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.16 11718

invalid NUMERIC type modifier

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.17 11719

value overflows numeric format

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.18 11720

cannot convert NaN to integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.19 11721

cannot convert NaN to bigint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.20 11722

cannot convert NaN to smallint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.21 11723

numeric field overflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.22 11725

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.23 11727

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.24 11728

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.25 11729

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.26 11730

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.27 11731

cannot accept a value of type language_handler

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.28 11732

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.29 11733

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.30 11734

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.31 11735

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.32 11736

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.33 11737

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.34 11738

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.35 11739

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.36 11740

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.37 11741

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.38 11742

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.39 11743

cannot accept a value of a shell type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.40 11744

cannot display a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.41 11745

cannot accept a value of type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.42 11746

"char" out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.43 11747

LIKE pattern must not end with escape character

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.44 11750

function @1@ is not an aggregate

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.45 11751

rule "@1@" has unsupported event type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.46 11752

replication connection authorized: user=@1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.18.47 11753

connection authorized: user=@1@ database=@2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.18.48 11754

database "@1@" has disappeared from pg_database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.49 11755

database "@1@" is not currently accepting connections

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.50 11756

permission denied for database "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.51 11757

too many connections for role "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.52 11758

database locale is incompatible with operating system

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.53 11759

no roles are defined in this database system

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.18.54 11760

new replication connections are not allowed during database shutdown

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.55 11761

must be superuser to connect during database shutdown

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.56 11762

must be superuser to connect in binary upgrade mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.57 11763

remaining connection slots are reserved for non-replication superuser connections

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.58 11765

template database "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.59 11766

database @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.60 11767

could not stat directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.61 11768

could not change directory to "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.62 11769

cannot set parameter "@1@" within security-restricted operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.63 11770

role "@1@" is not permitted to log in

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.64 11771

too many connections for database "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.65 11772

permission denied to set session authorization

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.66 11773

invalid role OID: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.67 11774

could not create lock file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.18.68 11775

could not open stop-word file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.69 11776

could not open lock file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.70 11777

lock file "@1@" already exists

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.71 11778

pre-existing shared memory block (key @1@, ID @2@) is still in use

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.18.72 11779

could not remove old lock file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.73 11780

could not read lock file "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.18.74 11781

could not read from file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.18.75 11782

"@1@" is not a valid data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.76 11784

loaded library "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.18.77 11785

unexpected encoding ID @1@ for WIN character sets

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.18.78 11786

unexpected encoding ID @1@ for ISO 8859 character sets

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.18.79 11787

conversion between @1@ and @2@ is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.80 11788

default conversion function for encoding "@1@" to "@2@" does not exist

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.18.81 11789

invalid source encoding name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.82 11790

invalid destination encoding name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.83 11791

invalid byte value for encoding "@1@": 0x@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.84 11793

invalid byte sequence for encoding "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.85 11795

invalid encoding number: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.86 11796

unrecognized configuration parameter "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.87 11797

parameter "@1@" cannot be changed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.88 11798

parameter "@1@" cannot be changed without restarting the server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.18.89 11799

parameter "@1@" cannot be changed now

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19 Message Numbers Beginning with 11800

2.19.1 11800

parameter "@1@" cannot be set after connection start

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.2 11801

permission denied to set role "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.3 11802

cannot set parameter "@1@" within security-definer function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.4 11803

invalid value for parameter "@1@": "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.5 11804

@1@@2@@3@ is outside the valid range for parameter "@4@" (@5@ .. @6@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.6 11805

@1@ requires a numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.7 11806

@1@@2@@3@ is outside the valid range for parameter "@4@" (@5@ .. @6@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.8 11807

must be superuser or a member of pg_read_all_settings to examine "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.9 11808

SET @1@ takes only one argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.10 11809

SET requires parameter name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.11 11810

attempt to redefine parameter "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.19.12 11811

could not parse setting for parameter "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.13 11812

invalid value for parameter "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.14 11813

invalid value for parameter "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.15 11814

parameter "@1@" removed from configuration file, reset to default

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.16 11815

parameter "@1@" changed to "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.17 11816

could not open configuration file "@1@": maximum nesting depth exceeded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.18 11817

syntax error in file "@1@" line @2@, near end of line

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.19 11818

syntax error in file "@1@" line @2@, near token "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.20 11819

user mapping not found for "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.21 11820

foreign-data wrapper "@1@" has no handler

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.22 11821

invalid option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.23 11822

foreign-data wrapper "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.24 11823

index "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.25 11824

could not create shared memory segment: @1@

[Description]

There was insufficient free space in the database server's shared memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.19.26 11825

could not stat data directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.19.27 11826

could not create semaphore: error code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.19.28 11827

could not lock semaphore: error code @1@

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.19.29 11828

could not unlock semaphore: error code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.19.30 11829

could not try-lock semaphore: error code @1@

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.19.31 11830

could not create semaphores: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.19.32 11832

pre-existing shared memory block is still in use

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.19.33 11833

oldest xmin is far in the past

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.34 11834

some databases have not been vacuumed in over 2 billion transactions

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.35 11835

skipping analyze of "@1@" --- lock not available

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.36 11836

skipping "@1@" --- only superuser can analyze it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.37 11837

skipping "@1@" --- only superuser or database owner can analyze it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.38 11838

skipping "@1@" --- only table or database owner can analyze it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.39 11839

skipping "@1@" --- cannot analyze non-tables or special system tables

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.40 11840

operator class "@1@" does not exist for access method "@2@", skipping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.41 11841

operator family "@1@" does not exist for access method "@2@", skipping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.42 11842

operator family "@1@" for access method "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.43 11843

access method "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.44 11844

must be superuser to create an operator class

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.45 11845

invalid operator number @1@, must be between 1 and @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.46 11846

invalid procedure number @1@, must be between 1 and @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.47 11847

storage type specified more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.48 11848

storage type cannot be different from data type for access method "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.49 11849

operator class "@1@" for access method "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.50 11850

could not make operator class "@1@" be default for type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.51 11851

must be superuser to create an operator family

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.52 11852

must be superuser to alter an operator family

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.53 11853

operator argument types must be specified in ALTER OPERATOR FAMILY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.54 11854

STORAGE cannot be specified in ALTER OPERATOR FAMILY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.55 11855

one or two argument types must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.56 11856

index operators must be binary

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.57 11857

access method "@1@" does not support ordering operators

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.58 11858

index search operators must return boolean

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.59 11859

btree comparison procedures must have two arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.60 11860

btree comparison procedures must return integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.61 11861

hash procedures must have one argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.62 11862

hash procedures must return integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.63 11863

associated data types must be specified for index support procedure

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.64 11864

procedure number @1@ for (@2@,@3@) appears more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.65 11865

operator number @1@ for (@2@,@3@) appears more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.66 11866

operator @1@(@2@,@3@) already exists in operator family "@4@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.67 11867

function @1@(@2@,@3@) already exists in operator family "@4@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.68 11868

operator @1@(@2@,@3@) does not exist in operator family "@4@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.69 11869

function @1@(@2@,@3@) does not exist in operator family "@4@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.70 11870

operator class "@1@" for access method "@2@" already exists in schema "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.71 11871

operator family "@1@" for access method "@2@" already exists in schema "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.72 11872

no security label providers have been loaded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.73 11873

must specify provider when multiple security label providers have been loaded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.74 11874

security label provider "@1@" is not loaded

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.75 11875

"@1@" is not a table, view, materialized view, composite type, or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.76 11876

aggregate attribute "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.77 11877

parameter "lc_collate" must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.78 11878

database "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.79 11879

collation "@1@" for encoding "@2@" already exists in schema "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.80 11880

function @1@ already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.81 11881

unrecognized value for EXPLAIN option "@1@": "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.82 11882

unrecognized EXPLAIN option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.83 11883

EXPLAIN option WAL requires ANALYZE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.84 11884

type "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.85 11885

collation attribute "@1@" not recognized

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.86 11886

aggregate stype must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.87 11887

aggregate sfunc must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.88 11888

aggregate input type must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.89 11889

basetype is redundant with aggregate input type specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.90 11890

aggregate transition data type cannot be @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.91 11891

function @1@(@2@) does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.92 11892

collation "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.19.93 11894

vacuuming "@1@.@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.19.94 11896

"@1@": removed @2@ row versions in @3@ pages

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.19.95 11897

"@1@": found @2@ removable, @3@ nonremovable row versions in @4@ pages

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.19.96 11898

"@1@": removed @2@ row versions in @3@ pages

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.19.97 11899

scanned index "@1@" to remove @2@ row versions

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20 Message Numbers Beginning with 11900

2.20.1 11900

index "@1@" now contains @2@ row versions in @3@ pages

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.2 11901

"@1@": truncated @2@ to @3@ pages

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.3 11902

option "@1@" not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.4 11903

option "@1@" provided more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.5 11904

permission denied to change owner of foreign-data wrapper "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.6 11905

function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.7 11906

permission denied to create foreign-data wrapper "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.8 11907

foreign-data wrapper "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.9 11908

permission denied to alter foreign-data wrapper "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.10 11909

changing the foreign-data wrapper handler can change behavior of existing foreign tables

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.11 11910

changing the foreign-data wrapper validator can cause the options for dependent objects to become invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.12 11912

foreign-data wrapper "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.13 11913

server "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.14 11914

type "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.15 11916

user mapping for "@1@" does not exist for server "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.16 11917

server "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.17 11918

user mapping for "@1@" does not exist for server "@2@", skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.18 11919

foreign table "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.19 11920

collation "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.20 11921

tablespace "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.21 11922

conversion "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.22 11923

constraint "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.23 11924

schema "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.24 11925

extension "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.25 11926

operator @1@ does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.26 11927

@1@ is not a domain

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.27 11929

table "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.28 11931

only shared relations can be placed in pg_global tablespace

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.29 11933

truncate cascades to table "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.30 11934

cannot vacuum temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.31 11935

cannot inherit from temporary relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.32 11936

relation "@1@" would be inherited from more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.33 11937

merging multiple inherited definitions of column "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.34 11938

inherited column "@1@" has a type conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.35 11939

inherited column "@1@" has a collation conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.36 11940

inherited column "@1@" has a storage parameter conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.37 11941

merging column "@1@" with inherited definition

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.38 11942

column "@1@" has a type conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.39 11943

column "@1@" has a collation conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.40 11944

column "@1@" has a storage parameter conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.41 11945

column "@1@" inherits conflicting default values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.42 11946

check constraint name "@1@" appears multiple times but with different expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.43 11947

cannot rename column of typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.44 11948

"@1@" is not a table, view, materialized view, composite type, index, or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.45 11949

inherited column "@1@" must be renamed in child tables too

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.46 11950

cannot rename system column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.47 11951

cannot rename inherited column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.48 11952

column "@1@" of relation "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.49 11953

cannot @1@ "@2@" because it is being used by active queries in this session

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.20.50 11954

cannot @1@ "@2@" because it has pending trigger events

[Description]

An error occurred because execution is temporarily impossible.

[System Processing]

Processing will be aborted.

[Action]

Restart the application. If the same error occurs when you restart the application, to check if there are any problems in the database server.

2.20.51 11955

type @1@ is not a composite type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.52 11956

cannot rewrite system relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.53 11957

cannot truncate temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.54 11958

rewriting table "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.55 11959

verifying table "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.56 11960

column "@1@" of relation "@2@" contains null values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.57 11961

check constraint "@1@" of relation "@2@" is violated by some row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.58 11962

"@1@" is not a table, materialized view, or index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.59 11963

"@1@" is not a table or view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.60 11964

"@1@" is not a table or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.61 11965

"@1@" is not a table, composite type, or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.62 11966

"@1@" is of the wrong type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.63 11967

cannot alter type "@1@" because it is the type of a typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.64 11968

type @1@ is not a domain

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.65 11969

cannot add column to typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.66 11970

child table "@1@" has different type for column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.67 11971

child table "@1@" has different collation for column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.68 11973

merging definition of column "@1@" for child "@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.69 11974

column must be added to child tables too

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.70 11975

cannot alter system column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.71 11976

column "@1@" is in a primary key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.72 11977

statistics target @1@ is too low

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.73 11978

lowering statistics target to @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.74 11979

invalid storage type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.75 11980

column data type @1@ can only have storage PLAIN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.76 11981

cannot drop column from typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.77 11982

column "@1@" of relation "@2@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.20.78 11983

cannot drop system column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.79 11984

cannot drop inherited column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.80 11985

ALTER TABLE / ADD CONSTRAINT USING INDEX will rename index "@1@" to "@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.20.81 11986

constraint must be added to child tables too

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.82 11987

inherited relation "@1@" is not a table or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.83 11988

constraints on permanent tables may reference only permanent tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.84 11989

constraints on unlogged tables may reference only permanent or unlogged tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.85 11990

constraints on temporary tables may reference only temporary tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.86 11991

number of referencing and referenced columns for foreign key disagree

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.87 11992

foreign key constraint "@1@" cannot be implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.88 11993

constraint "@1@" of relation "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.89 11994

column "@1@" referenced in foreign key constraint does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.90 11995

cannot have more than @1@ keys in a foreign key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.91 11996

cannot use a deferrable primary key for referenced table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.92 11997

there is no primary key for referenced table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.93 11998

cannot use a deferrable unique constraint for referenced table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.20.94 11999

there is no unique constraint matching given keys for referenced table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21 Message Numbers Beginning with 12000

2.21.1 12000

validating foreign key constraint "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.2 12001

cannot drop inherited constraint "@1@" of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.3 12002

constraint "@1@" of domain "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.4 12003

constraint "@1@" of relation "@2@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.5 12004

cannot alter column type of typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.6 12005

cannot alter inherited column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.7 12007

cannot use subquery in index expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.8 12010

column "@1@" cannot be cast automatically to type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.9 12011

type of inherited column "@1@" must be changed in child tables too

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.10 12012

cannot alter type of column "@1@" twice

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.11 12013

default for column "@1@" cannot be cast automatically to type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.12 12014

cannot alter type of a column used by a view or rule

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.13 12015

cannot alter type of a column used in a trigger definition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.14 12016

cannot change owner of index "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.15 12017

cannot change owner of sequence "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.16 12018

"@1@" is not a table, materialized view, index, or foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.17 12019

index "@1@" for table "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.18 12020

cannot have multiple SET TABLESPACE subcommands

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.19 12021

"@1@" is not a table, view, materialized view, index, or TOAST table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.20 12022

cannot move system relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.21 12023

cannot rewrite temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.22 12024

cannot change inheritance of typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.23 12025

circular inheritance not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.24 12027

column "@1@" in child table must be marked NOT NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.25 12028

child table is missing column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.26 12029

child table "@1@" has different definition for check constraint "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.27 12030

child table is missing constraint "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.28 12031

relation "@1@" is not a parent of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.29 12032

typed tables cannot inherit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.30 12033

table is missing column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.31 12034

table has column "@1@" where type requires "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.32 12035

table "@1@" has different type for column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.33 12036

table has extra column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.34 12037

"@1@" is not a typed table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.35 12038

cannot move an owned sequence into another schema

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.36 12039

conversion "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.37 12040

unlogged sequences are not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.38 12041

nextval: reached maximum value of sequence "@1@" (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.39 12042

nextval: reached minimum value of sequence "@1@" (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.40 12043

currval of sequence "@1@" is not yet defined in this session

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.41 12044

lastval is not yet defined in this session

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.42 12045

setval: value @1@ is out of bounds for sequence "@2@" (@3@..@4@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.43 12046

INCREMENT must not be zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.44 12047

MINVALUE (@1@) must be less than MAXVALUE (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.45 12048

START value (@1@) cannot be less than MINVALUE (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.46 12049

START value (@1@) cannot be greater than MAXVALUE (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.47 12050

RESTART value (@1@) cannot be less than MINVALUE (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.48 12051

RESTART value (@1@) cannot be greater than MAXVALUE (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.49 12052

CACHE (@1@) must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.50 12053

invalid OWNED BY option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.51 12054

sequence must have same owner as table it is linked to

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.52 12055

sequence must be in same schema as table it is linked to

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.53 12056

invalid cursor name: must not be empty

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.54 12057

utility statements cannot be prepared

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.55 12058

prepared statement is not a SELECT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.56 12059

wrong number of parameters for prepared statement "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.57 12060

cannot use subquery in EXECUTE parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.58 12061

aggregate functions are not allowed in EXECUTE parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.59 12062

window functions are not allowed in EXECUTE parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.60 12063

parameter $@1@ of type @2@ cannot be coerced to the expected type @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.61 12064

prepared statement "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.62 12065

unnamed prepared statement does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.63 12066

skipping vacuum of "@1@" --- lock not available

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.64 12067

skipping "@1@" --- only superuser can vacuum it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.65 12068

skipping "@1@" --- only superuser or database owner can vacuum it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.66 12069

skipping "@1@" --- only table or database owner can vacuum it

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.67 12070

skipping "@1@" --- cannot vacuum non-tables or special system tables

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.68 12071

analyzing "@1@.@2@" inheritance tree

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.69 12072

analyzing "@1@.@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.70 12073

automatic analyze of table "@1@.@2@.@3@" system usage: @4@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.71 12074

"@1@": scanned @2@ of @3@ pages, containing @4@ live rows and @5@ dead rows; @6@ rows in sample, @7@ estimated total rows

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.72 12075

cannot move temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.73 12076

there is no previously clustered index for table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.74 12077

cannot cluster a shared catalog

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.75 12078

cannot access temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.76 12079

"@1@" is not an index for table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.77 12080

cannot cluster on index "@1@" because access method does not support clustering

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.78 12081

cannot cluster on partial index "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.79 12082

cannot cluster on invalid index "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.80 12083

clustering "@1@.@2@" using index scan on "@3@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.81 12084

clustering "@1@.@2@" using sequential scan and sort

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.21.82 12086

invalid statement name: must not be empty

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.83 12088

SQL function cannot return shell type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.84 12089

type "@1@" is only a shell

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.85 12090

type "@1@" is not yet defined

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.86 12091

SQL function cannot accept shell type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.87 12092

type @1@ is only a shell

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.21.88 12093

token type "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.89 12094

functions cannot accept set arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.90 12095

VARIADIC parameter must be the last input parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.91 12096

VARIADIC parameter must be an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.92 12097

argument name "@1@" used more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.93 12098

only input parameters can have default values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.21.94 12099

cannot use table references in parameter default value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22 Message Numbers Beginning with 12100

2.22.1 12103

input parameters after one with a default value must also have defaults

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.2 12104

no function body specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.3 12105

no language specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.4 12106

COST must be positive

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.5 12107

ROWS must be positive

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.6 12108

unrecognized function attribute "@1@" ignored

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.7 12109

only one AS item needed for language "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.8 12110

role "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.9 12111

function result type must be @1@ because of OUT parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.10 12112

function result type must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.11 12113

ROWS is not applicable when function does not return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.12 12114

aggregate @1@(@2@) does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.13 12116

source data type @1@ is a pseudo-type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.14 12117

target data type @1@ is a pseudo-type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.15 12118

cast function must take one to three arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.16 12119

argument of cast function must match or be binary-coercible from source data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.17 12120

second argument of cast function must be type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.18 12122

return data type of cast function must match or be binary-coercible to target data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.19 12123

cast function must not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.20 12124

cast function must not be an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.21 12125

cast function must not be a window function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.22 12126

cast function must not return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.23 12127

must be superuser to create a cast WITHOUT FUNCTION

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.24 12128

source and target data types are not physically compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.25 12129

composite data types are not binary-compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.26 12130

enum data types are not binary-compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.27 12131

array data types are not binary-compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.28 12132

domain data types must not be marked binary-compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.29 12133

source data type and target data type are the same

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.30 12134

cast from type @1@ to type @2@ already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.31 12135

cast from type @1@ to type @2@ does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.32 12136

cast from type @1@ to type @2@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.33 12138

no inline code specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.34 12139

language "@1@" does not support inline code execution

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.35 12140

channel name cannot be empty

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.36 12141

channel name too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.37 12142

payload string too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.38 12143

cannot PREPARE a transaction that has executed LISTEN, UNLISTEN, or NOTIFY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.39 12144

too many notifications in the NOTIFY queue

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.40 12145

NOTIFY queue is @1@@2@ full

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.41 12147

must be superuser to create text search parsers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.42 12148

text search parser parameter "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.43 12149

text search parser start method is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.44 12150

text search parser gettoken method is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.45 12151

text search parser end method is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.46 12152

text search parser lextypes method is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.47 12153

must be superuser to rename @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.48 12154

text search parser "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.49 12156

text search parser "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.50 12157

text search template "@1@" does not accept options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.51 12158

text search template is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.52 12159

text search dictionary "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.53 12160

text search dictionary "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.54 12161

must be superuser to create text search templates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.55 12162

text search template parameter "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.56 12163

text search template lexize method is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.57 12165

text search template "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.58 12167

text search template "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.59 12168

text search configuration parameter "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.60 12169

cannot specify both PARSER and COPY options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.61 12170

text search parser is required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.62 12171

text search configuration "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.63 12172

text search configuration "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.64 12174

mapping for token type "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.65 12175

mapping for token type "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.66 12176

invalid parameter list format: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.67 12177

group "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.68 12178

invalid extension name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.69 12179

invalid extension version name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.70 12180

could not open extension control file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.22.71 12181

parameter "@1@" cannot be set in a secondary extension control file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.72 12183

parameter "@1@" must be a list of extension names

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.73 12184

unrecognized parameter "@1@" in file "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.74 12185

parameter "schema" cannot be specified when "relocatable" is true

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.75 12186

transaction control statements are not allowed within an extension script

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.76 12187

permission denied to create extension "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.77 12188

permission denied to update extension "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.78 12189

extension "@1@" has no update path from version "@2@" to version "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.79 12190

relation "@1@" already exists, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.80 12191

extension "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.81 12192

nested CREATE EXTENSION is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.82 12193

version to install must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.83 12195

extension "@1@" must be installed in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.84 12196

required extension "@1@" is not installed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.85 12197

language "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.22.86 12198

OID @1@ does not refer to a table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.22.87 12199

table "@1@" is not a member of the extension being created

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23 Message Numbers Beginning with 12200

2.23.1 12200

extension "@1@" does not support SET SCHEMA

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.2 12201

nested ALTER EXTENSION is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.3 12202

version "@1@" of extension "@2@" is already installed

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.23.4 12203

@1@ is already a member of extension "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.5 12204

@1@ is not a member of extension "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.6 12209

must be superuser to create custom procedural language

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.7 12211

language "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.8 12212

relation "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.9 12213

unacceptable schema name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.10 12214

sequence "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.11 12215

source encoding "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.12 12216

destination encoding "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.13 12217

encoding conversion function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.14 12218

view "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.15 12219

relation "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.16 12220

could not remove directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.23.17 12221

"@1@" exists but is not a directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.18 12222

permission denied to create tablespace "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.19 12223

tablespace location cannot contain single quotes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.20 12224

tablespace location must be an absolute path

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.21 12225

tablespace location "@1@" is too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.22 12226

unacceptable tablespace name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.23 12227

tablespace "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.24 12228

tablespaces are not supported on this platform

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.25 12229

window "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.26 12230

index "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.27 12231

tablespace "@1@" is not empty

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.28 12232

aggregate @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.29 12233

could not set permissions on directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.23.30 12234

some useless files may be left behind in old database directory "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.31 12235

directory "@1@" already in use as a tablespace

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.32 12236

could not create symbolic link "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.23.33 12237

could not read symbolic link "@1@": @2@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.23.34 12238

could not read directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.23.35 12239

"@1@" is a foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.36 12240

"@1@" is a view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.37 12241

TRUNCATE FOR EACH ROW triggers are not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.38 12242

INSTEAD OF triggers must be FOR EACH ROW

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.39 12243

INSTEAD OF triggers cannot have WHEN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.40 12244

INSTEAD OF triggers cannot have column lists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.41 12245

cannot use subquery in trigger WHEN condition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.42 12246

aggregate functions are not allowed in trigger WHEN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.43 12247

window functions are not allowed in trigger WHEN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.44 12248

statement trigger's WHEN condition cannot reference column values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.45 12249

INSERT trigger's WHEN condition cannot reference OLD values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.46 12250

DELETE trigger's WHEN condition cannot reference NEW values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.47 12251

BEFORE trigger's WHEN condition cannot reference NEW system columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.48 12254

trigger "@1@" for relation "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.49 12257

trigger "@1@" for relation "@2@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.50 12258

trigger "@1@" for table "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.51 12259

permission denied: "@1@" is a system trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.52 12260

trigger function @1@ returned null value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.53 12261

BEFORE STATEMENT trigger cannot return a value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.54 12262

constraint "@1@" is not deferrable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.55 12264

SYSID can no longer be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.56 12265

invalid connection limit: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.57 12266

must be superuser to create superusers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.58 12267

must be superuser to create replication users

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.59 12268

permission denied to create database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.60 12269

role name "@1@" is reserved

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.61 12270

role "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.62 12271

must be superuser to alter superusers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.63 12272

must be superuser to alter replication users

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.64 12273

permission denied

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.65 12274

permission denied to create role

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.66 12275

tablespace "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.67 12276

current user cannot be dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.68 12277

session user cannot be dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.69 12278

must be superuser to drop superusers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.70 12279

role "@1@" cannot be dropped because some objects depend on it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.71 12280

session user cannot be renamed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.72 12281

current user cannot be renamed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.73 12282

must be superuser to rename superusers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.74 12283

permission denied to rename database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.75 12284

MD5 password cleared because of role rename

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.76 12285

column names cannot be included in GRANT/REVOKE ROLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.77 12286

permission denied to drop role

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.78 12287

permission denied to drop objects

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.79 12288

must have admin option on role "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.80 12289

must be superuser to set grantor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.81 12290

role "@1@" is a member of role "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.82 12291

role "@1@" is already a member of role "@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.23.83 12292

role "@1@" is not a member of role "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.23.84 12293

COPY BINARY is not supported to stdout or from stdin

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.23.85 12294

could not write to COPY file: @1@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.23.86 12295

connection lost during COPY to stdout

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.23.87 12296

could not read from COPY file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.23.88 12297

COPY from stdin failed: @1@

[Description]

Processing was canceled.

[System Processing]

Processing will be aborted.

[Action]

Check the message text.

2.23.89 12298

unexpected message type 0x@1@ during COPY from stdin

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.23.90 12299

must be superuser to COPY to or from a file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24 Message Numbers Beginning with 12300

2.24.1 12300

COPY format "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.2 12301

argument to option "@1@" must be a list of column names

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.3 12302

argument to option "@1@" must be a valid encoding name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.4 12303

option "@1@" not recognized

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.24.5 12304

cannot specify DELIMITER in BINARY mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.6 12305

cannot specify NULL in BINARY mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.7 12306

COPY delimiter must be a single one-byte character

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.8 12307

COPY delimiter cannot be newline or carriage return

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.9 12308

COPY null representation cannot use newline or carriage return

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.10 12309

COPY delimiter cannot be "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.11 12310

COPY HEADER available only in CSV mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.12 12311

COPY quote available only in CSV mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.13 12312

COPY quote must be a single one-byte character

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.14 12313

COPY delimiter and quote must be different

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.15 12314

COPY escape available only in CSV mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.16 12315

COPY escape must be a single one-byte character

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.17 12316

COPY force quote available only in CSV mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.18 12317

COPY force quote only available using COPY TO

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.19 12318

COPY force not null available only in CSV mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.20 12319

COPY force not null only available using COPY FROM

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.21 12320

COPY delimiter must not appear in the NULL specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.22 12321

CSV quote character must not appear in the NULL specification

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.23 12324

COPY (SELECT INTO) is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.24 12325

FORCE_QUOTE column "@1@" not referenced by COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.25 12326

FORCE_NOT_NULL column "@1@" not referenced by COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.26 12327

cannot copy from sequence "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.27 12328

cannot copy from foreign table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.28 12329

cannot copy to sequence "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.29 12330

cannot copy from non-table relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.30 12331

relative path not allowed for COPY to file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.31 12332

could not open file "@1@" for reading: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.24.32 12333

"@1@" is a directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.33 12334

cannot copy to view "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.34 12335

cannot copy to foreign table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.35 12337

cannot copy to non-table relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.36 12338

COPY file signature not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.37 12339

invalid COPY file header (missing flags)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.38 12340

unrecognized critical flags in COPY file header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.39 12341

invalid COPY file header (missing length)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.40 12342

invalid COPY file header (wrong length)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.41 12343

extra data after last expected column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.42 12347

missing data for column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.43 12348

received copy data after EOF marker

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.44 12349

row field count is @1@, expected @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.45 12350

literal carriage return found in data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.46 12351

unquoted carriage return found in data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.47 12352

literal newline found in data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.48 12353

unquoted newline found in data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.49 12354

end-of-copy marker does not match previous newline style

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.50 12355

end-of-copy marker corrupt

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.51 12356

unterminated CSV quoted field

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.52 12357

unexpected EOF in COPY data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.53 12358

invalid field size

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.54 12359

incorrect binary data format

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.55 12360

must specify at least one column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.56 12361

cannot use more than @1@ columns in an index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.57 12362

cannot create index on foreign table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.58 12363

cannot create indexes on temporary tables of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.59 12364

substituting access method "gist" for obsolete method "rtree"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.24.60 12365

access method "@1@" does not support unique indexes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.61 12366

access method "@1@" does not support multicolumn indexes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.62 12367

access method "@1@" does not support exclusion constraints

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.63 12368

@1@ @2@ will create implicit index "@3@" for table "@4@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.24.64 12369

cannot use subquery in index predicate

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.65 12370

aggregate functions are not allowed in index predicates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.66 12371

functions in index predicate must be marked IMMUTABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.67 12372

cannot use subquery in transform expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.68 12374

functions in index expression must be marked IMMUTABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.69 12375

could not determine which collation to use for string comparison

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.70 12376

operator is not unique: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.71 12377

operator @1@ is not a member of operator family "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.72 12378

access method "@1@" does not support ASC/DESC options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.73 12379

access method "@1@" does not support NULLS FIRST/LAST options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.74 12380

data type @1@ has no default operator class for access method "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.75 12381

operator class "@1@" does not accept data type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.76 12382

there are multiple default operator classes for data type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.77 12384

can only reindex the currently open database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.78 12385

table "@1@.@2@" was reindexed

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.24.79 12386

@1@ requires a parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.80 12387

@1@ requires a Boolean value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.81 12389

argument of @1@ must be a name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.82 12391

@1@ requires an integer value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.83 12393

LOCATION is not supported anymore

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.24.84 12396

permission denied to copy database "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.85 12397

invalid server encoding @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.24.86 12399

new encoding (@1@) is incompatible with the encoding of the template database (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25 Message Numbers Beginning with 12400

2.25.1 12400

new collation (@1@) is incompatible with the collation of the template database (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.2 12401

new LC_CTYPE (@1@) is incompatible with the LC_CTYPE of the template database (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.3 12402

pg_global cannot be used as default tablespace

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.4 12403

cannot assign new default tablespace "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.5 12404

database "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.6 12405

source database "@1@" is being accessed by other users

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.7 12406

encoding "@1@" does not match locale "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.8 12407

role "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.25.9 12408

cannot drop a template database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.10 12409

cannot drop the currently open database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.11 12410

database "@1@" is being accessed by other users

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.12 12411

permission denied to rename role

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.13 12412

current database cannot be changed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.14 12413

cannot change the tablespace of the currently open database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.15 12414

some relations of database "@1@" are already in tablespace "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.16 12415

permission denied to change owner of database

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.17 12417

SETOF type not allowed for operator argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.18 12418

operator attribute "@1@" not recognized

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.25.19 12419

operator procedure must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.20 12420

at least one of leftarg or rightarg must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.21 12421

restriction estimator function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.22 12422

join estimator function @1@ must return type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.23 12424

must be superuser to create a base type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.24 12425

type attribute "@1@" not recognized

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.25.25 12426

invalid type category "@1@": must be simple ASCII

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.26 12427

array element type cannot be @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.27 12428

alignment "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.28 12429

storage "@1@" not recognized

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.29 12430

type input function must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.30 12431

type output function must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.31 12432

type modifier output function is useless without a type modifier input function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.32 12434

type input function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.33 12436

type output function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.34 12437

type receive function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.35 12438

type send function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.36 12439

"@1@" is not a number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.37 12440

"@1@" is not a valid base type for a domain

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.38 12441

multiple default expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.39 12442

conflicting NULL/NOT NULL constraints

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.40 12443

unique constraints not possible for domains

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.41 12444

primary key constraints not possible for domains

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.42 12445

exclusion constraints not possible for domains

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.43 12446

foreign key constraints not possible for domains

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.44 12447

specifying constraint deferrability not supported for domains

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.45 12450

typmod_in function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.46 12451

typmod_out function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.47 12452

type analyze function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.48 12453

column "@1@" of table "@2@" contains null values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.49 12454

column "@1@" of table "@2@" contains values that violate the new constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.50 12456

cannot use table references in domain check constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.51 12457

@1@ is a table's row type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.52 12458

cannot alter array type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.53 12460

could not obtain lock on relation "@1@.@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.54 12462

could not determine which collation to use for view column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.55 12464

cannot drop columns from view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.56 12465

cannot change name of view column "@1@" to "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.57 12466

cannot change data type of view column "@1@" from @2@ to @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.58 12467

views must not contain SELECT INTO

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.59 12468

views must not contain data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.60 12469

CREATE VIEW specifies more column names than columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.61 12470

view "@1@" will be a temporary view

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.25.62 12471

views cannot be unlogged because they do not have storage

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.63 12472

rule "@1@" for relation "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.64 12473

portal "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.65 12475

rule "@1@" for relation "@2@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.25.66 12476

WITH query name "@1@" appears in both a rule action and the query being rewritten

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.67 12477

cannot have RETURNING lists in multiple rules

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.68 12478

multiple assignments to same column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.69 12479

infinite recursion detected in rules for relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.70 12480

DO INSTEAD NOTHING rules are not supported for data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.71 12481

conditional DO INSTEAD rules are not supported for data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.72 12482

DO ALSO rules are not supported for data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.73 12483

multi-statement DO INSTEAD rules are not supported for data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.74 12484

cannot perform INSERT RETURNING on relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.75 12485

cannot perform UPDATE RETURNING on relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.76 12486

cannot perform DELETE RETURNING on relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.77 12487

WITH cannot be used in a query that is rewritten by rules into multiple queries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.78 12488

conditional utility statements are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.79 12489

WHERE CURRENT OF on a view is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.80 12490

rule "@1@" for relation "@2@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.81 12491

rule actions on OLD are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.82 12492

rule actions on NEW are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.83 12493

INSTEAD NOTHING rules on SELECT are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.84 12494

multiple actions for rules on SELECT are not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.85 12495

rules on SELECT must have action INSTEAD SELECT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.86 12496

rules on SELECT must not contain data-modifying statements in WITH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.87 12497

event qualifications are not implemented for rules on SELECT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.88 12498

"@1@" is already a view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.25.89 12499

view rule for "@1@" must be named "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26 Message Numbers Beginning with 12500

2.26.1 12500

could not convert table "@1@" to a view because it is not empty

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.2 12501

could not convert table "@1@" to a view because it has triggers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.3 12502

could not convert table "@1@" to a view because it has indexes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.4 12503

could not convert table "@1@" to a view because it has child tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.5 12504

cannot have multiple RETURNING lists in a rule

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.6 12505

RETURNING lists are not supported in conditional rules

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.7 12506

RETURNING lists are not supported in non-INSTEAD rules

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.8 12507

SELECT rule's target list has too many entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.9 12508

RETURNING list has too many entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.10 12509

cannot convert relation containing dropped columns to view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.11 12510

SELECT rule's target entry @1@ has different column name from column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.12 12511

SELECT rule's target entry @1@ has different type from column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.13 12512

RETURNING list's entry @1@ has different type from column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.14 12513

SELECT rule's target entry @1@ has different size from column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.15 12514

RETURNING list's entry @1@ has different size from column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.16 12515

SELECT rule's target list has too few entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.17 12516

RETURNING list has too few entries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.18 12517

@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.19 12518

Perl hash contains nonexistent column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.20 12519

number of array dimensions (@1@) exceeds the maximum allowed (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.21 12520

multidimensional arrays must have array expressions with matching dimensions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.22 12521

PL/Perl function must return reference to hash or array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.23 12522

$_TD->{new} does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.24 12523

$_TD->{new} is not a hash reference

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.25 12524

PL/Perl functions cannot return type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.26 12525

PL/Perl functions cannot accept type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.27 12526

didn't get a CODE reference from compiling function "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.26.28 12527

set-valued function called in context that cannot accept a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.29 12528

set-returning PL/Perl function must return reference to array or use return_next

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.30 12529

function returning record called in context that cannot accept type record

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.31 12530

ignoring modified row in DELETE trigger

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.26.32 12531

result of PL/Perl trigger function must be undef, "SKIP", or "MODIFY"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.33 12533

trigger functions can only be called as triggers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.34 12534

cannot use return_next in a non-SETOF function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.35 12535

SETOF-composite-returning PL/Perl function must call return_next with reference to hash

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.36 12536

PL/pgSQL functions cannot accept type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.37 12537

could not determine actual return type for polymorphic function "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.38 12538

trigger functions can only be called as triggers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.39 12539

PL/pgSQL functions cannot return type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.40 12540

trigger functions cannot have declared arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.41 12541

parameter name "@1@" used more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.42 12542

column reference "@1@" is ambiguous

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.43 12543

record "@1@" has no field "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.44 12544

variable "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.45 12545

relation "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.46 12546

variable "@1@" has pseudo-type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.47 12547

relation "@1@" is not a table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.48 12548

type "@1@" is only a shell

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.49 12549

unrecognized exception condition "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.50 12550

could not determine actual argument type for polymorphic function "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.51 12551

CONTINUE cannot be used outside a loop

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.52 12552

control reached end of function without RETURN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.53 12553

set-valued function called in context that cannot accept a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.54 12554

control reached end of trigger procedure without RETURN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.55 12555

trigger procedure cannot return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.56 12556

variable "@1@" declared NOT NULL cannot default to NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.57 12557

case not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.58 12558

lower bound of FOR loop cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.59 12559

upper bound of FOR loop cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.60 12560

BY value of FOR loop cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.61 12561

BY value of FOR loop must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.62 12562

cursor "@1@" already in use

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.63 12563

arguments given for cursor without arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.64 12564

arguments required for cursor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.65 12565

FOREACH expression must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.66 12566

FOREACH expression must yield an array, not type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.67 12567

slice dimension (@1@) is out of the valid range 0..@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.68 12568

FOREACH ... SLICE loop variable must be of an array type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.69 12569

FOREACH loop variable must not be of an array type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.70 12570

cannot use RETURN NEXT in a non-SETOF function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.71 12571

wrong result type supplied in RETURN NEXT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.72 12572

record "@1@" is not assigned yet

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.73 12573

wrong record type supplied in RETURN NEXT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.74 12574

RETURN NEXT must have a parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.75 12575

cannot use RETURN QUERY in a non-SETOF function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.76 12576

RAISE without parameters cannot be used outside an exception handler

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.77 12577

too few parameters specified for RAISE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.78 12578

too many parameters specified for RAISE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.79 12579

RAISE statement option cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.80 12580

RAISE option already specified: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.81 12581

cannot COPY to/from client in PL/pgSQL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.82 12582

cannot begin/end transactions in PL/pgSQL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.83 12583

INTO used with a command that cannot return data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.84 12584

query returned no rows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.85 12585

query returned more than one row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.86 12586

query has no destination for result data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.87 12587

query string argument of EXECUTE is null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.88 12588

EXECUTE of SELECT ... INTO is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.89 12589

cursor variable "@1@" is null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.90 12590

cursor "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.91 12591

relative or absolute cursor position is null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.92 12592

null value cannot be assigned to variable "@1@" declared NOT NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.93 12593

cannot assign non-composite value to a row variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.94 12594

cannot assign non-composite value to a record variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.95 12595

number of array dimensions (@1@) exceeds the maximum allowed (@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.96 12596

subscripted object is not an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.97 12597

array subscript in assignment must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.26.98 12598

query "@1@" did not return data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27 Message Numbers Beginning with 12600

2.27.1 12600

row or record variable cannot be NOT NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.2 12601

default value for row or record variable is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.3 12603

"@1@" is not a scalar variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.4 12604

loop variable of loop over rows must be a record or row variable or list of scalar variables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.5 12605

cursor FOR loop must have only one target variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.6 12606

cursor FOR loop must use a bound cursor variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.7 12607

integer FOR loop must have only one target variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.8 12608

cannot specify REVERSE in query FOR loop

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.9 12609

loop variable of FOREACH must be a known variable or list of variables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.10 12610

FETCH statement cannot return multiple rows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.11 12611

cursor variable must be a simple variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.12 12612

variable "@1@" must be of type cursor or refcursor

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.13 12613

"@1@" is not a known variable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.14 12614

missing "@1@" at end of SQL expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.15 12615

missing "@1@" at end of SQL statement

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.16 12616

RETURN cannot have a parameter in function returning set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.17 12617

RETURN cannot have a parameter in function with OUT parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.18 12618

RETURN cannot have a parameter in function returning void

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.19 12620

RETURN NEXT cannot have a parameter in function with OUT parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.20 12622

"@1@" is declared CONSTANT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.21 12623

record or row variable cannot be part of multiple-item INTO list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.22 12624

too many INTO variables specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.23 12625

end label "@1@" specified for unlabeled block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.24 12626

end label "@1@" differs from block's label "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.25 12627

cursor "@1@" has no arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.26 12628

cursor "@1@" has arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.27 12629

@1@ at end of input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.28 12630

unexpected return value from trigger procedure

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.29 12631

PL/Python trigger function returned "MODIFY" in a DELETE trigger -- ignored

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.27.30 12632

TD["new"] deleted, cannot modify row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.31 12633

TD["new"] is not a dictionary

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.32 12634

TD["new"] dictionary key at ordinal position @1@ is not a string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.33 12635

key "@1@" found in TD["new"] does not exist as a column in the triggering row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.34 12636

unsupported set function return mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.35 12637

returned object cannot be iterated

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.36 12638

PL/Python function with return type "void" did not return None

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.37 12639

forcibly aborting a subtransaction that has not been exited

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.27.38 12640

function returning record called in context that cannot accept type record

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.39 12641

trigger functions can only be called as triggers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.40 12642

PL/Python functions cannot return type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.41 12643

PL/Python functions cannot accept type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.42 12645

could not convert Python object into cstring: Python string representation appears to contain null bytes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.43 12646

key "@1@" not found in mapping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.44 12647

length of returned sequence did not match number of columns in row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.45 12648

attribute "@1@" does not exist in Python object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.46 12649

plpy.prepare: type name at ordinal position @1@ is not a string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.47 12652

@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.48 12653

@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.49 12655

trigger functions can only be called as triggers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.27.50 12656

PL/Tcl functions cannot return type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.28 Message Numbers Beginning with 12700

2.28.1 12704

function "@1@" does not exist

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.28.2 12725

operator @1@ is not a valid ordering operator

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.29 Message Numbers Beginning with 12900

2.29.1 12908

could not remove cache file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.29.2 12909

could not open tablespace directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.30 Message Numbers Beginning with 13000

2.30.1 13092

too few arguments for format()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.30.2 13094

null values cannot be formatted as an SQL identifier

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.31 Message Numbers Beginning with 13300

2.31.1 13359

online backup was canceled, recovery cannot continue

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.31.2 13362

online backup mode canceled

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.31.3 13363

online backup mode was not canceled

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.32 Message Numbers Beginning with 13400

2.32.1 13449

cannot convert whole-row table reference

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.2 13452

cannot alter type "@1@" because column "@2@.@3@" uses it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.3 13453

cannot alter foreign table "@1@" because column "@2@.@3@" uses its row type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.4 13454

cannot alter table "@1@" because column "@2@.@3@" uses its row type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.5 13478

parameter "lc_ctype" must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.6 13481

operator family "@1@" does not exist for access method "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.32.7 13490

directories for tablespace @1@ could not be removed

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.32.8 13497

cannot drop extension "@1@" because it is being modified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.32.9 13499

@1@ can only be called from an SQL script executed by CREATE EXTENSION

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.33 Message Numbers Beginning with 13500

2.33.1 13508

must be superuser to set schema of @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.33.2 13580

cannot PREPARE while holding both session-level and transaction-level locks on the same object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.33.3 13589

sending cancel to blocking autovacuum PID @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.33.4 13597

not enough elements in RWConflictPool to record a read/write conflict

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.33.5 13598

not enough elements in RWConflictPool to record a potential read/write conflict

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.34 Message Numbers Beginning with 13700

2.34.1 13761

cannot move extension "@1@" into schema "@2@" because the extension contains the schema

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.35 Message Numbers Beginning with 13800

2.35.1 13833

column @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.35.2 13860

symbolic link "@1@" target is too long

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.35.3 13864

unexpected message type "@1@"

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.35.4 13884

could not create signal listener pipe for PID @1@: error code @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.36 Message Numbers Beginning with 13900

2.36.1 13922

could not close handle to backend parameter variables: error code @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.36.2 13941

conflicting constraint properties

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.36.3 13943

@1@ constraints cannot be marked DEFERRABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.36.4 13944

@1@ constraints cannot be marked NOT VALID

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.37 Message Numbers Beginning with 14000

2.37.1 14024

column name must be qualified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.37.2 14028

cannot create relations in temporary schemas of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.37.3 14029

cannot create temporary relation in non-temporary schema

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.37.4 14030

only temporary relations may be created in temporary schemas

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.37.5 14042

cannot reassign ownership of objects owned by @1@ because they are required by the database system

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.38 Message Numbers Beginning with 14100

2.38.1 14104

cannot convert Perl array to non-array type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.38.2 14105

cannot convert Perl hash to non-composite type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.39 Message Numbers Beginning with 14200

2.39.1 14211

PL/Tcl functions cannot accept type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.39.2 14218

"@1@" is a table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.39.3 14282

cannot add schema "@1@" to extension "@2@" because the schema contains the extension

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.39.4 14284

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.5 14285

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.6 14286

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.7 14287

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.8 14289

could not read symbolic link "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.9 14290

child process exited with exit code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.10 14291

child process was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.11 14292

child process was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.12 14294

child process exited with unrecognized status @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.13 14295

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.14 14296

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.15 14297

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.16 14298

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.39.17 14299

could not change directory to "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40 Message Numbers Beginning with 14300

2.40.1 14300

could not read symbolic link "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.2 14301

child process exited with exit code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.3 14302

child process was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.4 14303

child process was terminated by signal @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.5 14304

child process was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.6 14305

child process exited with unrecognized status @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.7 14306

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.8 14307

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.9 14308

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.10 14309

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.11 14310

could not change directory to "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.12 14311

could not read symbolic link "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.13 14318

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.14 14319

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.15 14320

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.16 14321

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.17 14322

could not change directory to "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.18 14323

could not read symbolic link "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.19 14324

child process exited with exit code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.20 14325

child process was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.21 14326

child process was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.22 14328

auto-open of the keystore has been enabled

[Description]

Enabled automatic opening of the keystore.

[System Processing]

Continues processing.

[Action]

No action required.

2.40.23 14329

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.24 14330

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.25 14331

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.26 14332

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.27 14333

could not change directory to "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.28 14334

could not read symbolic link "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.29 14335

child process exited with exit code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.30 14336

child process was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.31 14337

child process was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.32 14339

@1@: no database directory specified and environment variable PGDATA unset

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.33 14340

could not identify current directory: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.34 14341

invalid binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.35 14342

could not read binary "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.36 14343

could not find a "@1@" to execute

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.37 14344

could not change directory to "@1@": @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.38 14345

could not read symbolic link "@1@"

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.39 14346

child process exited with exit code @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.40 14347

child process was terminated by exception 0x@1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.41 14348

child process was terminated by signal @1@: @2@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.40.42 14351

could not access directory for core file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.43 14352

path specified by configuration parameter "@1@" is invalid: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.44 14353

WAL archiving is not active

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.45 14354

could not set permissions on path specified by configuration parameter "@1@": "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.46 14366

a failure has occurred while multiplexing transaction log files

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.47 14367

multiplexing of transaction log files has been stopped

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.40.48 14368

must be superuser to control WAL multiplexing

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.49 14369

WAL multiplexing is not configured

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.50 14370

WAL multiplexing is already paused

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.51 14371

WAL multiplexing is not paused

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.52 14372

could not fork XLog multiplexer process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.53 14373

could not set junction for "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.54 14374

could not set junction for "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.55 14375

could not remove file or directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.56 14376

could not remove file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.57 14377

could not set junction for "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.58 14378

could not get junction for "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.40.59 14379

could not open directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.60 14380

could not read directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.61 14381

could not stat file or directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.62 14384

could not determine encoding for locale "@1@": codeset is "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.63 14385

could not remove file or directory "@1@": @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.40.64 14388

@1@ at or near "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.65 14390

query "@1@" returned more than one row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.66 14391

query "@1@" is not a SELECT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.67 14392

block label must be placed before DECLARE, not after

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.68 14393

collations are not supported by type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.69 14394

row or record variable cannot be CONSTANT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.40.70 14395

cannot use serializable mode in a hot standby

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.41 Message Numbers Beginning with 14400

2.41.1 14419

could not write lock file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.41.2 14421

Expected 1 tuple with 2 fields, got @1@ tuples with @2@ fields.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.41.3 14422

The primary's identifier is @1@, the standby's identifier is @2@.

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.41.4 14423

The transaction has already committed locally, but might not have been replicated to the standby.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.5 14424

You can choose the collation by applying the COLLATE clause to one or both expressions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.6 14425

Query has too few columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.7 14426

Cannot cast type @1@ to @2@ in column @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.8 14427

Query has too many columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.9 14430

No aggregate function matches the given name and argument types. Perhaps you misplaced ORDER BY; ORDER BY must appear after all regular arguments of the aggregate.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.10 14431

No function matches the given name and argument types. You might need to add explicit type casts.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.11 14432

There is a WITH item named "@1@", but it cannot be referenced from this part of the query.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.12 14433

Use WITH RECURSIVE, or re-order the WITH items to remove forward references.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.13 14434

Perhaps you meant to reference the table alias "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.14 14435

There is an entry for table "@1@", but it cannot be referenced from this part of the query.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.15 14436

String constants with Unicode escapes cannot be used when standard_conforming_strings is off.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.16 14437

Unicode escapes must be \\uXXXX or \\UXXXXXXXX.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.17 14438

Use '' to write quotes in strings. \\' is insecure in client-only encodings.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.18 14439

Use '' to write quotes in strings, or use the escape string syntax (E'...').

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.19 14440

Use the escape string syntax for backslashes, e.g., E'\\\\'.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.20 14441

Use the escape string syntax for escapes, e.g., E'\\r\\n'.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.21 14442

Cast the output of the non-recursive term to the correct type.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.22 14443

Use the COLLATE clause to set the collation of the non-recursive term.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.23 14444

Explicitly cast to the desired type, for example ARRAY[]::integer[].

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.24 14445

Row comparison operators must be associated with btree operator families.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.25 14446

There are multiple equally-plausible candidates.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.26 14447

You will need to rewrite or cast the expression.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.27 14448

Use an explicit ordering operator or modify the query.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.28 14449

Could not choose a best candidate operator. You might need to add explicit type casts.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.29 14450

No operator matches the given name and argument type(s). You might need to add explicit type casts.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.30 14451

Aggregates with DISTINCT must be able to sort their inputs.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.31 14452

Constraint "@1@" contains a whole-row reference to table "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.32 14453

Index "@1@" contains a whole-row table reference.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.33 14454

Cannot create a primary key or unique constraint using such an index.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.34 14455

Cannot create a non-deferrable constraint using a deferrable index.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.35 14456

Ordering operators must be "<" or ">" members of btree operator families.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.36 14457

Update your data type.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.37 14458

Use NONE to denote the missing argument of a unary operator.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.38 14459

Use separate LIMIT and OFFSET clauses.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.39 14460

For example, FROM (VALUES ...) [AS] foo.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.40 14461

For example, FROM (SELECT ...) [AS] foo.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.41 14463

The insertion source is a row expression containing the same number of columns expected by the INSERT. Did you accidentally use extra parentheses?

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.42 14464

Only result column names can be used, not expressions or functions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.43 14465

Add the expression/function to every SELECT, or move the UNION into a FROM clause.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.44 14466

Scrollable cursors must be READ ONLY.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.45 14467

Holdable cursors must be READ ONLY.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.46 14468

Insensitive cursors must be READ ONLY.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.47 14469

Valid options in this context are: @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.48 14470

Specify OWNED BY table.column or OWNED BY NONE.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.49 14471

Extension names must not be empty.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.50 14472

Extension names must not contain "--".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.51 14473

Extension names must not begin or end with "-".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.52 14474

Extension names must not contain directory separator characters.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.53 14475

Version names must not be empty.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.54 14476

Version names must not contain "--".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.55 14477

Version names must not begin or end with "-".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.56 14478

Version names must not contain directory separator characters.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.57 14479

Must be superuser to create this extension.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.58 14480

Must be superuser to update this extension.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.59 14481

@1@ is not in the extension's schema "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.60 14482

Consider using tablespaces instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.61 14483

Use the same encoding as in the template database, or use template0 as template.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.62 14484

Use the same collation as in the template database, or use template0 as template.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.63 14485

Use the same LC_CTYPE as in the template database, or use template0 as template.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.64 14486

There is a conflict because database "@1@" already has some tables in this tablespace.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.65 14487

The chosen LC_CTYPE setting requires encoding "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.66 14488

The chosen LC_COLLATE setting requires encoding "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.67 14489

You must move them back to the database's default tablespace before using this command.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.68 14490

There are @1@ other session(s) and @2@ prepared transaction(s) using the database.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.69 14493

@1@ dead row versions cannot be removed yet.@2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.70 14494

The prefix "pg_" is reserved for system schemas.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.71 14496

The server process with PID @1@ is among those with the oldest transactions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.72 14497

The NOTIFY queue cannot be emptied until that process ends its current transaction.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.41.73 14498

Use the COLLATE clause to set the collation explicitly.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42 Message Numbers Beginning with 14500

2.42.1 14500

Anyone can COPY to stdout or from stdin. psql's \\copy command also works for anyone.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.2 14501

Try the COPY (SELECT ...) TO variant.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.3 14502

COPY @1@, line @2@, column @3@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.4 14503

COPY @1@, line @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.5 14504

COPY @1@, line @2@, column @3@: "@4@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.6 14505

COPY @1@, line @2@, column @3@: null input

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.7 14506

COPY @1@, line @2@: "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.8 14507

Use "\\r" to represent carriage return.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.9 14508

Use quoted CSV field to represent carriage return.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.10 14509

Use "\\n" to represent newline.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.11 14510

Use quoted CSV field to represent newline.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.12 14512

@1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.13 14513

@1@ index row versions were removed.@2@ index pages have been deleted, @3@ are currently reusable.@4@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.14 14514

Operator class "@1@" already is the default.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.15 14515

Must be superuser to change owner of a foreign-data wrapper.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.16 14516

The owner of a foreign-data wrapper must be a superuser.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.17 14517

Must be superuser to create a foreign-data wrapper.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.18 14518

Must be superuser to alter a foreign-data wrapper.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.19 14520

Expected @1@ parameters but got @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.20 14521

Close open transactions soon to avoid wraparound problems.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.21 14522

You might have already suffered transaction-wraparound data loss.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.22 14523

Must be superuser to create a tablespace.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.23 14524

The prefix "pg_" is reserved for system tablespaces.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.24 14525

Create this directory for the tablespace before restarting the server.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.25 14526

You can remove the directories manually if necessary.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.26 14528

You can alter type @1@, which will alter the array type as well.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.27 14529

Tables cannot have INSTEAD OF triggers.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.28 14530

Views cannot have row-level BEFORE or AFTER triggers.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.29 14531

Views cannot have TRUNCATE triggers.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.30 14532

"@1@" versus "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.31 14533

To resolve the conflict, specify a default explicitly.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.32 14534

Use ALTER TYPE instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.33 14535

Use ALTER ... CASCADE to alter the typed tables too.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.34 14536

Key columns "@1@" and "@2@" are of incompatible types: @3@ and @4@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.35 14537

@1@ depends on @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.36 14538

Change the ownership of the index's table, instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.37 14539

Sequence "@1@" is linked to table "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.38 14540

"@1@" is already a child of "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.39 14541

Only commutative operators can be used in exclusion constraints.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.40 14542

The exclusion operator must be related to the index operator class for the constraint.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.41 14543

You must specify an operator class for the index or define a default operator class for the data type.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.42 14544

Creating a shell type definition.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.43 14545

Use CREATE LANGUAGE to load the language into the database.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.44 14546

Use DROP AGGREGATE to drop aggregate functions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.45 14549

Key @1@ is duplicated.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.46 14551

Perhaps you need a different "datestyle" setting.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.47 14552

The operating system could not find any locale data for the locale name "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.48 14553

The server's LC_CTYPE locale is probably incompatible with the database encoding.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.49 14554

Provide two argument types for operator.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.50 14555

Missing left parenthesis.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.51 14556

Too few columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.52 14557

Unexpected end of input.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.53 14558

Too many columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.54 14559

Junk after right parenthesis.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.55 14560

Intervals are not tied to specific calendar dates.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.56 14561

"EEEE" may only be used together with digit and decimal point patterns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.57 14562

Do not mix Gregorian and ISO week date conventions in a formatting template.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.58 14563

This value contradicts a previous setting for the same field type.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.59 14564

Field requires @1@ characters, but only @2@ remain.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.60 14565

If your source string is not fixed-width, try using the "FM" modifier.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.61 14566

Field requires @1@ characters, but only @2@ could be parsed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.62 14567

Value must be an integer.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.63 14568

Value must be in the range @1@ to @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.64 14569

The given value did not match any of the allowed values for this field.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.65 14570

Use the 24-hour clock, or give an hour between 1 and 12.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.66 14571

Escape string must be empty or one character.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.67 14572

Value has bits set to right of mask.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.68 14573

Target must be "archiver" or "bgwriter".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.69 14574

Identifier must be less than @1@ characters.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.70 14575

This functionality requires the server to be built with libxml support.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.71 14576

You need to rebuild PostgreSQL using --with-libxml.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.72 14577

XML processing instruction target name cannot be "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.73 14578

XML processing instruction cannot contain "?>".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.74 14579

libxml2 has incompatible char type: sizeof(char)=@1@, sizeof(xmlChar)=@2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.75 14580

XML does not support infinite date values.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.76 14581

XML does not support infinite timestamp values.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.77 14582

The array must be two-dimensional with length of the second axis equal to 2.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.78 14583

ACL key word must be "group" or "user".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.79 14584

A name must follow the "group" or "user" key word.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.80 14585

Use CASCADE to revoke them too.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.81 14586

Dimension array must be one dimensional.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.82 14587

Lower bound of dimension array must be one.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.83 14588

Low bound array has different size than dimensions array.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.84 14589

MATCH FULL does not allow mixing of null and nonnull key values.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.85 14590

Remove this referential integrity trigger and its mates, then do ALTER TABLE ADD CONSTRAINT.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.86 14591

This is most likely due to a rule having rewritten the query.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.87 14593

Key (@1@)=(@2@) is not present in table "@3@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.88 14594

Key (@1@)=(@2@) is still referenced from table "@3@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.89 14595

A field with precision @1@, scale @2@ must round to an absolute value less than @3@@4@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.90 14596

Arrays with element types @1@ and @2@ are not compatible for concatenation.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.91 14597

Arrays of @1@ and @2@ dimensions are not compatible for concatenation.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.92 14598

Arrays with differing element dimensions are not compatible for concatenation.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.42.93 14599

Arrays with differing dimensions are not compatible for concatenation.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43 Message Numbers Beginning with 14600

2.43.1 14600

Is another postgres (PID @1@) running in data directory "@2@"?

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.2 14601

Is another postmaster (PID @1@) running in data directory "@2@"?

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.3 14602

Is another postgres (PID @1@) using socket file "@2@"?

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.4 14603

Is another postmaster (PID @1@) using socket file "@2@"?

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.5 14605

The file seems accidentally left over, but it could not be removed. Please remove the file by hand and try again.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.6 14606

File "@1@" is missing.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.7 14607

File "@1@" does not contain valid data.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.8 14608

You might need to initdb.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.9 14609

he data directory was initialized by PostgreSQL version @1@, which is not compatible with this version @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.10 14610

Specify an absolute path.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.11 14611

Set up WAL archiving when you configure "@1@" parameter.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.12 14612

Database OID @1@ now seems to belong to "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.13 14613

User does not have CONNECT privilege.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.14 14614

The database was initialized with LC_COLLATE "@1@", which is not recognized by setlocale().

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.15 14615

Recreate the database with another locale or install the missing locale.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.16 14616

The database was initialized with LC_CTYPE "@1@", which is not recognized by setlocale().

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.17 14617

You should immediately run CREATE USER "@1@" SUPERUSER;.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.18 14618

It seems to have just been dropped or renamed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.19 14619

The database subdirectory "@1@" is missing.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.20 14620

String of @1@ bytes is too long for encoding conversion.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.21 14621

Continuing anyway, but there's something wrong.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.22 14622

Failed while creating memory context "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.23 14623

Failed on request of size @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.24 14624

Extension libraries are required to use the PG_MODULE_MAGIC macro.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.25 14625

Server is version @1@, library is version @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.26 14627

You need an unconditional ON INSERT DO INSTEAD rule with a RETURNING clause.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.27 14628

You need an unconditional ON UPDATE DO INSTEAD rule with a RETURNING clause.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.28 14629

You need an unconditional ON DELETE DO INSTEAD rule with a RETURNING clause.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.29 14630

Use views or triggers instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.30 14631

Use triggers instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.31 14632

Use views instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.32 14633

In particular, the table cannot be involved in any foreign key relationships.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.33 14634

Failed system call was shmget(key=@1@, size=@2@, 0@3@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.34 14638

Failed system call was CreateFileMapping(size=@1@, name=@2@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.35 14639

Check if there are any old server processes still running, and terminate them.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.36 14640

Failed system call was DuplicateHandle.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.37 14641

Failed system call was MapViewOfFileEx.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.38 14642

Failed system call was semget(@1@, @2@, 0@3@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.39 14643

This error does *not* mean that you have run out of disk space. It occurs when either the system limit for the maximum number of semaphore sets (SEMMNI), or the system wide maximum number of semaphores (SEMMNS), would be exceeded. You need to raise the respective kernel parameter. Alternatively, reduce PostgreSQL's consumption of semaphores by reducing its max_connections parameter.The PostgreSQL documentation contains more information about configuring your system for PostgreSQL.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.40 14644

You possibly need to raise your kernel's SEMVMX value to be at least @1@. Look into the PostgreSQL documentation for details.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.41 14645

Some of the datatypes only support hashing, while others only support sorting.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.42 14646

Window partitioning columns must be of sortable datatypes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.43 14647

Window ordering columns must be of sortable datatypes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.44 14648

SQL function "@1@" during startup

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.45 14649

All column datatypes must be hashable.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.46 14650

See server log for query details.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.47 14651

Client IP address resolved to "@1@", forward lookup matches.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.48 14652

Client IP address resolved to "@1@", forward lookup not checked.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.49 14653

Client IP address resolved to "@1@", forward lookup does not match.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.50 14654

LDAP over SSL is not supported on this platform.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.51 14655

Is another postmaster already running on port @1@? If not, remove socket file "@2@" and retry.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.52 14656

Is another postmaster already running on port @1@? If not, wait a few seconds and retry.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.53 14657

Anyone can use the client-side lo_import() provided by libpq.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.54 14658

Anyone can use the client-side lo_export() provided by libpq.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.55 14659

File must have permissions u=rw (0600) or less if owned by the database user, or permissions u=rw,g=r (0640) or less if owned by root.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.56 14662

line @1@ of configuration file "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.57 14663

Set ssl = on in postgresql.conf.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.58 14664

Compile with --with-openssl to use SSL connections.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.59 14666

Cannot enlarge string buffer containing @1@ bytes by @2@ more bytes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.60 14667

Please REINDEX it.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.61 14668

Values larger than 1/3 of a buffer page cannot be indexed.Consider a function index of an MD5 hash of the value, or use full text indexing.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.62 14669

Key @1@ already exists.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.63 14670

This may be because of a non-immutable index expression.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.64 14671

To fix this, do REINDEX INDEX "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.65 14672

This is caused by an incomplete page split at crash recovery before upgrading to PostgreSQL 9.1.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.66 14673

The index is not optimal. To optimize it, contact a developer, or try to use the column as the second one in the CREATE INDEX command.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.67 14674

Could not open file "@1@": @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.68 14675

Could not seek in file "@1@" to offset @2@: @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.69 14676

Could not read from file "@1@" at offset @2@: @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.70 14677

Could not write to file "@1@" at offset @2@: @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.71 14678

Could not fsync file "@1@": @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.72 14679

Could not close file "@1@": @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.73 14680

Set max_prepared_transactions to a nonzero value.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.74 14681

Increase max_prepared_transactions (currently @1@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.75 14682

Must be superuser or the user that prepared the transaction.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.76 14683

Connect to the database where the transaction was prepared to finish it.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.77 14687

Expected a numeric timeline ID.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.78 14688

Timeline IDs must be in increasing sequence.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.79 14689

Timeline IDs must be less than child timeline's ID.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.80 14690

The database cluster was initialized with PG_CONTROL_VERSION @1@ (0x@2@), but the server was compiled with PG_CONTROL_VERSION @3@ (0x@4@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.81 14691

This could be a problem of mismatched byte ordering. It looks like you need to initdb.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.82 14692

The database cluster was initialized with PG_CONTROL_VERSION @1@, but the server was compiled with PG_CONTROL_VERSION @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.83 14693

It looks like you need to initdb.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.84 14694

The database cluster was initialized with CATALOG_VERSION_NO @1@, but the server was compiled with CATALOG_VERSION_NO @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.85 14695

The database cluster was initialized with MAXALIGN @1@, but the server was compiled with MAXALIGN @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.86 14696

The database cluster appears to use a different floating-point number format than the server executable.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.87 14697

The database cluster was initialized with BLCKSZ @1@, but the server was compiled with BLCKSZ @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.88 14698

It looks like you need to recompile or initdb.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.43.89 14699

The database cluster was initialized with RELSEG_SIZE @1@, but the server was compiled with RELSEG_SIZE @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44 Message Numbers Beginning with 14700

2.44.1 14700

The database cluster was initialized with XLOG_BLCKSZ @1@, but the server was compiled with XLOG_BLCKSZ @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.2 14701

The database cluster was initialized with XLOG_SEG_SIZE @1@, but the server was compiled with XLOG_SEG_SIZE @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.3 14702

The database cluster was initialized with NAMEDATALEN @1@, but the server was compiled with NAMEDATALEN @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.4 14703

The database cluster was initialized with INDEX_MAX_KEYS @1@, but the server was compiled with INDEX_MAX_KEYS @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.5 14704

The database cluster was initialized with TOAST_MAX_CHUNK_SIZE @1@, but the server was compiled with TOAST_MAX_CHUNK_SIZE @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.6 14707

The database cluster was initialized without USE_FLOAT4_BYVAL but the server was compiled with USE_FLOAT4_BYVAL.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.7 14709

The database cluster was initialized without USE_FLOAT8_BYVAL but the server was compiled with USE_FLOAT8_BYVAL.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.8 14710

The database cluster was initialized with USE_FLOAT8_BYVAL but the server was compiled without USE_FLOAT8_BYVAL.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.9 14711

The database server will regularly poll the pg_wal subdirectory to check for files placed there.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.10 14712

Execute pg_wal_replay_resume() to continue.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.11 14713

Recovery control functions can only be executed during recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.12 14714

This happens if you temporarily set wal_level=minimal without taking a new base backup.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.13 14715

Either set wal_level to "replica" on the master, or turn off hot_standby here.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.14 14716

This probably means that some data is corrupted and you will have to use the last backup for recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.15 14717

If this has occurred more than once some data might be corrupted and you might need to choose an earlier recovery target.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.16 14718

If you are restoring from a backup, touch "@1@/recovery.signal" and add required recovery options.If you are not restoring from a backup, try removing the file "@2@/backup_label".Be careful: removing "@3@/backup_label" will result in a corrupt cluster if restoring from a backup.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.17 14719

Online backup started with pg_start_backup() must be ended with pg_stop_backup(), and all WAL up to that point must be available at recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.18 14720

WAL control functions cannot be executed during recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.19 14721

wal_level must be set to "replica" or "logical" at server start.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.20 14722

Run pg_stop_backup() and try again.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.21 14723

If you're sure there is no backup in progress, remove file "@1@" and try again.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.22 14724

Check that your archive_command is executing properly. pg_stop_backup can be canceled safely, but the database backup will not be usable without all the WAL segments.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.23 14727

WAL redo at @1@/@2@ for @3@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.24 14731

To avoid a database shutdown, execute a database-wide VACUUM in that database.You might also need to commit or roll back old prepared transactions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.25 14732

Values larger than a buffer page cannot be indexed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.26 14733

Valid values are between "@1@" and "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.27 14734

Valid values are between "@1@" and "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.28 14735

Returned type @1@ does not match expected type @2@ in column @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.29 14736

Number of returned columns (@1@) does not match expected column count (@2@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.30 14737

Attribute "@1@" of type @2@ does not match corresponding attribute of type @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.31 14738

Attribute "@1@" of type @2@ does not exist in type @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.32 14739

To enable inserting into the view, provide an INSTEAD OF INSERT trigger or an unconditional ON INSERT DO INSTEAD rule.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.33 14740

To enable updating the view, provide an INSTEAD OF UPDATE trigger or an unconditional ON UPDATE DO INSTEAD rule.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.34 14741

To enable deleting from the view, provide an INSTEAD OF DELETE trigger or an unconditional ON DELETE DO INSTEAD rule.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.35 14742

SQL function "@1@" statement @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.36 14743

SQL function "@1@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.37 14744

SQL function "@1@" during inlining

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.38 14745

Function's final statement must be SELECT or INSERT/UPDATE/DELETE RETURNING.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.39 14746

Final statement must return exactly one column.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.40 14747

Actual return type is @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.41 14748

Final statement returns too many columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.42 14749

Final statement returns @1@ instead of @2@ at column @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.43 14750

Final statement returns too few columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.44 14751

Input has too many columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.45 14752

Table has type @1@ at ordinal position @2@, but query expects @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.46 14753

Query provides a value for a dropped column at ordinal position @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.47 14754

Input has too few columns.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.48 14755

Check for missing "SPI_finish" calls.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.49 14756

SQL statement "@1@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.50 14757

Table has type @1@, but query expects @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.51 14758

Table row contains @1@ attribute, but query expects @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.52 14759

Physical storage mismatch on dropped attribute at ordinal position @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.53 14760

Returned row contains @1@ attribute, but query expects @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.54 14761

Returned type @1@ at ordinal position @2@, but query expects @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.55 14762

Array with element type @1@ cannot be included in ARRAY construct with element type @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.56 14763

Key @1@ conflicts with key @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.57 14764

Key @1@ conflicts with existing key @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.58 14765

This has been seen to occur with buggy kernels; consider updating your system.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.59 14766

Multiple failures --- write error might be permanent.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.60 14767

writing block @1@ of relation @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.61 14768

Only RowExclusiveLock or less can be acquired on database objects during recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.62 14769

You might need to increase max_locks_per_transaction.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.63 14771

You might need to run fewer transactions at a time or increase max_connections.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.64 14772

There might be an idle transaction or a forgotten prepared transaction causing this.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.65 14773

"default_transaction_isolation" is set to "serializable".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.66 14774

You can use "SET default_transaction_isolation = 'repeatable read'" to change the default.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.67 14775

You might need to increase max_pred_locks_per_transaction.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.68 14776

The transaction might succeed if retried.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.69 14778

User transaction caused buffer deadlock with recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.70 14779

System allows @1@, we need at least @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.71 14782

Check free disk space.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.72 14783

Consider increasing the configuration parameter "max_wal_size".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.73 14784

Consult recent messages in the server log for details.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.74 14785

This may indicate an incomplete PostgreSQL installation, or that the file "@1@" has been moved away from its proper location.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.75 14786

The server must be started by the user that owns the data directory.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.76 14787

Permissions should be u=rwx (0700).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.77 14788

See C include file "ntstatus.h" for a description of the hexadecimal value.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.78 14789

automatic vacuum of table "@1@.@2@.@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.79 14790

automatic analyze of table "@1@.@2@.@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.80 14791

Enable the "track_counts" option.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.81 14792

The failed archive command was: @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.82 14793

Some of the transaction logs were lost that are necessary to recover the database completely.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.83 14794

Fix the problem by referring to the messages prior to this one. Then take a full backup of the database.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.84 14795

line @1@ of configuration file "@2@": "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.85 14796

Words longer than @1@ characters are ignored.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.86 14797

Use "?" to represent a stop word within a sample phrase.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.87 14798

Declare it with SCROLL option to enable backward scan.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.44.88 14799

prepare: @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45 Message Numbers Beginning with 14800

2.45.1 14800

parameters: @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.2 14801

abort reason: recovery conflict

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.3 14802

User was holding shared buffer pin for too long.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.4 14803

User was holding a relation lock for too long.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.5 14804

User was or might have been using tablespace that must be dropped.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.6 14805

User query might have needed to see row versions that must be removed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.7 14806

User was connected to a database that must be dropped.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.8 14808

In a moment you should be able to reconnect to the database and repeat your command.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.9 14809

An invalid floating-point operation was signaled. This probably means an out-of-range result or an invalid operation, such as division by zero.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.10 14810

Increase the configuration parameter "max_stack_depth" (currently @1@kB), after ensuring the platform's stack depth limit is adequate.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.11 14811

Try "@1@ --help" for more information.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.12 14814

Use DROP FUNCTION @1@ first.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.13 14815

Row type defined by OUT parameters is different.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.14 14816

System catalog modifications are currently disallowed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.15 14818

A relation has an associated type of the same name, so you must use a name that doesn't conflict with any existing type.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.16 14819

Table "@1@" references "@2@", but they do not have the same ON COMMIT setting.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.17 14820

Table "@1@" references "@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.18 14821

Truncate table "@1@" at the same time, or use TRUNCATE ... CASCADE.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.19 14822

GRANT and REVOKE are not allowed on untrusted languages, because only superusers can use untrusted languages.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.20 14823

You can drop @1@ instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.21 14824

Use DROP ... CASCADE to drop the dependent objects too.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.22 14827

Labels must be @1@ characters or less.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.23 14828

Valid fork names are "main", "fsm", "vm", and "init".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.24 14830

Continuing to retry for 30 seconds.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.25 14831

You might have antivirus, backup, or similar software interfering with the database system.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.26 14832

while executing PostgreSQL::InServer::SPI::bootstrap

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.27 14833

while parsing Perl initialization

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.28 14834

while running Perl initialization

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.29 14835

while executing PLC_TRUSTED

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.30 14836

while executing utf8fix

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.31 14837

while executing plperl.on_plperl_init

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.32 14838

while executing plperl.on_plperlu_init

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.33 14839

PL/Perl function "@1@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.34 14840

compilation of PL/Perl function "@1@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.35 14841

PL/Perl anonymous code block

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.36 14842

PL/Python function "@1@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.37 14843

PL/Python anonymous code block

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.38 14844

while modifying trigger row

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.39 14845

while creating return value

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.40 14846

Expected None or a string.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.41 14847

Expected None, "OK", "SKIP", or "MODIFY".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.42 14848

PL/Python set-returning functions only support returning one value per call.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.43 14849

PL/Python set-returning functions must return an iterable object.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.44 14852

To return null in a column, add the value None to the mapping with the key named after the column.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.45 14853

To return null in a column, let the returned object have an attribute named after column with value None.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.46 14856

The arguments of the trigger can be accessed through TG_NARGS and TG_ARGV instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.47 14857

compilation of PL/pgSQL function "@1@" near line @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.48 14858

It could refer to either a PL/pgSQL variable or a table column.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.49 14859

PL/pgSQL function @1@ line @2@ @3@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.50 14860

PL/pgSQL function @1@ @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.51 14861

PL/pgSQL function @1@ line @2@ at @3@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.52 14862

PL/pgSQL function @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.53 14863

CASE statement is missing ELSE part.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.54 14864

The tuple structure of a not-yet-assigned record is indeterminate.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.55 14865

@1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.56 14866

Use a BEGIN block with an EXCEPTION clause instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.57 14867

If you want to discard the results of a SELECT, use PERFORM instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.58 14868

You might want to use EXECUTE ... INTO or EXECUTE CREATE TABLE ... AS instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.59 14869

Use RETURN NEXT or RETURN QUERY.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.60 14870

@1@in PL/Tcl function "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.45.61 14871

could not translate host name "@1@" to address: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.62 14873

out of memory

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.45.63 14877

host name must be specified

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.45.64 14881

GSSAPI continuation error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.45.65 14882

duplicate GSS authentication request

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.45.66 14883

GSSAPI name import error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.45.67 14884

SSPI continuation error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.45.68 14885

could not acquire SSPI credentials

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.69 14886

SCM_CRED authentication method not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.70 14887

Kerberos 4 authentication not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.71 14888

Kerberos 5 authentication not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.72 14889

GSSAPI authentication not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.73 14890

SSPI authentication not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.74 14891

Crypt authentication not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.75 14892

authentication method @1@ not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.76 14893

invalid sslmode value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.77 14894

sslmode value "@1@" invalid when SSL support is not compiled in

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.78 14895

could not set socket to TCP no delay mode: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.79 14896

could not connect to server: @1@ Is the server running locally and accepting connections on Unix domain socket "@2@"?

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.80 14897

could not connect to server: @1@ Is the server running on host "@2@" (@3@) and accepting TCP/IP connections on port @4@?

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.45.81 14898

could not connect to server: @1@ Is the server running on host "@2@" and accepting TCP/IP connections on port @3@?

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46 Message Numbers Beginning with 14900

2.46.1 14902

setsockopt(@1@) failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.2 14903

WSAIoctl(SIO_KEEPALIVE_VALS) failed: @1@i

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.3 14904

invalid port number: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.4 14906

could not translate Unix-domain socket path "@1@" to address: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.5 14907

invalid connection state, probably indicative of memory corruption

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.46.6 14908

could not create socket: @1@

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.46.7 14909

could not set socket to nonblocking mode: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.8 14910

could not set socket to close-on-exec mode: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.9 14911

keepalives parameter must be an integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.10 14913

could not get socket error status: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.11 14914

could not get client address from socket: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.12 14915

requirepeer parameter is not supported on this platform

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.13 14916

could not get peer credentials: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.14 14918

requirepeer specifies "@1@", but actual peer user name is "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.15 14919

could not send startup packet: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.16 14921

unexpected message from server during startup

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.17 14922

could not send SSL negotiation packet: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.18 14923

server does not support SSL, but SSL was required

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.19 14924

received invalid response to SSL negotiation: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.20 14925

expected authentication request from server, but received @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.21 14926

out of memory allocating GSSAPI buffer (@1@)

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.46.22 14927

invalid connection state @1@, probably indicative of memory corruption

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.46.23 14928

PGEventProc "@1@" failed during PGEVT_CONNRESET event

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.24 14929

invalid LDAP URL "@1@": scheme must be ldap://

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.25 14930

invalid LDAP URL "@1@": missing distinguished name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.26 14931

invalid LDAP URL "@1@": must have exactly one attribute

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.27 14932

invalid LDAP URL "@1@": must have search scope (base/one/sub)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.28 14933

invalid LDAP URL "@1@": no filter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.29 14934

invalid LDAP URL "@1@": invalid port number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.30 14935

could not create LDAP structure

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.31 14936

lookup on LDAP server failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.32 14937

more than one entry found on LDAP lookup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.33 14938

no entry found on LDAP lookup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.34 14939

attribute has no values on LDAP lookup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.35 14940

missing "=" after "@1@" in connection info string

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.36 14941

invalid connection option "@1@"

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.37 14942

unterminated quoted string in connection info string

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.38 14944

definition of service "@1@" not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.39 14945

service file "@1@" not found

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.40 14946

line @1@ too long in service file "@2@"

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.41 14947

syntax error in service file "@1@", line @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.46.42 14948

connection pointer is NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.43 14951

password retrieved from file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.46.44 14952

command string is a null pointer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.45 14953

statement name is a null pointer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.46 14954

function requires at least protocol version 3.0

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.47 14955

no connection to the server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.48 14956

another command is already in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.49 14957

length must be given for binary parameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.50 14958

unexpected asyncStatus: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.46.51 14959

PGEventProc "@1@" failed during PGEVT_RESULTCREATE event

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.52 14960

COPY terminated by new PQexec

[Description]

Processing was canceled.

[System Processing]

Processing will be aborted.

[Action]

Check the message text.

2.46.53 14961

COPY IN state must be terminated first

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.54 14962

COPY OUT state must be terminated first

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.55 14963

PQexec not allowed during COPY BOTH

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.56 14964

no COPY in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.57 14965

connection in wrong state

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.58 14966

invalid ExecStatusType code

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.59 14967

column number @1@ is out of range 0..@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.60 14968

row number @1@ is out of range 0..@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.61 14969

parameter number @1@ is out of range 0..@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.62 14970

could not interpret result from server: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.63 14971

incomplete multibyte character

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.64 14972

cannot determine OID of function lo_truncate

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.65 14973

cannot determine OID of function lo_create

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.66 14974

could not open file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.67 14975

could not read from file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.68 14976

could not write to file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.69 14977

query to initialize large object functions did not return data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.70 14978

cannot determine OID of function lo_open

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.71 14979

cannot determine OID of function lo_close

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.72 14980

cannot determine OID of function lo_creat

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.73 14981

cannot determine OID of function lo_unlink

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.74 14982

cannot determine OID of function lo_lseek

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.75 14983

cannot determine OID of function lo_tell

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.76 14984

cannot determine OID of function loread

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.77 14985

cannot determine OID of function lowrite

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.78 14986

integer of size @1@ not supported by pqGetInt

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.79 14987

integer of size @1@ not supported by pqPutInt

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.80 14988

connection not open

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.46.81 14989

server closed the connection unexpectedly This probably means the server terminated abnormally before or while processing the request.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.82 14990

timeout expired

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.46.83 14991

invalid socket

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.84 14992

select() failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.46.85 14993

invalid setenv state @1@, probably indicative of memory corruption

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.46.86 14994

invalid state @1@, probably indicative of memory corruption

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.46.87 14995

message type 0x@1@ arrived from server while idle

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.46.88 14996

unexpected character @1@ following empty query response ("I" message)

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.89 14997

server sent data ("D" message) without prior row description ("T" message)

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.90 14998

server sent binary data ("B" message) without prior row description ("T" message)

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.46.91 14999

unexpected response from server; first received character was "@1@"

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.47 Message Numbers Beginning with 15000

2.47.1 15000

out of memory for query result

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.47.2 15001

lost synchronization with server, resetting connection

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.3 15002

protocol error: id=0x@1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.47.4 15003

server sent data ("D" message) without prior row description ("T" message)

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.47.5 15004

message contents do not agree with length in message type "@1@"

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.47.6 15005

lost synchronization with server: got message type "@1@", length @2@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.7 15006

unexpected field count in "D" message

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.47.8 15007

PQgetline: not doing text COPY OUT

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.9 15008

could not establish SSL connection: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.10 15009

SSL SYSCALL error: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.11 15010

SSL SYSCALL error: EOF detected

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.12 15011

SSL error: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.13 15012

SSL connection has been closed unexpectedly

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.14 15013

unrecognized SSL error code: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.15 15014

could not receive data from server: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.16 15015

could not send data to server: @1@

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.47.17 15016

could not get server's host name from server certificate

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.18 15017

SSL certificate's name contains embedded null

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.19 15018

host name must be specified for a verified SSL connection

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.20 15019

server certificate for "@1@" does not match host name "@2@"

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.21 15020

could not create SSL context: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.22 15021

could not open certificate file "@1@": @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.23 15022

could not read certificate file "@1@": @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.24 15023

could not load SSL engine "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.25 15024

could not initialize SSL engine "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.26 15025

could not read private SSL key "@1@" from engine "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.27 15026

could not load private SSL key "@1@" from engine "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.28 15027

certificate present, but not private key file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.29 15028

private key file "@1@" has group or world access; permissions should be u=rw (0600) or less

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.30 15029

could not load private key file "@1@": @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.31 15030

certificate does not match private key file "@1@": @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.32 15031

could not read root certificate file "@1@": @2@

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.33 15033

could not get home directory to locate root certificate fileEither provide the file or change sslmode to disable server certificate verification.

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.34 15034

root certificate file "@1@" does not existEither provide the file or change sslmode to disable server certificate verification.

[Description]

The operating environment such as the status of the connection definition file and the connection method specification is abnormal.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the operating environment such as the status of the connection definition file and the connection method specification is normal.

2.47.35 15035

certificate could not be obtained: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.36 15036

no SSL error reported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.37 15037

SSL error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.38 15038

@1@: vacuuming database "@2@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.47.39 15042

skipped creating .ready file for multiplexed transaction log file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.40 15043

skipped recycling multiplexed transaction log file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.41 15044

skipped removing multiplexed transaction log file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.42 15045

no data found on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.43 15046

out of memory on line @1@

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.47.44 15047

unsupported type "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.45 15048

too many arguments on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.46 15049

too few arguments on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.47 15050

invalid input syntax for type int: "@1@", on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.48 15051

invalid input syntax for type unsigned int: "@1@", on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.49 15052

invalid input syntax for floating-point type: "@1@", on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.50 15053

invalid syntax for type boolean: "@1@", on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.51 15054

could not convert boolean value: size mismatch, on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.52 15055

empty query on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.53 15056

null value without indicator on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.54 15057

variable does not have an array type on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.55 15058

data read from server is not an array on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.56 15059

inserting an array of variables is not supported on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.57 15060

connection "@1@" does not exist on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.58 15061

not connected to connection "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.59 15062

invalid statement name "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.60 15063

descriptor "@1@" not found on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.61 15064

descriptor index out of range on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.62 15065

unrecognized descriptor item "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.63 15066

variable does not have a numeric type on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.64 15067

variable does not have a character type on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.65 15068

error in transaction processing on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.66 15069

could not connect to database "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.67 15070

SQL error @1@ on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.68 15071

the connection to the server was lost

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.69 15072

empty message text

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.70 15074

SP-GiST inner tuple size @1@ exceeds maximum @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.71 15075

backup_label contains data inconsistent with control file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.72 15076

WAL generated with full_page_writes=off was replayed since last restartpoint

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.73 15077

the standby was promoted during online backup

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.74 15078

WAL generated with full_page_writes=off was replayed during online backup

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.75 15080

cannot set privileges of array types

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.76 15081

drop cascades to @1@ other object
drop cascades to @2@ other objects

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.47.77 15082

constraint "@1@" conflicts with non-inherited constraint on relation "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.78 15083

DROP INDEX CONCURRENTLY must be first action in transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.79 15085

domain @1@ has multiple constraints named "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.80 15086

functions cannot have more than @1@ argument
functions cannot have more than @2@ arguments

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.81 15087

skipping "@1@" --- cannot analyze this foreign table

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.82 15088

could not convert row type

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.47.83 15089

unexpected EOF on client connection with an open transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.84 15090

EXPLAIN option TIMING requires ANALYZE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.85 15091

only superuser can define a leakproof function

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.86 15092

cast will be ignored because the source data type is a domain

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.87 15093

cast will be ignored because the target data type is a domain

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.88 15094

btree sort support procedures must accept type "internal"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.89 15095

btree sort support procedures must return void

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.90 15096

Use DROP TABLE to remove a table.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.91 15097

Use DROP SEQUENCE to remove a sequence.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.92 15098

Use DROP VIEW to remove a view.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.47.93 15099

Use DROP INDEX to remove an index.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48 Message Numbers Beginning with 15100

2.48.1 15100

Use DROP TYPE to remove a type.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.2 15101

Use DROP FOREIGN TABLE to remove a foreign table.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.3 15102

DROP INDEX CONCURRENTLY does not support dropping multiple objects

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.4 15103

DROP INDEX CONCURRENTLY does not support CASCADE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.5 15104

cannot inherit from temporary relation of another session

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.6 15105

constraints on temporary tables must involve temporary tables of this session

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.7 15106

constraint must be validated on child tables too

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.8 15107

cannot inherit to temporary relation of another session

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.9 15108

constraint "@1@" conflicts with non-inherited constraint on child table "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.10 15112

@1@ constraints cannot be marked NO INHERIT

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.11 15113

type attribute "subtype" is required

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.12 15114

range collation specified but subtype does not support collation

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.13 15115

range canonical function @1@ must be immutable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.14 15116

range subtype diff function @1@ must return type @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.15 15117

range subtype diff function @1@ must be immutable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.16 15118

constraint "@1@" of domain "@2@" does not exist, skipping

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.17 15119

"@1@": suspending truncate due to conflicting lock request

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.18 15120

cannot set transaction read-write mode inside a read-only transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.19 15121

transaction read-write mode must be set before any query

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.20 15122

cannot set transaction read-write mode during recovery

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.21 15123

SET TRANSACTION ISOLATION LEVEL must be called before any query

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.22 15124

SET TRANSACTION ISOLATION LEVEL must not be called in a subtransaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.23 15125

SET TRANSACTION [NOT] DEFERRABLE cannot be called within a subtransaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.24 15126

SET TRANSACTION [NOT] DEFERRABLE must be called before any query

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.25 15127

cannot delete from view "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.26 15128

GLOBAL is deprecated in temporary table creation

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.27 15129

duplicate trigger events specified

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.48.28 15130

unrecognized configuration parameter "@1@" in file "@2@" line @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.29 15131

configuration file "@1@" contains errors

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.30 15132

configuration file "@1@" contains errors; unaffected changes were applied

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.31 15133

configuration file "@1@" contains errors; no changes were applied

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.32 15134

too many syntax errors found, abandoning file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.33 15135

accepting GSS security context failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.34 15136

retrieving GSS user name failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.35 15137

could not acquire SSPI credentials

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.36 15138

could not accept SSPI security context

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.37 15139

could not get token from SSPI security context

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.38 15140

multiple values in ident field

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.39 15141

multiple values specified for connection type

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.40 15142

multiple values specified for host address

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.41 15143

multiple values specified for netmask

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.42 15144

multiple values specified for authentication type

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.43 15145

ident, peer, gssapi, sspi, and cert

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.44 15146

gssapi and sspi

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.48.45 15147

configuration file "@1@" contains no entries

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.46 15148

Unix-domain socket path "@1@" is too long (maximum @2@ bytes)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.47 15149

@1@: WSAStartup failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.48 15150

@1@: real and effective user IDs must match

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.49 15151

could not look up effective user ID @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.50 15153

too many range table entries

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.51 15154

SELECT ... INTO is not allowed here

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.52 15155

arguments declared "anyrange" are not all alike

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.53 15156

argument declared @1@ is not consistent with argument declared @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.54 15157

could not load dbghelp.dll, cannot write crash dump

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.55 15158

could not load required functions in dbghelp.dll, cannot write crash dump

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.56 15159

could not open crash dump file "@1@" for writing: error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.57 15160

could not write crash dump to file "@1@": error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.58 15161

could not check access token membership: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.59 15162

could not get SID for Administrators group: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.60 15163

could not get SID for PowerUsers group: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.61 15164

could not create signal listener pipe: error code @1@; retrying

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.62 15166

@1@: superuser_reserved_connections must be less than max_connections

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.63 15167

@1@: max_wal_senders must be less than max_connections

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.64 15168

@1@: invalid datetoken tables, please fix

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.65 15169

@1@: could not change permissions of external PID file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.66 15170

@1@: could not write external PID file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.67 15171

could not fork new process for connection:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.68 15172

could not read exit code for process

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.69 15173

could not post child completion status

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.70 15174

could not write to log file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.71 15175

invalid streaming start location

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.72 15176

unterminated quoted string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.73 15177

unexpected WAL file size "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.74 15178

unterminated bit string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.75 15179

unterminated hexadecimal string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.76 15180

invalid Unicode surrogate pair

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.77 15181

unterminated dollar-quoted string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.78 15182

zero-length delimited identifier

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.79 15183

unterminated quoted identifier

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.80 15184

Unicode escape values cannot be used for code point values above 007F when the server encoding is not UTF8

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.81 15185

invalid Unicode escape value

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.82 15186

invalid Unicode escape character

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.83 15187

temporary file size exceeds temp_file_limit (@1@kB)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.84 15188

a snapshot-importing transaction must not be READ ONLY DEFERRABLE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.85 15189

could not import the requested snapshot

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.86 15190

connection to client lost

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.48.87 15191

invalid command-line argument for server process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.88 15194

range constructor flags argument must not be null

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.89 15195

result of range difference would not be contiguous

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.90 15196

result of range union would not be contiguous

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.91 15197

range lower bound must be less than or equal to range upper bound

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.92 15198

invalid range bound flags

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.48.93 15199

could not set up XML error handler

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49 Message Numbers Beginning with 15200

2.49.1 15200

keystore_location is not supported by this build

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.2 15201

keystore location is not configured

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.3 15202

could not encrypt or decrypt data because the keystore is not open

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.4 15203

keystore is already open

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.5 15204

passphrase is too short or too long

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.6 15205

passphrase-based key derivation failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.7 15206

a new master encryption key has been set

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.8 15207

passphrase of the keystore has been changed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.9 15208

encryption or decryption of data in tablespace @1@ failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.10 15209

encryption or decryption of data failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.11 15210

could not open keystore "@1@": necessary master encryption key does not exist in the keystore

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.12 15211

decryption of the auto-open keystore "@1@" failed: error code = @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.13 15212

encryption of the auto-open keystore "@1@" failed: error code = @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.14 15213

keystore "@1@" is corrupted: size = @2@ bytes, expected size = @3@ bytes

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.15 15214

could not open keystore "@1@": passphrase is wrong, or the auto-open keystore was created by another computer or user

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.16 15215

keystore "@1@" is corrupted: invalid CRC

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.17 15216

encryption or decryption of the keystore "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.18 15217

character with byte sequence @1@ in encoding "@2@" has no equivalent in encoding "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.19 15218

Enables the planner's use of sequential-scan plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.20 15219

Enables the planner's use of index-scan plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.21 15220

Enables the planner's use of index-only-scan plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.22 15221

Enables the planner's use of bitmap-scan plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.23 15222

Enables the planner's use of TID scan plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.24 15223

Enables the planner's use of explicit sort steps.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.25 15224

Enables the planner's use of hashed aggregation plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.26 15225

Enables the planner's use of materialization.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.27 15226

Enables the planner's use of nested-loop join plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.28 15227

Enables the planner's use of merge join plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.29 15228

Enables the planner's use of hash join plans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.30 15229

Enables genetic query optimization.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.31 15230

Shows whether the current user is a superuser.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.32 15231

Enables advertising the server via Bonjour.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.33 15232

Enables SSL connections.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.34 15233

Forces synchronization of updates to disk.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.35 15235

Writes full pages to WAL when first modified after a checkpoint.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.36 15236

Logs each checkpoint.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.37 15237

Logs each successful connection.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.38 15238

Logs end of a session, including duration.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.39 15239

Shows whether the running server has assertion checks enabled.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.40 15240

Terminate session on any error.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.41 15241

Restarts all server processes on WAL multiplexing errors.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.42 15242

Enables fast WAL multiplexing.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.43 15243

Enables encryption of temporary files used in large quries.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.44 15244

Reinitialize server after backend crash.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.45 15245

Logs the duration of each completed SQL statement.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.46 15246

Logs each query's parse tree.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.47 15247

Logs each query's rewritten parse tree.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.48 15248

Logs each query's execution plan.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.49 15249

Indents parse and plan tree displays.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.50 15250

Writes parser performance statistics to the server log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.51 15251

Writes planner performance statistics to the server log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.52 15252

Writes executor performance statistics to the server log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.53 15253

Writes cumulative performance statistics to the server log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.54 15255

Collects information about executing commands.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.55 15256

Collects statistics on database activity.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.56 15257

Collects timing statistics for database I/O activity.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.57 15258

Updates the process title to show the active SQL command.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.58 15259

Starts the autovacuum subprocess.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.59 15260

Generates debugging output for LISTEN and NOTIFY.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.60 15261

Logs long lock waits.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.61 15262

Logs the host name in the connection logs.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.62 15264

Chooses the algorithm for encrypting passwords.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.63 15265

Treats "expr=NULL" as "expr IS NULL".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.64 15266

Enables per-database user names.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.65 15268

Sets the default read-only status of new transactions.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.66 15269

Sets the current transaction's read-only status.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.67 15270

Sets the default deferrable status of new transactions.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.68 15271

Whether to defer a read-only serializable transaction until it can be executed with no possible serialization failures.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.69 15272

Check function bodies during CREATE FUNCTION.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.70 15273

Enable input of NULL elements in arrays.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.71 15275

Start a subprocess to capture stderr output and/or csvlogs into log files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.72 15276

Truncate existing log files of same name during log rotation.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.73 15277

Emit information about resource usage in sorting.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.74 15278

Generate debugging output for synchronized scanning.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.75 15279

Enable bounded sorting using heap sort.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.76 15280

Emit WAL-related debugging output.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.77 15281

Datetimes are integer based.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.78 15282

Sets whether Kerberos and GSSAPI user names should be treated as case-insensitive.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.79 15283

Warn about backslash escapes in ordinary string literals.

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.49.80 15284

Causes '...' strings to treat backslashes literally.

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.49.81 15285

Enable synchronized sequential scans.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.82 15286

Allows archiving of WAL files using archive_command.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.83 15287

Allows connections and queries during recovery.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.84 15288

Allows feedback from a hot standby to the primary that will avoid query conflicts.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.85 15289

Allows modifications of the structure of system tables.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.86 15290

Disables reading from system indexes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.87 15291

Enables backward compatibility mode for privilege checks on large objects.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.88 15292

When generating SQL fragments, quote all identifiers.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.89 15293

Forces a switch to the next WAL file if a new file has not been started within N seconds.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.49.90 15294

Waits N seconds on connection startup after authentication.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.91 15295

Sets the default statistics target.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.92 15296

Sets the FROM-list size beyond which subqueries are not collapsed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.93 15297

Sets the FROM-list size beyond which JOIN constructs are not flattened.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.94 15298

Sets the threshold of FROM items beyond which GEQO is used.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.49.95 15299

GEQO: effort is used to set the default for other GEQO parameters.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50 Message Numbers Beginning with 15300

2.50.1 15300

GEQO: number of individuals in the population.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.2 15301

GEQO: number of iterations of the algorithm.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.3 15302

Sets the time to wait on a lock before checking for deadlock.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.4 15303

Sets the maximum delay before canceling queries when a hot standby server is processing archived WAL data.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.5 15304

Sets the maximum delay before canceling queries when a hot standby server is processing streamed WAL data.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.6 15305

Sets the maximum interval between WAL receiver status reports to the sending server

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.7 15306

Sets the maximum number of concurrent connections.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.8 15307

Sets the number of connection slots reserved for superusers.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.9 15308

Sets the number of shared memory buffers used by the server.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.10 15309

Sets the maximum number of temporary buffers used by each session.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.11 15310

Sets the TCP port the server listens on.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.12 15311

Sets the access permissions of the Unix-domain socket.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.13 15312

Sets the file permissions for log files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.14 15313

Sets the maximum memory to be used for query workspaces.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.15 15314

Sets the maximum memory to be used for maintenance operations.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.16 15315

Sets the maximum stack depth, in kilobytes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.17 15316

Limits the total size of all temporary files used by each process.

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.50.18 15317

Vacuum cost for a page found in the buffer cache.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.19 15318

Vacuum cost for a page not found in the buffer cache.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.20 15319

Vacuum cost for a page dirtied by vacuum.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.21 15320

Vacuum cost amount available before napping.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.22 15321

Vacuum cost delay in milliseconds.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.23 15322

Vacuum cost delay in milliseconds, for autovacuum.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.24 15323

Vacuum cost amount available before napping, for autovacuum.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.25 15324

Sets the maximum number of simultaneously open files for each server process.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.26 15325

Sets the maximum number of simultaneously prepared transactions.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.27 15326

Sets the maximum allowed duration of any statement.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.28 15327

Minimum age at which VACUUM should freeze a table row.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.29 15328

Age at which VACUUM should scan whole table to freeze tuples.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.30 15329

Number of transactions by which VACUUM and HOT cleanup should be deferred, if any.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.31 15330

Sets the maximum number of locks per transaction.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.32 15331

Sets the maximum number of predicate locks per transaction.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.33 15332

Sets the maximum allowed time to complete client authentication.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.34 15333

Waits N seconds on connection startup before authentication.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.35 15334

Sets the size of WAL files held for standby servers.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.36 15336

Sets the maximum time between automatic WAL checkpoints.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.37 15337

Enables warnings if checkpoint segments are filled more frequently than this.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.38 15338

Sets the number of disk-page buffers in shared memory for WAL.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.39 15339

Time between WAL flushes performed in the WAL writer.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.40 15340

Sets the maximum number of simultaneously running WAL sender processes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.41 15341

Sets the maximum time to wait for WAL replication.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.42 15342

Sets the delay in microseconds between transaction commit and flushing WAL to disk.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.43 15343

Sets the minimum concurrent open transactions before performing commit_delay.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.44 15344

Sets the number of digits displayed for floating-point values.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.45 15345

Sets the minimum execution time above which all statements will be logged.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.46 15346

Sets the minimum execution time above which autovacuum actions will be logged.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.47 15347

Background writer sleep time between rounds.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.48 15348

Background writer maximum number of LRU pages to flush per round.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.49 15349

Number of simultaneous requests that can be handled efficiently by the disk subsystem.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.50 15350

Automatic log file rotation will occur after N minutes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.51 15351

Automatic log file rotation will occur after N kilobytes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.52 15352

Shows the maximum number of function arguments.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.53 15353

Shows the maximum number of index keys.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.54 15354

Shows the maximum identifier length.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.55 15355

Shows the size of a disk block.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.56 15356

Shows the number of pages per disk file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.57 15357

Shows the block size in the write ahead log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.58 15358

Shows the number of pages per write ahead log segment.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.59 15359

Time to sleep between autovacuum runs.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.60 15360

Minimum number of tuple updates or deletes prior to vacuum.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.61 15361

Minimum number of tuple inserts, updates, or deletes prior to analyze.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.62 15362

Age at which to autovacuum a table to prevent transaction ID wraparound.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.63 15363

Sets the maximum number of simultaneously running autovacuum worker processes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.64 15364

Time between issuing TCP keepalives.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.65 15365

Time between TCP keepalive retransmits.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.66 15366

SSL renegotiation is no longer supported; this can only be 0.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.67 15367

Maximum number of TCP keepalive retransmits.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.68 15368

Sets the maximum allowed result for exact search by GIN.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.69 15369

Sets the planner's assumption about the size of the disk cache.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.70 15370

Shows the server version as an integer.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.71 15371

Log the use of temporary files larger than this number of kilobytes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.72 15372

Sets the size reserved for pg_stat_activity.query, in bytes.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.73 15373

Sets the planner's estimate of the cost of a sequentially fetched disk page.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.74 15374

Sets the planner's estimate of the cost of a nonsequentially fetched disk page.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.75 15375

Sets the planner's estimate of the cost of processing each tuple (row).

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.76 15376

Sets the planner's estimate of the cost of processing each index entry during an index scan.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.77 15377

Sets the planner's estimate of the cost of processing each operator or function call.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.78 15378

Sets the planner's estimate of the fraction of a cursor's rows that will be retrieved.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.79 15379

GEQO: selective pressure within the population.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.80 15380

GEQO: seed for random path selection.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.81 15381

Multiple of the average buffer usage to free per round.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.82 15382

Sets the seed for random-number generation.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.83 15383

Number of tuple updates or deletes prior to vacuum as a fraction of reltuples.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.84 15384

Number of tuple inserts, updates, or deletes prior to analyze as a fraction of reltuples.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.85 15385

Time spent flushing dirty buffers during checkpoint, as fraction of checkpoint interval.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.86 15386

Sets the shell command that will be called to archive a WAL file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.87 15387

Sets the client's character set encoding.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.88 15388

Controls information prefixed to each log line.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.89 15389

Sets the time zone to use in log messages.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.90 15390

Sets the display format for date and time values.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.91 15391

Sets the default tablespace to create tables and indexes in.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.92 15392

Sets the tablespace(s) to use for temporary tables and sort files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.93 15393

Sets the path for dynamically loadable modules.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.94 15394

Sets the location of the Kerberos server key file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.95 15396

Sets the Bonjour service name.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.96 15397

Shows the collation order locale.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.97 15398

Shows the character classification and case conversion locale.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.50.98 15399

Sets the language in which messages are displayed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51 Message Numbers Beginning with 15400

2.51.1 15400

Sets the locale for formatting monetary amounts.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.2 15401

Sets the locale for formatting numbers.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.3 15402

Sets the locale for formatting date and time values.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.4 15403

Lists shared libraries to preload into server.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.5 15404

Lists shared libraries to preload into each backend.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.6 15405

Sets the schema search order for names that are not schema-qualified.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.7 15406

Sets the server (database) character set encoding.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.8 15407

Shows the server version.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.9 15408

Sets the current role.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.10 15409

Sets the session user name.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.11 15410

Sets the destination for server log output.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.12 15411

Sets the destination directory for log files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.13 15412

Sets the file name pattern for log files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.14 15413

Sets the program name used to identify PostgreSQL messages in syslog.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.15 15414

Sets the application name used to identify PostgreSQL messages in the event log.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.16 15415

Sets the time zone for displaying and interpreting time stamps.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.17 15416

Selects a file of time zone abbreviations.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.18 15417

Sets the current transaction's isolation level.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.19 15418

Sets the owning group of the Unix-domain socket.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.20 15419

Sets the directories where Unix-domain sockets will be created.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.21 15420

Sets the host name or IP address(es) to listen to.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.22 15421

Sets the server's data directory.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.23 15422

Sets the server's backup directory.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.24 15423

Sets the directory where multiplexed transaction log files are stored.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.25 15424

Sets the directory where server's core files are dumped.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.26 15425

Sets the location where the keystore is stored

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.27 15426

Sets the server's main configuration file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.28 15427

Sets the server's "hba" configuration file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.29 15428

Sets the server's "ident" configuration file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.30 15429

Writes the postmaster PID to the specified file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.31 15430

Location of the SSL server certificate file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.32 15431

Location of the SSL server private key file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.33 15432

Location of the SSL certificate authority file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.34 15433

Location of the SSL certificate revocation list file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.35 15434

Writes temporary statistics files to the specified directory.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.36 15435

Number of synchronous standbys and list of names of potential synchronous ones.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.37 15436

Sets default text search configuration.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.38 15437

Sets the list of allowed SSL ciphers.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.39 15438

Sets the application name to be reported in statistics and logs.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.40 15439

Sets whether "\\'" is allowed in string literals.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.41 15440

Sets the output format for bytea.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.42 15441

Sets the message levels that are sent to the client.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.43 15442

Enables the planner to use constraints to optimize queries.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.44 15443

Sets the transaction isolation level of each new transaction.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.45 15444

Sets the display format for interval values.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.46 15445

Sets the verbosity of logged messages.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.47 15446

Sets the message levels that are logged.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.48 15447

Causes all statements generating error at or above this level to be logged.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.49 15448

Sets the type of statements logged.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.50 15449

Sets the syslog "facility" to be used when syslog enabled.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.51 15450

Sets the session's behavior for triggers and rewrite rules.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.52 15451

Sets the current transaction's synchronization level.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.53 15452

Enables logging of recovery-related debugging information.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.54 15453

Collects function-level statistics on database activity.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.55 15454

Set the level of information written to the WAL.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.56 15455

Selects the method used for forcing WAL updates to disk.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.57 15456

Sets how binary values are to be encoded in XML.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.58 15457

Sets whether XML data in implicit parsing and serialization operations is to be considered as documents or content fragments.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.59 15458

Sets what to dump in core files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.60 15459

Selects the algorithm for encrypting tablespaces.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.51.61 15460

@1@: could not access the server configuration file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.62 15461

SET LOCAL TRANSACTION SNAPSHOT is not implemented

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.63 15464

Bonjour is not supported by this build

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.64 15465

SSL is not supported by this build

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.65 15466

internal error: unrecognized run-time parameter type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.66 15467

time zone abbreviation "@1@" is too long (maximum @2@ characters) in time zone file "@3@", line @4@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.67 15468

invalid number for time zone offset in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.68 15469

time zone offset @1@ is out of range in time zone file "@2@", line @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.69 15470

missing time zone abbreviation in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.70 15471

missing time zone offset in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.71 15473

invalid syntax in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.72 15474

time zone abbreviation "@1@" is multiply defined

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.73 15475

invalid time zone file name "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.74 15476

time zone file recursion limit exceeded in file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.75 15477

line is too long in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.76 15478

@INCLUDE without file name in time zone file "@1@", line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.77 15479

cannot export a snapshot from a subtransaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.78 15480

invalid snapshot data in file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.79 15481

@1@ must be called before any query

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.80 15482

a snapshot-importing transaction must have isolation level SERIALIZABLE or REPEATABLE READ

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.81 15483

invalid snapshot identifier: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.82 15484

a serializable transaction cannot import a snapshot from a non-serializable transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.83 15485

a non-read-only serializable transaction cannot import a snapshot from a read-only transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.84 15486

cannot import a snapshot from a different database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.85 15487

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.51.86 15488

could not open file "@1@" for reading: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.87 15489

could not open file "@1@" for writing: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.88 15490

could not write file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.89 15491

could not execute command "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.90 15492

removing data directory "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.91 15493

failed to remove data directory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.92 15494

removing contents of data directory "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.51.93 15495

failed to remove contents of data directory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52 Message Numbers Beginning with 15500

2.52.1 15500

data directory "@1@" not removed at user's request

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.2 15503

user name lookup failure: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.3 15504

"@1@" is not a valid server encoding name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.4 15505

could not create directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.5 15506

file "@1@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.6 15507

could not access file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.7 15508

file "@1@" is not a regular file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.8 15509

Passwords didn't match.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.9 15510

could not read password from file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.10 15515

could not write to child process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.11 15516

ok

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.52.12 15517

failed to restore old locale "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.13 15518

invalid locale name "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.14 15519

encoding mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.15 15525

@1@ initializes a PostgreSQL database cluster.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.16 15527

invalid authentication method "@1@" for "@2@" connections

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.17 15528

must specify a password for the superuser to enable @1@ authentication

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.18 15529

too many command-line arguments (first is "@1@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.19 15530

password prompt and password file cannot be specified together

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.20 15533

The program "postgres" is needed by @1@ but was not found in thesame directory as "@2@".Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.21 15534

The program "postgres" was found by "@1@"but was not the same version as @2@.Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.22 15535

input file location must be an absolute path

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.23 15536

could not find suitable encoding for locale "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.24 15537

locale "@1@" requires unsupported encoding "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.25 15538

could not find suitable text search configuration for locale "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.26 15539

suitable text search configuration for locale "@1@" is unknown

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.52.27 15540

specified text search configuration "@1@" might not match locale "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.52.28 15541

The default text search configuration will be set to "@1@".

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.52.29 15542

directory "@1@" exists but is not empty

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.30 15543

could not access directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.31 15544

WAL directory location must be an absolute path

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.32 15545

could not create symbolic link "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.33 15546

symlinks are not supported on this platform

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.34 15547

could not read from ready pipe: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.35 15548

could not parse write-ahead log location "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.36 15549

could not create pipe for background process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.37 15550

could not create background process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.38 15551

could not create background thread: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.39 15552

could not create directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.40 15553

directory "@1@" exists but is not empty

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.41 15554

could not access directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.42 15555

@1@s/@2@ kB (100@3@), @4@/@5@ tablespace @6@s

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.52.43 15556

@1@s/@2@ kB (@3@@4@), @5@/@6@ tablespace (@7@%-*.*s)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.52.44 15560

@1@s/@2@ kB (@3@@4@), @5@/@6@ tablespace

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.52.45 15561

could not set compression level @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.46 15562

could not create compressed file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.47 15563

could not create file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.48 15564

could not get COPY data stream: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.49 15565

could not write to compressed file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.50 15566

could not write to file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.51 15567

could not close compressed file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.52 15568

could not close file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.53 15569

could not read COPY data: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.54 15570

invalid tar block header size: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.55 15573

could not set permissions on directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.56 15574

could not create symbolic link from "@1@" to "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.57 15575

unrecognized link indicator "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.58 15576

could not set permissions on file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.59 15577

COPY stream ended before last file was finished

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.60 15578

could not send replication command "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.61 15579

could not identify system: got @1@ rows and @2@ fields, expected @3@ rows and @4@ or more fields

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.62 15580

could not initiate base backup: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.63 15581

no data returned from server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.64 15582

could not get backup header: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.65 15584

can only write single tablespace to stdout, database has @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.66 15585

starting background WAL receiver

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.67 15586

could not get write-ahead log end position from server: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.68 15587

no write-ahead log end position returned from server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.69 15588

final receive failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.70 15589

could not send command to background pipe: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.71 15590

could not wait for child process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.72 15591

child @1@ died, expected @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.73 15594

could not wait for child thread: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.74 15595

could not get child thread exit status: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.75 15596

child thread exited with error @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.76 15597

invalid output format "@1@", must be "plain" or "tar"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.52.77 15599

invalid compression level "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53 Message Numbers Beginning with 15600

2.53.1 15600

invalid checkpoint argument "@1@", must be "fast" or "spread"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.2 15601

invalid status interval "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.3 15602

too many command-line arguments (first is "@1@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.4 15603

no target directory specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.5 15604

only tar mode backups can be compressed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.6 15606

this build does not support compression

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.7 15607

finished segment at @1@/@2@ (timeline @3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.8 15608

received interrupt signal, exiting

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.9 15609

could not open directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.10 15611

could not stat file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.11 15612

segment file "@1@" has incorrect size @2@, skipping

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.12 15613

starting log streaming at @1@/@2@ (timeline @3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.13 15614

invalid port number "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.14 15615

disconnected

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.15 15616

disconnected; waiting @1@ seconds to try again

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.16 15617

could not open existing write-ahead log file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.17 15619

write-ahead log file "@1@" has @2@ byte, should be 0 or @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.18 15622

could not determine seek position in file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.19 15623

could not fsync file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.20 15625

not renaming "@1@@2@", segment is not complete

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.21 15626

system identifier does not match between base backup and streaming connection

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.22 15628

could not send feedback packet: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.23 15629

select() failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.24 15630

could not receive data from WAL stream: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.25 15632

unrecognized streaming header: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.26 15633

streaming header too small: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.27 15634

received write-ahead log record for offset @1@ with no file open

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.28 15635

got WAL data offset @1@, expected @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.29 15636

could not write @1@ bytes to WAL file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.30 15637

unexpected termination of replication stream: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.31 15638

replication stream was terminated before stop point

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.32 15640

could not connect to server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.33 15642

could not determine server setting for integer_datetimes

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.34 15643

integer_datetimes compile flag does not match server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.35 15645

@1@: could not find own program executable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.36 15646

@1@: invalid argument: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.37 15647

no data directory specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.38 15648

could not open file "@1@" for reading: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.39 15649

could not read file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.40 15652

child process exited with unrecognized status @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.41 15653

@1@: could not open PID file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.42 15654

@1@: invalid data in PID file "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.43 15658

@1@: cannot set core file size limit; disallowed by hard limit

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.44 15659

@1@: could not read file "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.45 15660

@1@: option file "@2@" must have exactly one line

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.46 15661

The program "@1@" is needed by @2@ but was not found in thesame directory as "@3@".Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.47 15662

The program "@1@" was found by "@2@"but was not the same version as @3@.Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.48 15663

@1@: database system initialization failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.49 15664

@1@: another server might be running; trying to start server anyway

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.50 15666

@1@: could not start serverExamine the log output.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.51 15668

@1@: PID file "@2@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.52 15669

Is server running?

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.53 15670

@1@: cannot stop server; single-user server is running (PID: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.54 15671

@1@: could not send stop signal (PID: @2@): @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.55 15673

@1@: server does not shut down

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.56 15674

@1@: cannot restart server; single-user server is running (PID: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.57 15675

@1@: old server process (PID: @2@) seems to be gone

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.58 15676

@1@: cannot reload server; single-user server is running (PID: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.59 15677

@1@: could not send reload signal (PID: @2@): @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.60 15678

@1@: cannot promote server; single-user server is running (PID: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.61 15679

@1@: cannot promote server; server is not in standby mode

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.62 15680

@1@: could not create promote signal file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.63 15681

@1@: could not write promote signal file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.64 15682

@1@: could not send promote signal (PID: @2@): @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.65 15683

@1@: could not send signal @2@ (PID: @3@): @4@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.66 15684

@1@: could not find own program executable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.67 15685

@1@: could not find postgres program executable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.68 15686

@1@: could not open service manager

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.69 15687

@1@: service "@2@" already registered

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.70 15688

@1@: could not register service "@2@": error code @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.71 15689

@1@: service "@2@" not registered

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.72 15690

@1@: could not open service "@2@": error code @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.73 15691

@1@: could not unregister service "@2@": error code @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.74 15692

Timed out waiting for server startup

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.75 15693

@1@: could not start service "@2@": error code @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.76 15695

@1@: could not open process token: error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.77 15696

@1@: could not allocate SIDs: error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.78 15697

@1@: could not create restricted token: error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.53.79 15699

@1@: unrecognized shutdown mode "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54 Message Numbers Beginning with 15700

2.54.1 15700

@1@: unrecognized signal name "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.2 15701

@1@: unrecognized start type "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.3 15702

@1@: could not determine the data directory using command "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.4 15703

@1@: -S option not supported on this platform

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.5 15704

@1@: too many command-line arguments (first is "@2@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.6 15705

@1@: missing arguments for kill mode

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.7 15706

@1@: unrecognized operation mode "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.8 15707

@1@: no operation specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.9 15708

child process exited with unrecognized status @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.10 15709

failed sanity check, parent OID @1@ of table "@2@" (OID @3@) not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.11 15710

could not parse numeric array "@1@": too many numbers

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.12 15711

could not parse numeric array "@1@": invalid character in number

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.13 15712

invalid compression code: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.14 15713

not built with zlib support

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.15 15714

could not initialize compression library: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.16 15715

could not close compression stream: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.17 15716

could not compress data: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.18 15718

could not uncompress data: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.19 15719

could not close compression library: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.20 15720

cannot duplicate null pointer (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.21 15721

@1@: unrecognized section name: "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.22 15722

out of on_exit_nicely slots

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.23 15723

could not close output file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.24 15725

unexpected section code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.25 15726

parallel restore is not supported with this archive file format

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.26 15727

parallel restore is not supported with archives made by pre-8.0 pg_dump

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.27 15728

cannot restore from compressed archive (compression not supported in this installation)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.28 15729

connecting to database for restore

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.54.29 15730

direct database connections are not supported in pre-1.3 archives

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.30 15731

warning from original dump file: @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.54.31 15732

internal error -- WriteData cannot be called outside the context of a DataDumper routine

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.32 15733

large-object output not supported in chosen format

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.33 15734

restored @1@ large object

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.34 15736

could not create large object @1@: @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.54.35 15737

could not open large object @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.36 15738

could not open TOC file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.37 15740

could not find entry for ID @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.38 15741

could not close TOC file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.39 15742

could not open output file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.40 15743

could not open output file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.41 15744

wrote @1@ byte of large object data (result = @2@)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.54.42 15746

could not write to large object (result: @1@, expected: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.43 15748

while INITIALIZING:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.44 15749

while PROCESSING TOC:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.45 15750

while FINALIZING:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.46 15751

from TOC entry @1@; @2@ @3@ @4@ @5@ @6@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.47 15752

bad dumpId

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.48 15753

bad table dumpId for TABLE DATA item

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.49 15754

unexpected data offset flag @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.50 15755

file offset in dump file is too large

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.51 15757

directory name too long: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.52 15758

directory "@1@" does not appear to be a valid archive ("toc.dat" does not exist)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.53 15759

could not open input file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.54 15760

could not open input file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.55 15761

could not read input file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.56 15762

input file is too short (read @1@, expected 5)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.57 15763

input file appears to be a text format dump. Please use psql.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.58 15764

input file does not appear to be a valid archive (too short?)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.59 15765

input file does not appear to be a valid archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.60 15766

could not close input file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.61 15767

unrecognized file format "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.62 15768

entry ID @1@ out of range -- perhaps a corrupt TOC

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.63 15770

unrecognized encoding "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.64 15771

invalid ENCODING item: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.65 15772

invalid STDSTRINGS item: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.66 15773

could not set session user to "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.67 15775

could not set search_path to "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.68 15776

could not set default_tablespace to @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.69 15779

did not find magic string in file header

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.70 15780

unsupported version (@1@.@2@) in file header

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.71 15781

sanity check on integer size (@1@) failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.72 15783

expected format (@1@) differs from format found in file (@2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.73 15786

a worker process died unexpectedly

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.74 15787

processing missed item @1@ @2@ @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.75 15789

could not create worker process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.76 15793

worker process failed: exit code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.77 15795

table "@1@" could not be created, will not restore its data

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.78 15796

invalid OID for large object

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.79 15797

unrecognized data block type (@1@) while searching archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.54.80 15798

error during file seek: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55 Message Numbers Beginning with 15800

2.55.1 15800

could not find block ID @1@ in archive -- possibly due to out-of-order restore request, which cannot be handled due to non-seekable input file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.2 15801

could not find block ID @1@ in archive -- possibly corrupt archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.3 15802

found unexpected block ID (@1@) when reading data -- expected @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.4 15803

unrecognized data block type @1@ while restoring archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.5 15804

could not read from input file: end of file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.6 15805

could not read from input file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.7 15807

could not close archive file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.8 15808

can only reopen input archives

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.9 15809

parallel restore from standard input is not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.10 15810

parallel restore from non-seekable file is not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.11 15811

could not determine seek position in archive file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.12 15812

could not set seek position in archive file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.13 15814

@1@: could not parse server version "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.14 15815

could not get server_version from libpq

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.15 15816

aborting because of server version mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.16 15817

could not connect to database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.17 15820

already connected to a database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.18 15821

could not connect to database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.19 15822

connection to database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.20 15823

query failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.21 15824

query was: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.22 15825

@1@: @2@ Command was: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.23 15826

could not execute query

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.24 15827

error returned by PQputCopyData: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.25 15828

error returned by PQputCopyEnd: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.26 15829

COPY failed for table "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.27 15830

could not start database transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.28 15831

could not commit database transaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.29 15832

no output directory specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.30 15833

could not create directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.31 15834

could not close data file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.32 15835

could not open large object TOC file "@1@" for input: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.33 15836

invalid line in large object TOC file "@1@": "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.34 15837

error reading large object TOC file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.35 15838

could not close large object TOC file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.36 15840

could not write to blobs TOC file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.37 15841

file name too long: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.38 15842

this format cannot be read

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.39 15843

could not open TOC file "@1@" for output: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.40 15844

could not open TOC file for output: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.41 15845

compression is not supported by tar archive format

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.42 15846

could not open TOC file "@1@" for input: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.43 15847

could not open TOC file for input: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.44 15848

could not find file "@1@" in archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.45 15849

could not generate temporary file name: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.46 15850

could not open temporary file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.47 15851

could not close tar member

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.48 15856

invalid OID for large object (@1@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.49 15858

could not close temporary file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.50 15859

actual file length (@1@) does not match expected (@2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.51 15861

could not find header for file "@1@" in tar archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.52 15863

restoring data out of order is not supported in this archive format: "@1@" is required, but comes before "@2@" in the archive file.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.53 15864

incomplete tar header found (@1@ byte)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.54 15867

corrupt tar header found in @1@ (expected @2@, computed @3@) file position @4@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.55 15868

@1@: too many command-line arguments (first is "@2@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.56 15870

no matching schemas were found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.57 15871

no matching tables were found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.58 15872

invalid client encoding "@1@" specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.59 15873

invalid output format "@1@" specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.60 15875

dumping contents of table "@1@.@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.61 15876

Dumping the contents of table "@1@" failed: PQgetCopyData() failed.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.62 15877

Dumping the contents of table "@1@" failed: PQgetResult() failed.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.63 15878

error reading large object @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.64 15879

could not find parent extension for @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.65 15881

schema with OID @1@ does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.66 15889

failed sanity check, parent table with OID @1@ of sequence with OID @2@ not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.67 15890

query produced null referenced table name for foreign key trigger "@1@" on table "@2@" (OID of table: @3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.68 15891

invalid column numbering in table "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.69 15892

invalid adnum value @1@ for table "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.70 15893

expected @1@ check constraint on table "@2@" but found @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.55.71 15895

(The system catalogs might be corrupted.)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56 Message Numbers Beginning with 15900

2.56.1 15902

unrecognized provolatile value for function "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.2 15907

could not parse default ACL list (@1@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.3 15908

could not parse GRANT ACL list (@1@) or REVOKE ACL list (@2@) for object "@3@" (@4@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.4 15909

query to obtain definition of view "@1@" returned no data

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.5 15910

query to obtain definition of view "@1@" returned more than one definition

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.6 15911

definition of view "@1@" appears to be empty (length zero)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.7 15912

invalid column number @1@ for table "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.8 15913

missing index for constraint "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.9 15914

unrecognized constraint type: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.10 15915

query to get data of sequence "@1@" returned @2@ row (expected 1)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.11 15918

unexpected tgtype value: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.12 15919

invalid argument string (@1@) for trigger "@2@" on table "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.13 15920

query to get rule "@1@" for table "@2@" failed: wrong number of rows returned

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.14 15921

query returned @1@ row instead of one: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.15 15923

invalid dumpId @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.16 15924

invalid dependency @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.17 15925

could not identify dependency loop

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.18 15927

The program "@1@" is needed by @2@ but was not found in thesame directory as "@3@".Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.19 15928

The program "@1@" was found by "@2@"but was not the same version as @3@.Check your installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.20 15929

@1@: could not connect to database "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.21 15930

@1@: could not connect to databases "postgres" or "template1"Please specify an alternative database.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.22 15931

@1@: could not open the output file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.23 15932

@1@: could not parse ACL list (@2@) for tablespace "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.24 15933

@1@: could not parse ACL list (@2@) for database "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.25 15934

@1@: pg_dump failed on database "@2@", exiting

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.26 15935

@1@: could not re-open the output file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.27 15936

@1@: running "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.28 15937

@1@: could not connect to database "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.29 15938

could not get server version

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.30 15941

executing @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.31 15942

query failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.32 15943

query was: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.33 15944

unrecognized archive format "@1@"; please specify "c", "d", or "t"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.34 15946

@1@: invalid argument for option @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.35 15947

@1@: transaction ID epoch (-e) must not be -1

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.36 15949

@1@: transaction ID (-x) must not be 0

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.37 15951

@1@: OID (-o) must not be 0

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.38 15953

@1@: multitransaction ID (-m) must not be 0

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.39 15955

@1@: multitransaction offset (-O) must not be -1

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.40 15957

@1@: no data directory specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.41 15958

@1@: cannot be executed by "root"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.42 15959

@1@: could not change directory to "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.43 15960

@1@: could not open file "@2@" for reading: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.44 15961

If these values seem acceptable, use -f to force reset.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.45 15962

Transaction log reset

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.46 15963

@1@: could not read file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.47 15964

@1@: pg_control exists but has invalid CRC; proceed with caution

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.48 15965

@1@: pg_control exists but is broken or unknown version; ignoring it

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.49 15966

@1@: internal error -- sizeof(ControlFileData) is too large ... fix PG_CONTROL_SIZE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.50 15967

@1@: could not create pg_control file: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.51 15968

@1@: could not write pg_control file: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.52 15969

@1@: fsync error: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.53 15970

@1@: could not open directory "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.54 15971

@1@: could not read directory "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.55 15972

@1@: could not delete file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.56 15973

@1@: could not open file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.57 15974

@1@: could not write file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.58 15975

could not create directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.59 15976

could not open directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.60 15977

could not stat file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.61 15978

could not read symbolic link "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.62 15979

could not create symbolic link "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.63 15981

could not open file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.64 15982

could not create file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.65 15983

could not read file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.66 15984

could not write to file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.67 15985

could not fsync file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.68 15986

could not close file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.69 15987

could not find own program executable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.70 15988

invalid checkpoint argument "@1@", must be "fast" or "spread"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.71 15989

invalid argument @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.72 15990

option @1@ conflicts with option @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.73 15991

the configured database storage directory differs from the data_directory parameter

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.74 15992

an invalid value was specified for the option -@1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.75 15993

backup data "@1@" is lost

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.76 15994

cannot be run as root

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.77 15995

invalid option --@1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.78 15996

invalid option -@1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.79 15997

backup of the database has not yet been performed, or an incorrect backup storage directory was specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.80 15998

the database storage directory and the $PGDATA environment variable have not been specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.56.81 15999

option @1@ is necessary for option @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57 Message Numbers Beginning with 16000

2.57.1 16000

the requested recovery point is earlier than the date and time that the backup finished

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.2 16001

the specified backup does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.3 16002

the directory "@1@" for the tablespace with OID "@2@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.4 16003

the specified backup storage directory "@1@" is not correct

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.5 16004

the specified database storage directory is not correct

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.6 16005

the token in the file "pg_hba.conf" is too long and will be skipped: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.7 16006

the directory "@1@" for storing WAL does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.8 16007

"@1@" is being executed by another user

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.9 16008

the "@1@" parameter was not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.10 16009

could not find the configuration file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.11 16010

could not open the configuration file "@1@": maximum nesting depth exceeded

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.12 16011

the PID file "@1@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.13 16012

the server is running

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.14 16013

the server is not running

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.15 16014

caught signal @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.16 16015

failed to build the absolute path "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.17 16016

failed to check the completion of archiving WAL files

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.18 16017

failed to connect to the database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.19 16018

failed to get the database OID : @1@ (@2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.20 16019

failed to remove old backup data

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.21 16020

failed to restore the database storage directory "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.22 16021

failed to restore the tablespace directory "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.23 16022

retried backup @1@ times, but failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.24 16023

SQL command failed (@1@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.25 16024

the database with OID @1@ was created during backup

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.26 16025

backup control function "@1@" failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.27 16026

command failed: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.28 16027

could not close the file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.29 16028

could not close the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.30 16029

could not create the directory "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.31 16030

could not create the file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.32 16031

could not create the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.33 16032

could not create the symbolic link "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.34 16033

could not identify the current directory: @1@ (errno=@2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.35 16034

could not open the directory "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.36 16035

could not open the file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.37 16036

could not open the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.38 16037

could not read the file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.39 16038

could not read the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.40 16039

could not read the symbolic link "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.41 16040

could not remove the file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.42 16041

could not remove the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.43 16042

could not rename the directory "@1@" to "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.44 16043

could not rename the file "@1@" to "@2@": @3@ (errno=@4@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.45 16044

could not write the file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.46 16045

could not write the PID file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.47 16046

failed to find the internal file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.48 16047

failed to parse the internal file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.49 16048

failed to parse the internal file: "@1@" (@2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.50 16049

failed to parse the configuration file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.51 16050

failed to remove archived transaction log files

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.52 16051

failed to replace the contents of the pg_wal directory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.53 16052

failed to restore the configuration files

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.54 16053

invalid data in the PID file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.55 16055

cannot find the server process (PID: @1@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.56 16056

an error occurred during recovery

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.57 16057

could not remove the directory "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.58 16058

target "@1@" mismatch (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.59 16059

the program "@1@" is needed by @2@ but was not found in the same directory as "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.60 16060

the program "@1@" was found in "@2@" but was not the same version as @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.61 16061

failed to get port number (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.62 16062

backup of configuration files completed successfully

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.57.63 16063

backup of database and configuration files completed successfully

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.57.64 16064

Confirm that the specified directory is correct. If it is correct, the backup data may be corrupted. Copy the backup data to the backup storage directory from backup media.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.65 16065

Check the installation.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.66 16066

Continue the backup.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.57.67 16067

Create an empty directory "@1@" on which the database administrator has full permissions, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.68 16068

Create an empty directory "@1@" on which the database administrator has full permissions.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.69 16069

Recover the corrupt resource.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.70 16070

Is the server running?

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.71 16071

Please check whether the backup data exists or is not in the backup storage directory.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.72 16072

Please decrease the length of the path and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.73 16073

Please decrease the number of digits and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.74 16074

Please log in as the user that owns the server process.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.75 16075

Please remove the cause of the error, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.76 16076

Please set the database storage directory "@1@" to -D option, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.77 16077

Please set the recovery point to be after the date and time that the backup finished, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.78 16078

Please set the backup storage directory to the 'backup_destination' parameter and restart the server.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.79 16079

Please specify the database storage directory as "@1@" and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.80 16080

Please specify the database storage directory correctly and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.81 16081

Please specify the port number correctly and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.82 16082

Please specify an integer greater than 0, and try again.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.83 16083

Please specify an integer greater than 0, or the 'all' keyword, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.84 16084

Please specify an integer greater than or equal to 0, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.85 16085

Please specify the backup storage directory correctly and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.86 16086

Please specify the time stamp using the correct length and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.87 16087

Please start the server and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.88 16088

Please stop the server and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.89 16089

Please wait for a short period and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.90 16090

Recovery of database completed successfully.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.91 16091

Retrying backup. (@1@ times).

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.92 16092

Specify the backup storage directory with the -B option, and retry.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.93 16093

Refer to "@1@ --help" for more information.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.94 16094

Retry after the other process terminates.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.95 16095

Failed to identify backup data.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.96 16096

restore point name is too long (maximum @1@ bytes)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.97 16097

Try "@1@ --help" for more information.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.98 16098

keystore location is not specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.57.99 16099

too many command-line arguments (first is "@1@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58 Message Numbers Beginning with 16100

2.58.1 16100

no operation is specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.2 16101

could not open file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.3 16102

could not read file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.4 16103

keystore "@1@" is corrupted: size = @2@ bytes, expected size = @3@ bytes

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.5 16104

file "@1@" is not a keystore

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.6 16105

key is too long

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.7 16106

key is wrong

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.8 16107

passphrase-based key derivation failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.9 16108

decryption of the keystore failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.10 16109

decryption of the keystore failed: passphrase is wrong

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.11 16110

keystore "@1@" is corrupted: invalid CRC

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.12 16111

encryption of the keystore failed: error code = @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.13 16112

encryption of the keystore failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.14 16113

could not create file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.15 16114

could not write file "@1@": @2@ (errno=@3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.16 16115

child process exited with unrecognized status @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.17 16117

invalid command \\@1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.18 16118

\\@1@: extra argument "@2@" ignored

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.19 16119

could not get home directory for user ID @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.20 16120

\\@1@: could not change directory to "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.21 16121

You are currently not connected to a database.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.22 16122

no query buffer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.23 16123

@1@: invalid encoding name or conversion procedure not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.24 16124

\\@1@: missing required argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.25 16125

Passwords didn't match.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.26 16128

out of memory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.27 16129

\\@1@: environment variable name must not contain "="

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.28 16130

The server (version @1@) does not support showing function source.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.29 16131

function name is required

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.30 16132

@1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.31 16137

environment variable PSQL_EDITOR_LINENUMBER_ARG must be set to specify a line number

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.32 16138

could not start editor "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.33 16139

could not start /bin/sh

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.34 16140

could not locate temporary directory: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.35 16141

could not open temporary file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.36 16142

\\pset: allowed formats are aligned, asciidoc, csv, html, latex, latex-longtable, troff-ms, unaligned, wrapped

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.37 16143

\\pset: allowed line styles are ascii, old-ascii, unicode

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.38 16144

\\pset: unknown option: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.39 16145

\\!: failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.40 16146

cannot duplicate null pointer (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.41 16147

connection to server was lost

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.42 16148

Failed.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.58.43 16149

unexpected PQresultStatus: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.44 16150

The server (version @1@) does not support savepoints for ON_ERROR_ROLLBACK.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.45 16151

unexpected transaction status (@1@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.46 16152

\\copy: arguments required

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.47 16153

\\copy: parse error at "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.48 16154

\\copy: parse error at end of line

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.49 16155

@1@: cannot copy from/to a directory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.50 16156

could not write COPY data: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.51 16158

Enter data to be copied followed by a newline.End with a backslash and a period on a line by itself, or an EOF signal.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.52 16159

aborted because of read failure

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.53 16160

The server (version @1@) does not support tablespaces.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.54 16161

\\df only takes [antwS+] as options

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.55 16162

\\df does not take a "w" option with server version @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.56 16163

The server (version @1@) does not support altering default privileges.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.57 16164

Did not find any relation named "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.58 16165

Did not find any relation with OID @1@.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.59 16166

The server (version @1@) does not support per-database role settings.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.60 16167

Did not find any settings for role "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.61 16168

Did not find any settings.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.62 16169

Did not find any relation named "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.63 16170

Did not find any relations.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.64 16171

The server (version @1@) does not support collations.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.65 16172

The server (version @1@) does not support full text search.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.66 16173

Did not find any text search configuration named "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.67 16174

The server (version @1@) does not support foreign-data wrappers.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.68 16175

The server (version @1@) does not support foreign servers.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.69 16176

The server (version @1@) does not support user mappings.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.70 16177

The server (version @1@) does not support foreign tables.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.71 16178

The server (version @1@) does not support extensions.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.72 16179

Did not find any extension named "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.73 16180

Did not find any extensions.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.74 16181

user name lookup failure: error code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.75 16182

could not read from input file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.76 16183

could not save history to file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.77 16184

history is not supported by this installation

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.78 16185

@1@: not connected to a database

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.79 16186

@1@: current transaction is aborted

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.80 16187

@1@: unknown transaction status

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.81 16188

Cannot add header to table content: column count of @1@ exceeded.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.82 16189

Cannot add cell to table content: total cell count of @1@ exceeded.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.83 16190

invalid output format (internal error): @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.84 16191

skipping recursive expansion of variable "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.85 16192

unterminated quoted string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.86 16193

@1@: out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.58.87 16194

cannot escape without active connection

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.88 16195

could not open log file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.89 16196

could not set printing parameter "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.90 16197

\\@1@: could not read value for variable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.58.91 16199

extra command-line argument "@1@" ignored

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59 Message Numbers Beginning with 16200

2.59.1 16200

tab completion query failed: @1@Query was:@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.2 16201

unrecognized value "@1@" for "@2@"Available values are: @3@.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.3 16202

Try "@1@ --help" for more information.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.4 16203

too many command-line arguments (first is "@1@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.5 16204

cannot cluster all databases and a specific one at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.6 16205

cannot cluster specific table(s) in all databases

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.7 16206

clustering of table "@1@" in database "@2@" failed: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.8 16207

clustering of database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.9 16208

@1@: clustering database "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.10 16213

could not connect to database @1@: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.11 16214

query failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.12 16215

cannot duplicate null pointer (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.13 16216

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.59.14 16217

Cancel request sent

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.15 16218

Could not send cancel request:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.16 16219

only one of --locale and --lc-ctype can be specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.17 16220

only one of --locale and --lc-collate can be specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.18 16221

"@1@" is not a valid encoding name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.19 16222

database creation failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.20 16223

comment creation failed (database was created): @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.21 16228

Passwords didn't match.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.22 16229

password encryption failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.23 16230

creation of new role failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.24 16231

missing required argument database name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.25 16232

Database "@1@" will be permanently removed.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.26 16233

database removal failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.27 16236

missing required argument role name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.28 16237

Role "@1@" will be permanently removed.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.29 16238

removal of role "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.30 16239

cannot reindex all databases and a specific one at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.31 16240

cannot reindex all databases and system catalogs at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.32 16241

cannot reindex specific table(s) in all databases

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.33 16242

cannot reindex specific index(es) in all databases

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.34 16243

cannot reindex specific table(s) and system catalogs at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.35 16244

cannot reindex specific index(es) and system catalogs at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.36 16245

reindexing of table "@1@" in database "@2@" failed: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.37 16246

reindexing of index "@1@" in database "@2@" failed: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.38 16247

reindexing of database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.39 16248

@1@: reindexing database "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.40 16250

cannot use the "@1@" option when performing only analyze

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.41 16252

cannot vacuum all databases and a specific one at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.42 16253

cannot vacuum specific table(s) in all databases

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.43 16254

vacuuming of table "@1@" in database "@2@" failed: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.44 16255

vacuuming of database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.45 16256

SQL error: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.46 16257

variable "@1@" must have a numeric type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.47 16258

descriptor "@1@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.48 16259

descriptor header item "@1@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.49 16260

nullable is always 1

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.50 16261

key_member is always 0

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.51 16262

descriptor item "@1@" is not implemented

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.52 16263

descriptor item "@1@" cannot be set

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.53 16264

@1@: could not open file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.54 16265

Try "@1@ --help" for more information.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.55 16266

@1@: parser debug support (-d) not available

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.56 16268

@1@: no input files specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.57 16269

cursor "@1@" has been declared but not opened

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.58 16270

could not remove output file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.59 16272

invalid bit string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.60 16273

unterminated bit string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.61 16274

unterminated hexadecimal string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.62 16275

unterminated quoted string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.63 16276

zero-length delimited identifier

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.64 16277

unterminated quoted identifier

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.65 16278

missing identifier in EXEC SQL UNDEF command

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.66 16279

missing matching "EXEC SQL IFDEF" / "EXEC SQL IFNDEF"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.67 16280

missing "EXEC SQL ENDIF;"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.68 16281

more than one EXEC SQL ELSE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.69 16282

unmatched EXEC SQL ENDIF

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.70 16283

too many nested EXEC SQL IFDEF conditions

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.71 16284

missing identifier in EXEC SQL IFDEF command

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.72 16285

missing identifier in EXEC SQL DEFINE command

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.73 16286

syntax error in EXEC SQL INCLUDE command

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.74 16287

internal error: unreachable state; If the cause of errors cannot be found, contact the Fujitsu Systems Engineer (SE).

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause. If the cause of errors cannot be found, contact the Fujitsu Systems Engineer (SE).

2.59.75 16288

Error: include path "@1@/@2@" is too long on line @3@, skipping

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.76 16289

could not open include file "@1@" on line @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.77 16290

cursor "@1@" does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.78 16291

initializer not allowed in type definition

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.79 16292

type name "string" is reserved in Informix mode

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.80 16293

type "@1@" is already defined

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.81 16294

multidimensional arrays for simple data types are not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.82 16295

AT option not allowed in CLOSE DATABASE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.83 16296

AT option not allowed in CONNECT statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.84 16297

AT option not allowed in DISCONNECT statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.85 16298

AT option not allowed in SET CONNECTION statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.59.86 16299

AT option not allowed in TYPE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60 Message Numbers Beginning with 16300

2.60.1 16300

AT option not allowed in VAR statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.2 16301

AT option not allowed in WHENEVER statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.3 16302

unsupported feature will be passed to server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.4 16303

SHOW ALL is not implemented

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.5 16304

COPY FROM STDIN is not implemented

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.6 16308

using variable "@1@" in different declare statements is not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.7 16309

cursor "@1@" is already defined

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.8 16310

no longer supported LIMIT #,# syntax passed to server

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.9 16311

subquery in FROM must have an alias

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.10 16312

CREATE TABLE AS cannot specify INTO

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.11 16313

expected "@", found "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.12 16314

only protocols "tcp" and "unix" and database type "postgresql" are supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.13 16315

expected "://", found "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.14 16316

Unix-domain sockets only work on "localhost" but not on "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.15 16317

expected "postgresql", found "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.16 16318

invalid connection type: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.17 16319

expected "@" or "://", found "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.18 16320

invalid data type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.19 16321

incomplete statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.20 16322

unrecognized token "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.21 16323

only data types numeric and decimal have precision/scale argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.22 16324

interval specification not allowed here

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.23 16325

too many levels in nested structure/union definition

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.24 16326

pointers to varchar are not implemented

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.25 16327

using unsupported DESCRIBE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.26 16328

initializer not allowed in EXEC SQL VAR command

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.27 16329

arrays of indicators are not allowed on input

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.28 16330

@1@ at or near "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.29 16331

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.60.30 16332

unrecognized variable type code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.31 16333

variable "@1@" is hidden by a local variable of a different type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.32 16334

variable "@1@" is hidden by a local variable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.33 16335

indicator variable "@1@" is hidden by a local variable of a different type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.34 16336

indicator variable "@1@" is hidden by a local variable

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.35 16337

indicator for array/pointer has to be array/pointer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.36 16338

nested arrays are not supported (except strings)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.37 16339

indicator for struct has to be a struct

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.38 16340

indicator for simple data type has to be simple

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.39 16341

unrecognized descriptor item code @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.40 16342

incorrectly formed variable "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.41 16343

variable "@1@" is not a pointer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.42 16344

variable "@1@" is not a pointer to a structure or a union

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.43 16345

variable "@1@" is neither a structure nor a union

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.44 16346

variable "@1@" is not an array

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.45 16347

variable "@1@" is not declared

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.46 16348

indicator variable must have an integer type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.47 16349

unrecognized data type name "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.48 16350

multidimensional arrays are not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.49 16351

multilevel pointers (more than 2 levels) are not supported; found @1@ level

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.50 16353

pointer to pointer is not supported for this data type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.51 16354

multidimensional arrays for structures are not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.52 16355

invalid URI propagated to internal parser routine: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.53 16356

end of string reached when looking for matching "]" in IPv6 host address in URI: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.54 16357

IPv6 host address may not be empty in URI: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.55 16358

unexpected character "@1@" at position @2@ in URI (expected ":" or "/"): "@3@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.56 16359

extra key/value separator "=" in URI query parameter: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.57 16360

missing key/value separator "=" in URI query parameter: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.58 16361

invalid URI query parameter: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.59 16362

invalid percent-encoded token: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.60 16363

forbidden value @1@00 in percent-encoded value: "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.61 16364

insufficient data in "T" message

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.62 16365

extraneous data in "T" message

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.63 16366

insufficient data in "D" message

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.64 16367

extraneous data in "D" message

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.65 16368

at character @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.66 16369

unrecognized socket error: 0x@1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.67 16370

If true, trusted and untrusted Perl code will be compiled in strict mode.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.68 16371

Perl initialization code to execute when a Perl interpreter is initialized.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.69 16372

Perl initialization code to execute once when plperl is first used.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.70 16373

Perl initialization code to execute once when plperlu is first used.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.71 16374

duplicate declaration

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.72 16375

diagnostics item @1@ is not allowed in GET STACKED DIAGNOSTICS

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.73 16376

diagnostics item @1@ is not allowed in GET CURRENT DIAGNOSTICS

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.74 16377

unrecognized GET DIAGNOSTICS item

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.75 16378

unexpected end of function definition

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.76 16379

syntax error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.77 16380

invalid SQLSTATE code

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.78 16381

syntax error, expected "FOR"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.79 16382

mismatched parentheses

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.80 16383

missing expression

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.81 16384

missing SQL statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.82 16385

incomplete data type declaration

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.83 16386

missing data type declaration

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.84 16387

INTO specified more than once

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.85 16388

expected FROM or IN

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.86 16389

cursor "@1@" has no argument named "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.87 16390

value for parameter "@1@" of cursor "@2@" specified more than once

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.88 16391

unrecognized RAISE statement option

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.89 16392

syntax error, expected "="

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.90 16393

during initialization of execution state

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.91 16394

while storing call arguments into local variables

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.92 16395

during function entry

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.93 16396

while casting return value to function's return type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.94 16397

returned record type does not match expected record type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.95 16398

during function exit

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.60.96 16399

returned row structure does not match the structure of the triggering table

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61 Message Numbers Beginning with 16400

2.61.1 16400

during statement block local variable initialization

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.2 16401

during statement block entry

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.3 16402

during statement block exit

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.4 16403

during exception cleanup

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.5 16404

structure of query does not match function result type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.6 16405

query "@1@" returned @2@ column
query "@3@" returned @4@ columns

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.7 16406

Sets handling of conflicts between PL/pgSQL variable names and table column names.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.8 16407

plpy.cursor expected a query or a plan

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.9 16408

plpy.cursor takes a sequence as its second argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.10 16409

could not execute plan

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.11 16410

Expected sequence of @1@ argument, got @2@: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.12 16412

iterating a closed cursor

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.13 16413

iterating a cursor in an aborted subtransaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.14 16414

fetch from a closed cursor

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.15 16415

closing a cursor in an aborted subtransaction

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.16 16416

error fetching next item from iterator

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.17 16417

PyList_SetItem() failed, while setting up arguments

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.18 16418

PyDict_SetItemString() failed, while setting up arguments

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.19 16419

could not create new dictionary while building trigger arguments

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.20 16420

untrapped error in initialization

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.21 16421

could not import "__main__" module

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.22 16422

could not create globals

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.23 16424

could not import "plpy" module

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.24 16425

could not add the spiexceptions module

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.25 16427

could not generate SPI exceptions

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.26 16428

could not unpack arguments in plpy.elog

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.27 16429

could not parse error message in plpy.elog

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.28 16430

could not compile PL/Python function "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.29 16431

could not compile anonymous PL/Python code block

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.30 16432

command did not produce a result set

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.31 16433

second argument of plpy.prepare must be a sequence

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.32 16434

plpy.execute expected a query or a plan

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.33 16435

plpy.execute takes a sequence as its second argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.34 16437

this subtransaction has already been entered

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.35 16438

this subtransaction has already been exited

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.36 16439

this subtransaction has not been entered

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.37 16440

there is no subtransaction to exit from

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.38 16441

could not create new dictionary

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.39 16443

could not create bytes representation of Python object

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.40 16444

could not create string representation of Python object

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.41 16445

return value of function with array return type is not a Python sequence

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.42 16446

could not extract bytes from encoded string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.43 16447

The name: @1@ is invalid.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.44 16448

";" is not permitted in COBOL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.45 16449

"END-EXEC" is not permitted in C

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.46 16450

missing "EXEC SQL ENDIF END-EXEC."

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.47 16451

debug line with EXEC SQL is not permitted

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.48 16452

SQL string literal cannot continue multiline by COBOL syntax

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.49 16453

COBOL string literal cannot continue multiline by SQL syntax

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.50 16454

syntax error at or near "END-EXEC" in declare section

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.51 16455

syntax error in include file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.52 16456

internal error: unreachable state;

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.53 16457

could not open temporary file "@1@" for continue line

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.54 16458

FILLER or implicit FILLER is not available in EXEC SQL TYPE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.55 16459

VALUE clause is not available in EXEC SQL TYPE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.56 16460

REDEFINES clause is not available in EXEC SQL TYPE statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.57 16461

FILLER or implicit FILLER is not available in EXEC SQL VAR statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.58 16462

VALUE clause is not available in EXEC SQL VAR statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.59 16463

syntax error in WHENEVER statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.60 16464

FILLER or implicit FILLER is not available in TYPEDEF statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.61 16465

VALUE clause is not available in TYPEDEF statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.62 16466

REDEFINES clause is not available in TYPEDEF statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.63 16467

FILLER or implicit FILLER can use only for elementary item in group item

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.64 16468

USAGE clause is not available for group item name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.65 16469

SIGN clause is not available for group item name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.66 16470

VALUE clause is not available for group item name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.67 16471

more than one USAGE clause

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.68 16472

more than one OCCURS clause

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.69 16473

more than one VALUE clause

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.70 16474

more than one SIGN clause

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.71 16475

more than one REDEFINES clause

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.72 16476

syntax error at or near "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.73 16477

length of varchar type is not assined

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.74 16478

invalid NULL is set

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.61.75 16479

you can not be set to more than 1024 bytes of the string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.61.76 16480

group item is too deep

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.77 16481

multidimensional array is not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.78 16482

syntax is not available

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.79 16483

there is a character code that can not be determined

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.80 16484

the number of variables reached the max number 1000000

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.81 16485

host array variable is needed when using FOR ARRAY_SIZE

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.82 16486

unsupported datatype found at FOR statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.83 16487

FOR value should be positive integer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.84 16488

SELECT..INTO returns too many rows on line @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.85 16491

@1@ failed

[Description]

Aborted the processing of this operation because an error occurred.

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the messages shown before this message, and then work around if necessary.

2.61.86 16492

CREATE TRIGGER will create implicit function "@1@"."@2@"() for TRIGGER "@3@" on TABLE "@4@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.61.87 16493

The cursor is invalid on line @1@

[Description]

An error occurred during execution of the command.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.61.88 16494

Constraint trigger "@1@" for relation "@2@" cannot be replaced with non-constraint trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.61.89 16495

Trigger "@1@" for relation "@2@" cannot be replaced with constraint trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.61.90 16497

unterminated /*+ comment for hint of pg_hint_plan

[Description]

An unterminated /*+ comment for hint of pg_hint_plan is detected.

[System Processing]

Processing will be aborted.

[Action]

Terminate /*+ comment for hint of pg_hint_plan.

2.61.91 16498

trigger created with EXECUTE PROCEDURE cannot be replaced by DO block

[Description]

Trigger created with EXECUTE PROCEDURE cannot be replaced by DO block.

[System Processing]

Processing is aborted.

[Action]

Please redefine it after deleting the trigger.

2.61.92 16499

trigger created with DO block cannot be replaced by EXECUTE PROCEDURE

[Description]

Trigger created with DO block cannot be replaced by EXECUTE PROCEDURE.

[System Processing]

Processing is aborted.

[Action]

Please redefine it after deleting the trigger.

2.62 Message Numbers Beginning with 16500

2.62.1 16500

the connection is not the same as the connection in DECLARE STATEMENT, on line @1@

[Description]

The connection is not the same as the connection in DECLARE STATEMENT, on line @1@

[System Processing]

Processing is aborted.

[Action]

Please do not specify the connection when you use SQL statement identifier declared with DECLARE STATEMENT.

2.62.2 16501

cannot copy window "@1@" because it has a frame clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.62.3 16502

could not find any WAL files

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.4 16503

exceeded maxAllocatedDescs (@1@) while trying to open file "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.5 16504

exceeded maxAllocatedDescs (@1@) while trying to open directory "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.6 16505

tsquery is too large

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.62.7 16506

bit string length exceeds the maximum allowed (@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.62.8 16507

error occurred before error message processing is available

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.9 16508

language validation function @1@ called for language @2@ instead of @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.10 16510

The sslservercertcn "@1@" could not be verified

[Description]

value of sslservercertcn is different from common name in the server certificate.

[System Processing]

Processing is aborted.

[Action]

Set SSL certificate's common name to sslservercertcn.

2.62.11 16511

@1@: must be superuser to run this command

[Description]

Must be superuser to run this command.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command by the superuser.

2.62.12 16512

@1@: must be database super user to run this command

[Description]

Must be database super user to run this command.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command by the database super user.

2.62.13 16513

@1@: no subcommand specified

[Description]

No subcommand specified.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options or operands.

2.62.14 16514

@1@: unrecognized subcommand "@2@"

[Description]

Unknown subcommand is specified.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct subcommand.

2.62.15 16515

@1@: too many command-line arguments (first is "@2@")

[Description]

Too many command-line arguments.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options or operands.

2.62.16 16516

@1@: argument to an option "@2@" must be a list of port numbers

[Description]

Argument to the option must be a list of port numbers.

[System Processing]

Processing will be aborted.

[Action]

Specify multiple port number, separated by commas argument to an option, and re-execute the command. Specify a number from 1024 to 32767 for the port number.

2.62.17 16517

@1@: invalid argument for an option "@2@"

[Description]

Invalid argument for an option.

[System Processing]

Processing will be aborted.

[Action]

Check the options specified in command-line, and re-execute the command with correct operands.

2.62.18 16518

@1@: option "@2@" is required

[Description]

The indispensable option is not specified.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options or confirm the indispensable option is being used correctly.

2.62.19 16519

@1@: requires an option "@2@" or setting the "@3@" environment variable

[Description]

Requires an option or setting the environment variable.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options. Or, set a correct value to the environment variable, and re-execute the command.

2.62.20 16520

@1@: successfully completed

[Description]

Command successfully completed.

[System Processing]

Continues processing.

[Action]

No action required.

2.62.21 16521

@1@: user "@2@" does not exist

[Description]

The user is not registered into OS.

[System Processing]

Processing will be aborted.

[Action]

Register the user into OS, and re-execute the command. Or, re-execute the command which specified the registered user.

2.62.22 16522

@1@: data directory "@2@" does not exist

[Description]

The data directory does not exist.

[System Processing]

Processing will be aborted.

[Action]

Confirm that an option "--cluster-standbynode" is being used correctly. Or, check the command-line, and re-execute the command with existing data directory.

2.62.23 16523

@1@: "@2@" is not a valid data directory

[Description]

The data directory is not valid.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with valid data directory.

2.62.24 16524

@1@: database cluster is not stopped

[Description]

Database cluster is not stopped.

[System Processing]

Processing will be aborted.

[Action]

Stop the database cluster, and re-execute the command.

2.62.25 16525

@1@: domain root "@2@" already exists

[Description]

The domain root already exists.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct domain root.

2.62.26 16526

@1@: could not create directory "@2@"

[Description]

Could not create the directory.

[System Processing]

Processing will be aborted.

[Action]

Check the following and eliminate the cause of errors, and re-execute the command.

- the state of a disk and file system to creating the directory

- permission of the upper directory of specified directory

2.62.27 16527

@1@: start of PL/extJava has timed out : @2@

[Description]

Timed out waiting for start of PL/extJava.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command after the load on the system has decreased.

2.62.28 16528

@1@: stop of PL/extJava has timed out : @2@

[Description]

Timed out waiting for stop of PL/extJava.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command after the load on the system has decreased.

2.62.29 16529

@1@: port number "@2@" is already in use

[Description]

The port number is already in use.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command with a port number which is not used in other processes.

2.62.30 16530

@1@: domain name can only be specified "domain1"

[Description]

Domain name can only be specified "domain1".

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct domain name.

2.62.31 16531

@1@: domain "@2@" has already been created

[Description]

The domain has already been created.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct domain name.

2.62.32 16532

@1@: domain "@2@" has not been created

[Description]

The domain has not been created.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct domain name.

2.62.33 16533

@1@: permission denied to update file "@2@"

[Description]

Permission denied to update the file.

[System Processing]

Processing will be aborted.

[Action]

Permit writing to the file by execution user, and re-execute the command.

2.62.34 16534

@1@: container for database "@2@" does not exist

[Description]

Container for database does not exist.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct database name.

2.62.35 16535

@1@: container for database "@2@" already exists

[Description]

Container for database already exists.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct database name.

2.62.36 16536

@1@: command error occurred

[Description]

Internal command error occurred.

[System Processing]

Processing will be aborted.

[Action]

Fix the problem by referring to the messages prior to this one.

2.62.37 16537

@1@: the domain was not able to be deleted because there was a container

[Description]

The domain was not able to be deleted because the domain have a container.

[System Processing]

Processing will be aborted.

[Action]

Delete all containers on the domain, and re-execute the command. Or, re-execute the command with "--force" option.

2.62.38 16538

@1@: could not access the data directory

[Description]

Could not access the data directory.

[System Processing]

Processing will be aborted.

[Action]

Confirm that an option "--cluster-standbynode" is being used correctly. Or, specify database super user in "--dbadminuser" option and re-execute the command.

2.62.39 16539

@1@: server instance "@2@" does not exist

[Description]

Server instance does not exist.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct server instance.

2.62.40 16540

@1@: specified database name "@2@" does not follow the naming rules

[Description]

Specified database name does not follow the naming rules.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct database name.

2.62.41 16541

@1@: all the server instances of the container cannot be deleted

[Description]

All the server instances of the container cannot be deleted.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct database name.

2.62.42 16542

@1@: the mount does the shared-file system of the domain root or the data directory

[Description]

A command executing node is not a standby node.

[System Processing]

Processing will be aborted.

[Action]

Execute the command on standby node.

2.62.43 16543

@1@: cannot execute this subcommand on standby node

[Description]

Cannot execute this subcommand on standby node.

[System Processing]

Processing will be aborted.

[Action]

Execute the command on primary node.

2.62.44 16544

@1@: cannot execute this command concurrently

[Description]

Cannot execute this command concurrently.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command after a command executing was finished.

2.62.45 16545

@1@: domain root "@2@" does not exist

[Description]

Domain root does not exist.

[System Processing]

Processing will be aborted.

[Action]

Confirm that the shared-file system of the domain root is mounted. Or, restore domain root from backup and re-execute the command.

2.62.46 16546

parameter "@1@" necessary for the PL/extJava environment was not set

[Description]

PL/extJava environment was not set.

[System Processing]

Processing will be aborted.

[Action]

Set the PL/extJava environment.

2.62.47 16547

mismatched parentheses

[Description]

Missing parenthesis '('or')' in Java function definition.

[System Processing]

Processing will be aborted.

[Action]

Check the definition of Java function.

2.62.48 16548

invalid format specification for Java function

[Description]

Invalid format specification for Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the definition of Java function.

Java function definition format is [package].[class].[method].

2.62.49 16549

Java function cannot return type @1@

[Description]

The specified data type is not supported as Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the data type of return value.

2.62.50 16550

Java function cannot accept type @1@

[Description]

The specified data type is not supported as Java function arguments.

[System Processing]

Processing will be aborted.

[Action]

Check the data type of arguments value.

2.62.51 16551

could not execute the Java function at the application server: HTTP status code @1@ details: "@2@"

[Description]

The application server could not execute the Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the Java function of registered in application server.

Check the details.

- The classpath is not found. (plextjava_lib_dir=%s2)

%s2: directory

The directory that stores the Java function is not in the application server.Check the directory and register the Java function.

- The return type is different. (%s3)

%s3: data type

The return value of the Java function is not corresponding to the CREATE FUNCTION definition. Check the data type of Java function.

- The method is not found. (%s4)

%s4: data type

The Java function to which the data type is corresponding is not found. Check the data type of Java function.

- The class is not found.(%s5)

%s5: class name

The Java function to which the class name is corresponding is not found. Check the class name of Java function.

- The method is not static modifier. (%s6)

%s6: Java function name

The Java function is not defined by "Static". Check the Java function definition.

here is no executed authority. (%s7)

%s7: Java function name

The Java function is not defined by "Public". Check the Java function definition.

- Java application throws exception(%s8).

%s8: exception

The exception was generated by the Java function. Check the Java function definition.

- no message

The following causes are thought.

-There is a possibility that the container is not made. Make the container in application server.

a) There is a possibility where the number of server instances is insufficient. Add server instance (JavaVM) to the application server.

b) There is a possibility that memory shortage occurs. Check the Java application.

c) There is a possibility that the time-out is generated. Check the Java application.

d) There is a possibility that abnormality occurs by the application server. Check the following logs.

- Event log (For Windows(R))/system log (For Solaris/Linux).

- Server log of container

- JavaVM log of container

- Trace log of Web server

- Internal log of Web server

2.62.52 16552

could not connect to application server: @1@

[Description]

Could not connect to application server.

[System Processing]

Processing will be aborted.

[Action]

Check the plextjava.http_port parameter in postgresql.conf.

2.62.53 16553

could not create socket for application server connection: @1@

[Description]

Could not create socket.

[System Processing]

Processing will be aborted.

[Action]

There is possible where an open number of files that can be used with the system is insufficient. Please confirm the total of the file that can be used with the system.

2.62.54 16554

could not send data to application server: @1@

[Description]

The application server was disconnected during execution of the Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the message of application server.

2.62.55 16555

could not receive data from application server

[Description]

The application server was disconnected during execution of the Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the message of application server.

2.62.56 16556

could not receive data from application server: @1@

[Description]

The application server was disconnected during execution of the Java function.

[System Processing]

Processing will be aborted.

[Action]

Check the message of application server.

2.62.57 16563

@1@: at least one option of "@2@" must be specified

[Description]

Must specify at least one option.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options.

2.62.58 16574

@1@: could not write directory "@2@"

[Description]

Could not write the directory.

[System Processing]

Processing will be aborted.

[Action]

Check that the disk of the directory has free space, and check that the abnormalities of the disk have not occurred.

2.62.59 16575

@1@: cannot execute with "@2@" option in primary server

[Description]

Do not specify the option to execute the command in primary server.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options.

Restore it because PL/extJava environment may be corrupted when the server is member nodes of the cluster.

2.62.60 16576

@1@: specify "@2@" option in standby server

[Description]

Specify the option to execute the command in standby server.

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options.

Restore it because PL/extJava environment may be corrupted when the server is member nodes of the cluster.

2.62.61 16577

Could not translate client host name "@1@" to IP address: @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.62.62 16578

Could not resolve client IP address to a host name: @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.62.63 16579

SELECT target entry is named "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.62.64 16580

SELECT target entry has type @1@, but column has type @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.62.65 16581

RETURNING list entry has type @1@, but column has type @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.62.66 16582

pg_largeobject entry for OID @1@, page @2@ has invalid data field size @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.62.67 16583

could not close directory "@1@": @2@

[Description]

Terminated normally but a warning was output.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.62.68 16584

could not create shared memory segment "@1@": @2@

[Description]

Could not create shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.69 16585

could not open shared memory segment "@1@": @2@

[Description]

Could not open shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.70 16586

could not map shared memory segment "@1@": @2@

[Description]

Could not map shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.71 16587

could not unmap shared memory segment "@1@": @2@

[Description]

Could not unmap shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.72 16588

could not remove shared memory segment "@1@": @2@

[Description]

Could not remove shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.73 16589

background worker "@1@": must attach to shared memory in order to request a database connection

[Description]

Could not register background worker.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.74 16590

background worker "@1@": cannot request database access if starting at postmaster start

[Description]

Could not register background worker.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.75 16591

background worker "@1@": invalid restart interval

[Description]

Could not register background worker.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.76 16592

terminating background worker "@1@" due to administrator command

[Description]

Could not register background worker.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.77 16596

dynamic shared memory control segment is not valid

[Description]

dynamic shared memory control segment is not valid.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.78 16597

too many dynamic shared memory segments

[Description]

Too many dynamic shared memory segments exist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.62.79 16599

could not stat shared memory segment "@1@": @2@

[Description]

Could not get details about dynamic shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.63 Message Numbers Beginning with 16600

2.63.1 16600

could not resize shared memory segment "@1@" to @2@ bytes: @3@

[Description]

Could not resize shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.63.2 16601

could not get shared memory segment: @1@

[Description]

Could not get shared memory segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.63.3 16604

cannot add more timeout reasons

[Description]

cannot add more timeout reasons

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.63.4 16606

aborting because lock on relation "@1@"."@2@" is not available

[Description]

Aborting because lock on relation is not available.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.5 16607

affix file contains both old-style and new-style commands

[Description]

Affix file conatins commands in both old and new format.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.6 16608

aggregate cannot accept shell type @1@

[Description]

aggregate cannot accept shell type.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.7 16609

aggregate functions are not allowed in a recursive query's recursive term

[Description]

aggregate functions are not allowed in a recursive query's recursive term.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.8 16610

aggregate functions are not allowed in check constraints

[Description]

aggregate functions are not allowed in check constraints.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.9 16611

aggregate functions are not allowed in DEFAULT expression

[Description]

aggregate functions are not allowed in DEFAULT expressions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.10 16612

aggregate functions are not allowed in EXECUTE parameters

[Description]

aggregate functions are not allowed in EXECUTE parameter.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.11 16613

aggregate functions are not allowed in FROM clause of their own query level

[Description]

Should only be possible in a LATERAL subquery.aggregate functions are not allowed in FROM clause of their own query level.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.12 16614

aggregate functions are not allowed in functions in FROM

[Description]

aggregate functions are not allowed in functions in FROM.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.13 16615

aggregate functions are not allowed in index expression

[Description]

aggregate functions are not allowed in index expression.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.14 16616

aggregate functions are not allowed in index predicates

[Description]

aggregate functions are not allowed in index predicates.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.15 16617

aggregate functions are not allowed in JOIN conditions

[Description]

aggregate functions are not allowed in JOIN conditions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.16 16618

aggregate functions are not allowed in @1@

[Description]

aggregate functions are not allowed in some kinds of expressions we are parsing such as EXPR_KIND_WHERE,EXPR_KIND_FILTER, EXPR_KIND_INSERT_TARGET, EXPR_KIND_UPDATE_SOURCE, EXPR_KIND_UPDATE_TARGET, EXPR_KIND_GROUP_BY, EXPR_KIND_LIMIT, EXPR_KIND_OFFSET, EXPR_KIND_RETURNING,EXPR_KIND_VALUES.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.17 16620

aggregate functions are not allowed in trigger WHEN conditions

[Description]

aggregate functions are not allowed in trigger WHEN conditions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.18 16621

aggregate functions are not allowed in window RANGE

[Description]

aggregate functions are not allowed in window RANGE.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.19 16622

aggregate functions are not allowed in window ROWS

[Description]

aggregate functions are not allowed in window ROWS.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.20 16623

aggregate mfinalfunc must not be specified without mstype

[Description]

aggregate mfinalfunc must not be specified without mstype.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.21 16624

aggregate minitcond must not be specified without mstype

[Description]

aggregate minitcond must not be specified without mstype.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.22 16625

aggregate minvfunc must be specified when mstype is specified

[Description]

aggregate minvfunc must be specified when mstype is specified.if mtransType is given, mtransfuncName and minvtransfuncName must be as well; if not, then none of the moving-aggregate options should have been given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.23 16626

aggregate minvfunc must not be specified without mstype

[Description]

aggregate minvfunc must not be specified without mstype.if mtransType is given, mtransfuncName and minvtransfuncName must be as well; if not, then none of the moving-aggregate options should have been given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.24 16627

aggregate msfunc must be specified when mstype is specified

[Description]

aggregate msfunc must be specified when mstype is specified.if mtransType is given, mtransfuncName and minvtransfuncName must be as well; if not, then none of the moving-aggregate options should have been given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.25 16628

aggregate msfunc must not be specified without mstype

[Description]

aggregate msfunc must not be specified without mstype.if mtransType is given, mtransfuncName and minvtransfuncName must be as well; if not, then none of the moving-aggregate options should have been given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.26 16629

aggregate msspace must not be specified without mstype

[Description]

aggregate msspace must not be specified without mstype.if mtransType is given, mtransfuncName and minvtransfuncName must be as well; if not, then none of the moving-aggregate options should have been given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.27 16630

aggregates cannot accept set arguments

[Description]

aggregates cannot accept set arguments.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.28 16631

aggregates cannot have more than @1@ argument

[Description]

aggregates cannot have more than 99 argument.Aggregates can have at most FUNC_MAX_ARGS-1 args, else the transfnand/or finalfn will be unrepresentable in pg_proc. We must check now to protect fixed-size arrays here and possibly in called functions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.29 16632

aggregates cannot have output arguments

[Description]

aggregates cannot have output arguments.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.30 16633

a hypothetical-set aggregate must have direct arguments matching its aggregated arguments

[Description]

a hypothetical-set aggregate must have direct arguments matching its aggregated arguments.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.31 16634

All connection parameters must be supplied because no database connection exists

[Description]

All connection parameters must be supplied because no database connection exists.We don't know the supplied connection parameters and don't want to connect to the wrong database by using defaults, so require all parameters to be specified.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.32 16635

all replication slots are in use

[Description]

all replication slots are in use.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.33 16636

an aggregate with DISTINCT must have at least one argument

[Description]

an aggregate with DISTINCT must have at least one argument.Returning an empty list would cause the parsed Query to look like it didn't have DISTINCT, with results that would probably surprise the user. Note: this case is presently impossible for aggregates because of grammar restrictions, but we check anyway.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.34 16637

an ordered-set aggregate with a VARIADIC direct argument must have one VARIADIC aggregated argument of the same data type

[Description]

an ordered-set aggregate with a VARIADIC direct argument must have one VARIADIC aggregated argument of the same data type.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.35 16638

argument declared "anyrange" is not a range type but type @1@

[Description]

argument declared \"anyrange\" is not a range type but type format type of range_type.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.36 16639

argument list must have even number of elements

[Description]

argument list must have even number of elements.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.37 16640

argument of lo_read exceeds integer range

[Description]

argument of lo_read exceeds integer range.Long ago, somebody thought it'd be a good idea to declare this function as taking size_t ... but the underlying backend function only accepts a signed int32 length. So throw error if the given value overflows int32.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.38 16641

argument of lo_truncate exceeds integer range

[Description]

argument of lo_truncate exceeds integer range\n.Long ago, somebody thought it'd be a good idea to declare this function as taking size_t ... but the underlying backend function only accepts a signed int32 length. So throw error if the given value overflows int32. (A possible alternative is to automatically redirect the call to lo_truncate64; but if the caller wanted to rely on that backend function being available, he could have called lo_truncate64 for himself.)

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.39 16642

argument of lo_write exceeds integer range

[Description]

argument of lo_write exceeds integer range\n.Long ago, somebody thought it'd be a good idea to declare this functionas taking size_t ... but the underlying backend function only accepts a signed int32 length. So throw error if the given value overflows int32.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.40 16643

argument of @1@ must be an array of objects

[Description]

argument of funcname must be an array of objects.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.41 16644

Array contents must start with "{"

[Description]

Array contents must start with \"{\".intuit dimensions from brace structure -- it better match what we were given.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.42 16645

array must be one-dimensional

[Description]

array must be one-dimensional.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.43 16646

array must have even number of elements

[Description]

array must have even number of elements.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.44 16647

array must have two columns

[Description]

array must have two columns.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.45 16648

array must not contain nulls

[Description]

array must not contain nulls.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.46 16649

Array value must start with "{" or dimension information

[Description]

Array value must start with \"{\" or dimension information. No array dimensions, so intuit dimensions from brace structure.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.47 16650

authentication file line too long

[Description]

authentication file line too long. Line too long!

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.48 16651

a variadic ordered-set aggregate must use VARIADIC type ANY

[Description]

a variadic ordered-set aggregate must use VARIADIC type ANY.An ordered-set aggregate that is VARIADIC must be VARIADIC ANY. In principle we could support regular variadic types, but it would make things much more complicated because we'd have to assemble the correct subsets of arguments into array values. Since no standard aggregates have use for such a case, we aren't bothering for now.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.49 16652

a worker process died unexpectedly

[Description]

a worker process died unexpectedly.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.50 16653

canceling statement due to lock timeout

[Description]

canceling statement due to lock timeout.If LOCK_TIMEOUT and STATEMENT_TIMEOUT indicators are both set, we prefer to report the former; but be sure to clear both.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.51 16654

cannot extract elements from an object

[Description]

cannot extract elements from an object.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.52 16655

cannot extract elements from a scalar

[Description]

cannot extract elements from a scalar.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.53 16656

cannot get array length of a non-array

[Description]

cannot get array length of a non-array.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.54 16657

cannot get array length of a scalar

[Description]

cannot get array length of a scalar.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.55 16658

cannot have more than 2^32-2 commands in a transaction

[Description]

cannot have more than 2^32-2 commands in a transaction.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.56 16659

cannot insert into column "@1@" of view "@2@"

[Description]

cannot insert into column non_updatable_col of view RelationGetRelationName(view).This is a different error, caused by an attempt to update a non-updatable column in an otherwise updatable view.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.57 16660

cannot insert into foreign table "@1@"

[Description]

cannot insert into foreign table RelationName of resultRel.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.58 16661

cannot lock rows in materialized view "@1@"

[Description]

cannot lock rows in materialized view RelationName of provided rel.Allow referencing a matview, but not actual locking clauses.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.59 16662

cannot move relations in to or out of pg_global tablespace

[Description]

cannot move relations in to or out of pg_global tablespace.Can't move shared relations in to or out of pg_global. This is also checked by ATExecSetTableSpace, but nice to stop earlier.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.60 16663

cannot perform FREEZE because of prior transaction activity

[Description]

cannot perform FREEZE because of prior transaction activity.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.61 16664

cannot perform FREEZE because the table was not created or truncated in the current subtransaction

[Description]

cannot perform FREEZE because the table was not created or truncated in the current subtransaction.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.62 16665

cannot refresh materialized view "@1@" concurrently

[Description]

cannot refresh materialized view matviewname concurrently.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.63 16666

cannot rename inherited constraint "@1@"

[Description]

cannot rename inherited constraint oldconname.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.64 16667

cannot return non-composite value from function returning composite type

[Description]

cannot return non-composite value from function returning composite type.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.65 16668

cannot rewrite table "@1@" used as a catalog table

[Description]

cannot rewrite table Relation name used as a catalog table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.66 16669

cannot update column "@1@" of view "@2@"

[Description]

cannot update column non_updatable_col of view RelationGetRelationName(view).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.67 16670

cannot update foreign table "@1@"

[Description]

cannot update foreign table resultRel relation name.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.68 16671

cannot use a logical replication slot for physical replication

[Description]

Logical replication slots, similar to physical slots except that they are attached to a single database.cannot use a logical replication slot for physical replication.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.69 16672

cannot use DISTINCT with WITHIN GROUP

[Description]

cannot use DISTINCT with WITHIN GROUP.The order clause for WITHIN GROUP and the one for plain-aggregate ORDER BY share a field, so we have to check here that at most one is present. We also check for DISTINCT here to give a better error location.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.70 16673

cannot use expression index "@1@" as replica identity

[Description]

cannot use expression index Relation name of indexRel as replica identity. Expression indexes aren't supported.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.71 16674

cannot use invalid index "@1@" as replica identity

[Description]

cannot use invalid index Relation name of indexRel as replica identity.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.72 16675

cannot use ldapbasedn, ldapbinddn, ldapbindpasswd, ldapsearchattribute, or ldapurl together with ldapprefix

[Description]

cannot use ldapbasedn, ldapbinddn, ldapbindpasswd, ldapsearchattribute, or ldapurl together with ldapprefix.LDAP can operate in two modes: either with a direct bind, using ldapprefix and ldapsuffix, or using a search+bind, using ldapbasedn, ldapbinddn, ldapbindpasswd and ldapsearchattribute.Disallow mixing these parameters.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.73 16676

cannot use multiple ORDER BY clauses with WITHIN GROUP

[Description]

cannot use multiple ORDER BY clauses with WITHIN GROUP.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.74 16677

cannot use non-immediate index "@1@" as replica identity

[Description]

cannot use non-immediate index Relation name of indexRel as replica identity.Deferred indexes are not guaranteed to be always unique.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.75 16678

cannot use non-unique index "@1@" as replica identity

[Description]

cannot use non-unique index Relation name of indexRel as replica identity. The Access Method must support uniqueness, and the index must in fact be unique.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.76 16679

cannot use partial index "@1@" as replica identity

[Description]

cannot use partial index Relation name of indexRel as replica identity.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.77 16680

cannot use physical replication slot for logical decoding

[Description]

cannot use physical replication slot for logical decoding.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.78 16681

cannot use subquery in DEFAULT expression

[Description]

cannot use subquery in DEFAULT expression. Check to see if the sublink is in an invalid place within the query. We allow sublinks everywhere in SELECT/INSERT/UPDATE/DELETE, but generally not in utility statements.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.79 16682

cannot use VARIADIC with WITHIN GROUP

[Description]

cannot use VARIADIC with WITHIN GROUP.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.80 16683

check constraints for domains cannot be marked NO INHERIT

[Description]

check constraints for domains cannot be marked NO INHERIT. Check constraints are handled after domain creation, as they require the Oid of the domain; at this point we can only check that they're not marked NO INHERIT, because that would be bogus.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.81 16684

CONCURRENTLY and WITH NO DATA options cannot be used together

[Description]

CONCURRENTLY and WITH NO DATA options cannot be used together. Check that conflicting options have not been specified.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.82 16685

CONCURRENTLY cannot be used when the materialized view is not populated

[Description]

CONCURRENTLY cannot be used when the materialized view is not populated.Check that CONCURRENTLY is not specified if not populated.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.83 16687

constraint "@1@" of relation "@2@" is not a foreign key or check constraint

[Description]

constraint constrName of relation RelationName(rel) is not a foreign key or check constraint.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.84 16688

could not change directory to "@1@": @2@

[Description]

could not change directory to path: strerror(errno). could not change directory to orig_wd:strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.85 16689

could not close directory "@1@": @2@

[Description]

could not close directory ctx->directory and the corresponding error will be printed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.86 16690

could not close log file @1@: @2@

[Description]

could not close log file XLogFileNameP(ThisTimeLineID, openLogSegNo) and the reason failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.87 16691

could not close log segment @1@: @2@

[Description]

could not close log segment XLogFileNameP(recvFileTLI, recvSegNo) and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.88 16692

could not close pipe to external command: @1@

[Description]

could not close pipe to external command and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.89 16693

could not close pipe to external command: @1@

[Description]

could not close pipe to external command: strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.90 16694

could not complete SSL handshake on renegotiation, too many failures

[Description]

could not complete SSL handshake on renegotiation, too many failures. A handshake can fail, so be prepared to retry it, but only a few times and in this case we considered maximum limit is 20 times.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.91 16695

could not create any Unix-domain sockets

[Description]

could not create any Unix-domain sockets.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.92 16696

could not create communication channels: @1@

[Description]

could not create communication channels: strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.93 16697

could not create shared memory segment "@1@": @2@

[Description]

could not create shared memory segment name and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.94 16698

could not create Unix-domain socket in directory "@1@"

[Description]

could not create Unix-domain socket in one of the Unix_socket_directories.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.63.95 16699

could not determine data type for argument @1@

[Description]

could not determine data type for argument 1. since json_object_agg() is declared as taking type "any", the parser will not do any type conversion on unknown-type literals (that is, undecorated strings or NULLs). Such values will arrive here as type UNKNOWN, which fortunately does not matter to us, since unknownout() works fine.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64 Message Numbers Beginning with 16700

2.64.1 16700

could not determine encoding for codeset "@1@"

[Description]

could not determine encoding for codeset cp followed by the provided unsigned integer.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.2 16701

could not duplicate handle for "@1@": @2@

[Description]

could not duplicate handle for handle name and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.3 16702

could not execute command "@1@": @2@

[Description]

could not execute command filename and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.4 16703

could not execute command "@1@": @2@

[Description]

could not execute command options->file and the strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.5 16704

could not fdatasync log file @1@: @2@

[Description]

could not fdatasync log file XLogFileNameP(ThisTimeLineID, segno) and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.6 16705

could not fork worker process: @1@

[Description]

could not fork worker process. The reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.7 16706

could not fsync log file @1@: @2@

[Description]

could not fsync log file XLogFileNameP(ThisTimeLineID, segno) and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.8 16707

could not fsync log segment @1@: @2@

[Description]

could not fsync log segment XLogFileNameP(ThisTimeLineID, openLogSegNo) and reason for failure also printed along with error. XLogFileNameP(ThisTimeLineID, openLogSegNo) currently open log segment (if any). Also, if the open flag is changing, close the log file so it will be reopened (with new flag bit) at next use.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.9 16708

could not fsync write-through log file @1@: @2@

[Description]

could not fsync write-through log file XLogFileNameP(ThisTimeLineID, segno) and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.10 16709

could not get current working directory: @1@

[Description]

could not get current working directory:strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.11 16710

could not get home directory for user ID @1@: @2@

[Description]

could not get home directory for user ID user_id and strerror(errno) if errno set otherwise print _("user does not exist").

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.12 16711

could not get junction for "@1@": @2@

[Description]

could not get junction for path :msg.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.13 16712

could not get relation name for OID @1@: @2@

[Description]

could not get relation name for OID te->catalogId.oid, PQerrorMessage(AH->connection).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.14 16713

could not get shared memory segment: @1@

[Description]

could not get shared memory segment and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.15 16714

Could not identify system: got @1@ rows and @2@ fields, expected @3@ rows and @4@ or more fields

[Description]

Could not identify system: got res->ntups rows and res->numAttributes fields, expected 3 rows and 1or more fields.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.16 16715

could not import a module for Decimal constructor

[Description]

could not import a module for Decimal constructor.Try to import cdecimal. If it doesn't exist, fall back to decimal.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.17 16716

could not initialize LDAP: @1@

[Description]

could not initialize LDAP and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.18 16719

could not look up local user ID @1@: @2@

[Description]

could not look up local user ID geteuid() and error string for the corresponding errno will be printed or if it is unknown error it will print "Unknown error".

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.19 16720

could not look up local user ID @1@: @2@

[Description]

could not look up local user ID (long)uid and if errno is set error string for the corresponding errno will be printed otherwise "user does not exist" will be printed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.20 16721

could not map anonymous shared memory: @1@

[Description]

could not map anonymous shared memory and the reason for failure will be printed along with error.If errno is ENOMEM means This error usually means that PostgreSQL's request for a shared memory segment exceeded available memory, swap space, or huge pages. To reduce the request size (currently size bytes), reduce PostgreSQL's shared memory usage, perhaps by reducing shared_buffers or max_connections.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.21 16722

could not map shared memory segment "@1@": @2@

[Description]

could not map shared memory segment handle name and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.22 16723

could not obtain lock on relation "@1@"

[Description]

could not obtain lock on relation relation name. Lock relation. This will also accept any pending invalidation messages. If we got back InvalidOid, indicating not found, then there's nothing to lock, but we accept invalidation messages anyway, to flush any negative catcache entries that may be lingering.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.23 16724

could not open backend variables file "@1@": @2@

[Description]

could not open backend variables file id and strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.24 16725

could not open configuration directory "@1@": @2@

[Description]

could not open configuration directory absolute location of includedir and the reason for failure also be printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.25 16726

could not open shared memory segment "@1@": @2@

[Description]

could not open shared memory segment dsm handle name and reason for failure also printed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.26 16727

could not open transaction log file "@1@": @2@

[Description]

could not open transaction log file path and reason for failure also prined along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.27 16728

could not parse file name "@1@"

[Description]

could not parse file name path name. temporary filenames from SnapBuildSerialize() include the LSN and everything but are postfixed by .$pid.tmp. We can just remove them the same as other files because there can be none that are currently being written that are older than cutoff. We just log a message if a file doesn't fit the pattern, it's probably some editors lock/state file or similar...

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.28 16729

could not parse LDAP URL "@1@": @2@

[Description]

could not parse LDAP URL val and ldap_err2string on the return value of ldap_url_parse.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.29 16730

could not perform initial LDAP bind for ldapbinddn "@1@" on server "@2@": @3@

[Description]

could not perform initial LDAP bind for ldapbinddn port->hba->ldapbinddn on server port->hba->ldapserver and ldap_err2string on the return value of ldap_simple_bind_s. Bind with a pre-defined username/password (if available) for searching. If none is specified, this turns into an anonymous bind.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.30 16731

could not read directory "@1@": @2@

[Description]

could not read directory path and strerrror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.31 16732

could not read file "@1@", read @2@ of @3@: @4@

[Description]

could not read file path, read readBytes of (int) SnapBuildOnDiskConstantSize) and the reason for failure also printed along with error.This error can occur during readingstatically sized portion of snapshot or reading SnapBuild or during restore running xacts information or during restore committed xacts information.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.32 16733

could not read file "@1@", read @2@ of @3@: @4@

[Description]

could not read file , path read readBytes of (uint32) ReplicationSlotOnDiskConstantSize) and the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.33 16734

could not read from backend variables file "@1@": @2@

[Description]

could not read from backend variables file id and strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.34 16735

could not read from file "@1@": read @2@ instead of @3@ bytes

[Description]

could not read from file path: read readBytes instead of (int32) sizeof(LogicalRewriteMappingData) bytes.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.35 16736

could not read from log segment @1@, offset @2@, length @3@: @4@

[Description]

could not read from log segment XLogFileNameP(curFileTimeLine, sendSegNo), offset sendOff, length (unsigned long) segbytes) and the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.36 16737

could not read from log segment @1@, offset @2@: @3@

[Description]

could not read from log segment fname, offset readOff and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.37 16738

could not read from reorderbuffer spill file: @1@

[Description]

could not read from reorderbuffer spill file and the reason for failure also be printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.38 16739

could not read from reorderbuffer spill file: read @1@ instead of @2@ bytes

[Description]

could not read from reorderbuffer spill file: read readBytes instead of (uint32) sizeof(ReorderBufferDiskChange) bytes.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.39 16740

could not read from tuplestore temporary file: @1@

[Description]

could not read from tuplestore temporary file and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.40 16741

could not read time zone file "@1@": @2@

[Description]

could not read time zone file filename and the reason for failure also be printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.41 16742

could not receive timeline history file from "the primary server: @1@

[Description]

could not receive timeline history file from "the primary server:PQerrorMessage(streamConn).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.42 16743

could not remove directory "@1@"

[Description]

could not remove directory tmppath.If removing the directory fails, the worst thing that will happen is that the user won't be able to create a new slot with the same name until the next server restart.we crashed while a slot was being setup or deleted, clean up.If we crashed with an ephemeral slot active, don't restore but delete it.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.43 16744

could not remove shared memory segment "@1@": @2@

[Description]

could not remove shared memory segment name and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.44 16746

could not resize shared memory segment "@1@" to @2@ bytes: @3@

[Description]

could not resize shared memory segment name to request_size bytes.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.45 16747

Could not resolve client IP address to a host name: @1@

[Description]

Could not resolve client IP address to a host name gai_strerror(port->remote_hostname_errcode).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.46 16748

could not restore file "@1@" from archive: @2@

[Description]

could not restore file xlogfname from archive: Returns a human-readable string explaining the reason a child process terminated by taking the argument as rc.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.47 16749

could not search LDAP for filter "@1@" on server "@2@": @3@

[Description]

could not search LDAP for filter filter on server port->hba->ldapserver: ldap_err2string(return value of ldap_search_s).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.48 16750

could not seek in log file @1@ to offset @2@: @3@

[Description]

could not seek in log file XLogFileNameP(ThisTimeLineID, openLogSegNo) to offset startoffset and reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.49 16751

could not seek in log segment @1@ to offset @2@: @3@

[Description]

could not seek in log segment fname to offset readOff: the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.50 16752

could not seek in tuplestore temporary file: @1@

[Description]

could not seek in tuplestore temporary file and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.51 16753

could not seek to beginning of file "@1@": @2@

[Description]

could not seek to beginning of file path and the reason for failure also printed along with error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.52 16754

could not send end-of-streaming message to primary: @1@

[Description]

could not send end-of-streaming message to primary: PQerrorMessage(streamConn).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.53 16755

could not set LDAP protocol version: @1@

[Description]

could not set LDAP protocol version: ldap_err2string(return value of ldap_set_option).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.54 16756

could not set socket to nonblocking mode: @1@

[Description]

could not set socket to nonblocking mode: the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.55 16757

could not set socket to nonblocking mode: @1@

[Description]

could not set socket to nonblocking mode: SOCK_STRERROR(SOCK_ERRNO, sebuf, sizeof(sebuf).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.56 16758

could not set variable "@1@"

[Description]

could not set variable varname.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.57 16759

could not start LDAP TLS session: @1@

[Description]

could not start LDAP TLS session: ldap_err2string(return value of _ldap_start_tls_sA).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.58 16760

could not stat control file "@1@": @2@

[Description]

could not stat control file XLOG_CONTROL_FILE and reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.59 16761

could not stat file or directory "@1@": @2@

[Description]

could not stat file or directory path/TABLESPACE_VERSION_DIRECTORY :the reason for failure printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.60 16762

could not stat file "@1@": @2@

[Description]

could not stat file options->file,strerror(errno).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.61 16763

could not stat shared memory segment "@1@": @2@

[Description]

could not stat shared memory segment name:the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.62 16764

could not stat trigger file "@1@": @2@

[Description]

Check to see whether the user-specified trigger file exists and whether apromote request has arrived. If either condition holds, return true.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.63 16765

Could not translate client host name "@1@" to IP address: @2@

[Description]

could not translate the client host name to ip address.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.64 16766

could not truncate file "@1@" to @2@: @3@

[Description]

Truncate all data that's not guaranteed to have been safely fsynced (by previous record or by the last checkpoint).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.65 16767

could not unmap shared memory segment "@1@": @2@

[Description]

could not unmap shared memory segment name: the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.66 16768

could not write to COPY program: @1@

[Description]

could not write to COPY program: the reason for failure is printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.67 16769

could not write to data file for XID @1@: @2@

[Description]

could not write to data file for XID txn->xid) and the reason for failure is also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.68 16770

could not write to file "@1@", wrote @2@ of @3@: @4@

[Description]

could not write to file src->path, wrote written of len: the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.69 16771

could not write to log file @1@ at offset @2@, length @3@: @4@

[Description]

could not write to log file XLogFileNameP(ThisTimeLineID, openLogSegNo) at offset openLogOff length nbytes: the reason for failure also printed along with the error.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.70 16772

could not write to log segment @1@ at offset @2@, length @3@: @4@

[Description]

if write didn't set errno, assume no disk space

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.71 16773

could not write to the communication channel: @1@

[Description]

1.This function is executed in the worker process.It sends a message to the master on the communication channel.

2.This function is executed in the master process.It sends a message to a certain worker on the communication channel.If we're already aborting anyway, don't care if we succeed or not.The child might have gone already.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.72 16774

could not write to tuplestore temporary file:@1@

[Description]

could not write to tuplestore temporary file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.73 16775

database connection requirement not indicated during registration

[Description]

This flag means the bgworker requires a database connection. The connectionis not established automatically; the worker must establish it later.It requires that BGWORKER_SHMEM_ACCESS was passed too.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.74 16776

database is not accepting commands that generate new MultiXactIds to avoid wraparound data loss in database "@1@"

[Description]

database is not accepting commands that generate new MultiXactIds to avoid wraparound data loss in database Execute a database-wide VACUUM in that databaseYou might also need to commit or roll back old prepared transactions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.75 16777

database is not accepting commands that generate new MultiXactIds to avoid wraparound data loss in database with OID

[Description]

Execute a database-wide VACUUM in that database.You might also need to commit or roll back old prepared transactions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.76 16778

database "@1@" is used by a logical replication slot

[Description]

Check whether there are, possibly unconnected, logical slots that refer to the to-be-dropped database. The database lock we are holding prevents the creation of new slots using the database. ReplicationSlotsCountDBSlots -- count the number of slots that refer to the passed database oid.Returns true if there are any slots referencing the database. *nslots will be set to the absolute number of slots in the database, *nactive to ones currently active.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.77 16779

date field value out of range: @1@-@2@-@3@

[Description]

date field value out of range Note: we'll reject zero or negative year values. Perhaps negativesshould be allowed to represent BC years?

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.78 16780

date out of range: @1@-@2@-@3@

[Description]

date out of rangeNote: we'll reject zero or negative year values. Perhaps negativesshould be allowed to represent BC years?

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.79 16781

DECLARE CURSOR WITH HOLD ... @1@ is not supported

[Description]

DECLARE CURSOR WITH HOLD is not supported .FOR UPDATE and WITH HOLD are not compatible

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.80 16782

DECLARE INSENSITIVE CURSOR ... @1@ is not supported

[Description]

DECLARE INSENSITIVE CURSOR is not supportedFOR UPDATE and INSENSITIVE are not compatible

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.81 16783

DECLARE SCROLL CURSOR ... @1@ is not supported

[Description]

DECLARE SCROLL CURSOR is not supportedFOR UPDATE and SCROLL are not compatible

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.82 16784

ECDH: could not create key

[Description]

ECDH: could not create key

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.83 16785

ECDH: unrecognized curve name: @1@

[Description]

ECDH: unrecognized curve name

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.84 16786

enum label "@1@" already exists

[Description]

Check if label is already in use. The unique index on pg_enum would catch this anyway, but we prefer a friendlier error message, and besides we need a check to support IF NOT EXISTS.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.85 16788

error processing a parallel work item

[Description]

error processing a parallel work itemIt looks for an idle worker process and only returns if there is one.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.86 16789

error reading result of streaming command: @1@

[Description]

error reading result of streaming command

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.87 16790

event trigger functions cannot have declared arguments

[Description]

event trigger functions cannot have declared argumentsshouldn't be any declared arguments

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.88 16791

event trigger name cannot be qualified

[Description]

event trigger name cannot be qualifiedThe types of names handled by this function are not permitted to beschema-qualified or catalog-qualified.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.89 16792

event trigger "@1@" already exists

[Description]

An event trigger of same name is already exist

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.90 16793

event triggers are not supported for @1@

[Description]

Validate DDL command tags.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.91 16794

event trigger "@1@" does not exist

[Description]

event trigger does not exist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.92 16795

event trigger "@1@" does not exist, skipping

[Description]

Generate a NOTICE stating that the named object was not found, and isbeing skipped. This is only relevant when "IF EXISTS" is used; otherwise,get_object_address() in RemoveObjects would have thrown an ERROR.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.93 16796

event trigger with OID @1@ does not exist

[Description]

event trigger with OID does not exist

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.94 16797

exceeded maxAllocatedDescs (@1@) while trying to execute command "@2@

[Description]

exceeded maxAllocatedDescs while trying to execute command

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.95 16798

Expected 1 tuple with 2 fields, got @1@ tuples with @2@ fields.

[Description]

Expected 1 tuple with 2 fields

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.64.96 16799

Expected array element or "]", but found "@1@

[Description]

The context of the parser is maintained by the recursive descent mechanism, but is passed explicitly to the error reporting routine for better diagnostics.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65 Message Numbers Beginning with 16800

2.65.1 16800

Expected a transaction log switchpoint location.

[Description]

Expected a transaction log switchpoint location.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.2 16801

Expected ":", but found "@1@"

[Description]

invalid input syntax for type json The context of the parser is maintained by the recursive descent mechanism, but is passed explicitly to the error reporting routine for better diagnostics.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.3 16802

extended query protocol not supported in a replication connection

[Description]

'firstchar' specifies what kind of a forbidden message was received, and is used to construct the error message.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.4 16803

fastpath function calls not supported in a replication connection

[Description]

'firstchar' specifies what kind of a forbidden message was received, and is used to construct the error message.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.5 16804

field name must not be null

[Description]

If function is not marked "proisstrict" in pg_proc, it must check for null arguments using this macro. Do not try to GETARG a null argument!

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.6 16805

FILTER is not implemented for non-aggregate window functions

[Description]

FILTER is not yet supported with true window functions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.7 16806

filters not supported in LDAP URLs.

[Description]

filters not supported in LDAP URLs.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.8 16807

FILTER specified, but @1@ is not an aggregate function

[Description]

FILTER specified, but the function is not an aggregate function

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.9 16808

filter value "@1@" not recognized for filter variable "@2@"

[Description]

Validate DDL command tags

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.10 16809

filter variable "@1@" specified more than once

[Description]

Complain about a duplicate filter variable.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.11 16810

final function with extra arguments must not be declared STRICT

[Description]

When finalfnExtraArgs is specified, the finalfn will certainly be passed at least one null argument, so complain if it's strict.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.12 16811

first argument of @1@ must be a row type

[Description]

Convenience function to determine whether a type OID represents a "rowtype" type --- either RECORD or a named composite type.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.13 16812

FORCE NULL column "@1@" not referenced by COPY

[Description]

Convert FORCE NULL name list to per-column flags, check validity

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.14 16813

foreign key referenced-columns list must not contain duplicates

[Description]

Reject duplicate appearances of columns in the referenced-columns list. Such a case is forbidden by the SQL standard, and even if we thought it useful to allow it, there would be ambiguity about how to match the list to unique indexes (in particular, it'd be unclear which indexopclass goes with which FK column).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.15 16814

Foreign tables cannot have constraint triggers.

[Description]

Foregin key table does not contain constraint triggers

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.16 16815

Foreign tables cannot have INSTEAD OF triggers.

[Description]

Foreign tables cannot have INSTEAD OF triggers.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.17 16816

Foreign tables cannot have TRUNCATE triggers.

[Description]

Foreign tables cannot have TRUNCATE triggers.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.18 16817

foreign table "@1@" does not allow deletes

[Description]

foreign table does not allow deletes

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.19 16818

foreign table "@1@" does not allow inserts

[Description]

foreign table does not allow inserts

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.20 16819

foreign table "@1@" does not allow updates

[Description]

foreign table \"%s\" does not allow updates

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.21 16820

foreign table "@1@" does not exist, skipping

[Description]

the foreign table is not existing.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.22 16821

format specifies argument 0, but arguments are numbered from 1

[Description]

Explicit 0 for argument index is immediately refused

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.23 16822

function returning record called in context that cannot accept type record

[Description]

1.failed to determine actual type of RECORDfunction returning record called in context that cannot accept type record

2.get the tupdesc from the result set info - it must be a record typebecause we already checked that arg1 is a record type, or we're in ato_record function which returns a setof record.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.24 16823

function @1@ must accept VARIADIC ANY to be used in this aggregate

[Description]

If the agg is declared to take VARIADIC ANY, the underlying functionshad better be declared that way too, else they may receive too manyparameters; but func_get_detail would have been happy with plain ANY.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.25 16824

function "@1@" must return type "event_trigger"

[Description]

Find and validate the trigger function.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.26 16825

hot standby is not possible because wal_level was not set to "hot_standby" or higher on the master server

[Description]

For Hot Standby, the WAL must be generated with 'hot_standby' mode, andwe must have at least as many backend slots as the primary.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.27 16826

huge pages not supported on this platform

[Description]

huge pages not supported on this platform if the value is 1

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.28 16827

huge TLB pages not supported on this platform

[Description]

huge pages not supported on this platform if the value is 1

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.29 16829

index row size @1@ exceeds hash maximum @2@

[Description]

Check whether the item can fit on a hash page at all. (Eventually, we ought to try to apply TOAST methods if not.) Note that at this point,itemsz doesn't include the ItemId.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.30 16830

index row size @1@ exceeds maximum @2@ for index "@3@"

[Description]

If the tuple would be too big to be stored, function throws a suitable error if errorTooBig is TRUE, or returns NULL if errorTooBig is FALSE.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.31 16831

index "@1@" cannot be used as replica identity because column "@2@" is nullable

[Description]

Check index for nullable columns.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.32 16832

index "@1@" contains a half-dead internal page

[Description]

Pre-9.4 page deletion only marked internal pages as half-dead,but now we only use that flag on leaf pages.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.33 16833

interval time zone "@1@" must not include months or days

[Description]

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.34 16834

interval units "@1@" not supported because months usually have fractional weeks

[Description]

default condition of the switch statement with condition val

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.35 16835

invalid backup block size in record at @1@/@2@

[Description]

Add in the backup blocks, if any

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.36 16836

invalid contrecord length @1@ at @2@/@3@

[Description]

Cross-check that xlp_rem_len agrees with how much of the record we expect there to be left.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.37 16837

invalid flags for opening a large object: @1@

[Description]

Large object descriptor, appropriately filled in. The descriptor and subsidiary data are allocated in the specified memory context,which must be suitably long-lived for the caller's purposes.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.38 16839

invalid input syntax for numeric time zone: "@1@"

[Description]

Note pg_tzset happily parses numeric input that DecodeTimezone would reject. To avoid having it accept input that would otherwise be seen as invalid, it's enough to disallow having a digit in the first position of our input string.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.39 16840

invalid input syntax for type json

[Description]

Per RFC4627, these characters MUST be escaped. Since *s isn't printable, exclude it from the context string.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.40 16841

invalid input syntax for type pg_lsn: "@1@"

[Description]

Sanity check input format.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.41 16842

invalid large object write request size:@1@

[Description]

the addition in the condition can't overflow because nbytes is only int32

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.42 16843

invalid line number: @1@

[Description]

validating the line number.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.43 16844

invalid line specification: A and B cannot both be zero

[Description]

invalid line specification: A and B cannot both be zero

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.44 16845

invalid line specification: must be two distinct points

[Description]

invalid line specification: must be two distinct points

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.45 16846

invalid locale name: "@1@"

[Description]

Check that the chosen locales are valid, and get canonical spellings

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.46 16847

invalid magic number @1@ in log segment @2@, offset @3@

[Description]

invalid magic number in log segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.47 16848

invalid message received from worker:@1@

[Description]

Invalid message received from worker.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.48 16849

invalid MultiXactId: @1@

[Description]

No work except at first MultiXactId of a page. But beware: just after wraparound, the first MultiXactId of page zero is FirstMultiXactId.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.49 16850

invalid page in block @1@ of relation @2@

[Description]

verifying the page in block of relations

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.50 16851

invalid page in block @1@ of relation @2@; zeroing out page

[Description]

invalid page in block of relation, zeroing out page

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.51 16852

invalid processing mode in background worker

[Description]

it had better not gotten out of "init" mode yet

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.52 16853

invalid scale in external "numeric" value

[Description]

invalid scale in external

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.53 16854

invalid timeline @1@

[Description]

invalid timeline

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.54 16855

invalid value for "buffering" option

[Description]

Validator for "buffering" reloption on GiST indexes. Allows "on", "off"and "auto" values.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.55 16856

invalid value for "check_option" option

[Description]

Validator for "check_option" reloption on views. The allowed values are "local" and "cascaded".

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.56 16857

invalid value for parameter "replication"

[Description]

Try to interpret value as boolean value. Valid values are: true,false, yes, no, on, off, 1, 0; as well as unique prefixes thereof.If the string parses okay, return true, else false. If okay and result is not NULL, return the value in *result.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.57 16858

invalid value for recovery parameter "recovery_target"

[Description]

the recovery parameter name should be "recovery_target" and the recovery parameter value should be "immediate" .

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.58 16859

invalid value "@1@" for "@2@"

[Description]

1.checking if the parsed character is greater than 0 and that parsed character is less than required.

2.check if the source is equal to init

3.if the length is not valid

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.59 16860

invalid whence setting: @1@

[Description]

Note: overflow in the additions is possible, but since we will reject negative results, we don't need any extra test for that.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.60 16861

JSON does not support infinite date values.

[Description]

XSD doesn't support infinite values.Infinity and minus infinity must be the max and min values of DateADT.We could use INT_MIN and INT_MAX here, but seems better to not assume that int32 == int.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.61 16862

JSON does not support infinite timestamp values

[Description]

XSD doesn't support infinite values

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.62 16863

Junk after closing right brace

[Description]

only whitespace is allowed after the closing brace.We used to use isspace() for parsing array values, but that has undesirable results: an array value might be silently interpreted differently depending on the locale setting. Now we just hard-wire the traditional ASCII definition of isspace().

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.63 16864

Junk view columns are not updatable

[Description]

the only updatable columns we support are those that are Vars referring to user columns of the underlying base relation.The view targetlist may contain resjunk columns (e.g., a view defined like "SELECT * FROM t ORDER BY a+b" is auto-updatable) but such columns are not auto-updatable, and in fact should never appear in the outer query's targetlist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.64 16865

large object read request is too large

[Description]

A result_length calculated from loSize may not fit in a size_t. Check that the size will satisfy this and subsequently-enforced size limits.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.65 16866

LIKE is not supported for creating foreign tables

[Description]

we could support LIKE in many cases, but worry about it another day

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.66 16867

lock file "@1@" is empty

[Description]

Either another server is starting, or the lock file is the remnant of a previous server startup crash.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.67 16868

logical decoding cannot be used while in recovery

[Description]

We check shared state each time only until we leave recovery mode. We can't re-enter recovery, so there's no need to keep checking after the shared variable has once been seen false.Note: We don't need a memory barrier when we're still in recovery. We might exit recovery immediately after return, so the caller can't rely on 'true' meaning that we're still in recovery anyway.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.68 16869

logical decoding requires a database connection

[Description]

Make sure the current settings & environment are capable of doing logicaldecoding.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.69 16870

logical decoding requires wal_level >= logical

[Description]

Make sure the current settings & environment are capable of doing logicaldecoding.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.70 16871

lo_lseek result out of range for large-object descriptor @1@

[Description]

guard against result overflow

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.71 16872

lo_tell result out of range for large-object descriptor @1@

[Description]

guard against result overflow

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.72 16873

malformed range literal: "@1@"

[Description]

first check for the empty range and then the rest should be whitespace. and then check if the string is not null terminated

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.73 16874

materialized views may not be defined using bound parameters

[Description]

A materialized view would either need to save parameters for use in maintaining/loading the data or prohibit them entirely.The latter seems safer and more sane.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.74 16875

materialized views must not use data-modifying statements in WITH

[Description]

Prohibit a data-modifying CTE in the query used to create a materialized view. It's not sufficiently clear what the user would want to happen if the MV is refreshed or incrementally maintained.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.75 16876

materialized views must not use temporary tables or views

[Description]

Check whether any temporary database objects are used in the creation query. It would be hard to refresh data or incrementally maintain it if a source disappeared.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.76 16877

mismatched array dimensions

[Description]

take separate key and value arrays of text to construct a json object pairwise.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.77 16878

Missing array dimension value

[Description]

Missing array dimension value

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.78 16879

more than one row returned for \\gset

[Description]

StoreQueryTuple: assuming query result is OK, save data into variables

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.79 16880

moving-aggregate implementation returns type @1@, but plain implementation returns type @2@

[Description]

check if the moving-aggregate implementation returns type is not same as that of plain implementation returns type

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.80 16881

moving-aggregate transition function must not return null

[Description]

Moving-aggregate transition functions must not return null, for more see advance_windowaggregate_base().

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.81 16882

Multidimensional arrays must have sub-arrays with matching dimensions

[Description]

Multidimensional arrays must have sub-arrays with matching dimensionsArrayCount will Determines the dimensions for an array string.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.82 16883

multiple column definition lists are not allowed for the same function

[Description]

check if the codelist and the range functions codelist ie., the multiple column definition list for the same function

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.83 16884

MultiXactId @1@ does no longer exist -- apparent wraparound

[Description]

MultiXactId does no longer exist -- apparent wraparound

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.84 16885

MultiXactId @1@ has not been created yet -- apparent wraparound

[Description]

MultiXactId has not been created yet -- apparent wraparound

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.85 16886

must be owner of event trigger @1@

[Description]

the MAX_ACL_KIND object types that can have privilege errors

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.86 16887

must be superuser or replication role to start walsender

[Description]

Check replication permissions needed for walsender processes.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.87 16888

must be superuser or replication role to use replication slots

[Description]

must be superuser or replication role to use replication slots

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.88 16889

must be superuser to alter settings globally

[Description]

Must be superuser to alter settings globally.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.89 16890

must be superuser to COPY to or from an external program

[Description]

Disallow COPY to/from file or program except to superusers.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.90 16891

Must be superuser to create an event trigger

[Description]

It would be nice to allow database owners or even regular users to do this, but there are obvious privilege escalation risks which would have to somehow be plugged first.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.91 16892

must be superuser to execute ALTER SYSTEM command

[Description]

must be superuser to execute ALTER SYSTEM command

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.92 16894

new data for "@1@" contains duplicate rows without any null columns

[Description]

Note that this ereport() is returning data to the user. Generally, we would want to make sure that the user has been granted access to this data. However, REFRESH MAT VIEW is only able to be run by the owner of the mat view (or a superuser) and therefore there is no need to check for access to data in the mat view.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.93 16895

new row violates WITH CHECK OPTION for view "@1@"

[Description]

WITH CHECK OPTION checks are intended to ensure that the new tuple is visible in the view. If the view's qual evaluates to NULL, then the new tuple won't be included in the view. Therefore we need to tell ExecQual to return FALSE for NULL (the opposite of what we do above for CHECK constraints).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.94 16896

no Decimal attribute in module

[Description]

the module is not contain any Decimal attribute.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.95 16897

no matching relations in tablespace "@1@" found

[Description]

there is no matching relations in tablespace.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.96 16898

no rows returned for \\gset

[Description]

StoreQueryTuple: assuming query result is OK, save data into variables Returns true if successful, false otherwise.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.65.97 16899

not enough arguments for cursor "@1@"

[Description]

check the syntax immediately, instead ofchecking the final expression that may have the arguments reordered. Trailing whitespace must not be trimmed, because otherwise input of the form (param -- comment\n, param) would be translated into a form where the second parameter is commented out.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66 Message Numbers Beginning with 16900

2.66.1 16900

not enough shared memory for data structure "@1@" (@2@ bytes requested)

[Description]

If the shmem index doesn't exist, we are bootstrapping: we must be trying to init the shmem index itself. Notice that the ShmemIndexLock is released before the shmem index has been initialized. This should be OK because no other process can be accessing shared memory yet.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.2 16901

not enough shared memory for elements of data structure "@1@" (@2@ bytes requested)

[Description]

not enough shared memory for elements of data structure

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.3 16902

null value not allowed for object key

[Description]

null value not allowed for object key

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.4 16903

number is out of range

[Description]

check if the number is coming out of range ie.,in betwwen 0 and 9.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.5 16904

number of jsonb array elements exceeds the maximum allowed (@1@)

[Description]

number of jsonb array elements exceeds the maximum allowed

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.6 16905

number of jsonb object pairs exceeds the maximum allowed (@1@)

[Description]

number of jsonb object pairs exceeds the maximum allowed

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.7 16906

number of parameters must be between 0 and 65535

[Description]

number of parameters must be between 0 and 65535

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.8 16907

Numeric time zones must have "-" or "+" as first character.

[Description]

The starting charactor of the numeric time zone should not digit.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.9 16908

numeric time zone "@1@" out of range

[Description]

DecodeTimezone()-Interpret string as a numeric timezone. Return 0 if okay (and set *tzp), a DTERR code if not okay.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.10 16909

Object keys should be text

[Description]

If function is not marked "proisstrict" in pg_proc, it must check for null arguments using this macro. Do not try to GETARG a null argument!

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.11 16910

only ordered-set aggregates can be hypothetical

[Description]

Symbolic values for aggkind column. We distinguish normal aggregates from ordered-set aggregates (which have two sets of arguments, namely direct and aggregated arguments) and from hypothetical-set aggregates (which are a subclass of ordered-set aggregates in which the last direct arguments have to match up in number and datatypes with the aggregated arguments).

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.12 16911

only tables, indexes, and materialized views exist in tablespaces

[Description]

only tables, indexes, and materialized views exist in tablespaces

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.13 16912

operator not allowed in variable definition

[Description]

operator not allowed in variable definition

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.14 16913

option --if-exists requires option -c/--clean

[Description]

option --if-exists requires option -c/--clean

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.15 16914

outer-level aggregate cannot contain a lower-level variable in its direct arguments

[Description]

Now check for vars/aggs in the direct arguments, and throw error if needed. Note that we allow a Var of the agg's semantic level, but not an Agg of that level. In principle such Aggs could probably be supported, but it would create an ordering dependency among the aggregates at execution time. Since the case appears neither to be required by spec nor particularly useful, we just treat it as a nested-aggregate situation.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.16 16915

out-of-sequence timeline ID @1@ (after @2@) in log segment @3@, offset @4@

[Description]

Since child timelines are always assigned a TLI greater than their immediate parent's TLI, we should never see TLI go backwards across successive pages of a consistent WAL sequence.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.17 16916

OVER is not supported for ordered-set aggregate @1@

[Description]

window functions must be called with a window definition.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.18 16917

page verification failed, calculated checksum @1@ but expected @2@

[Description]

Throw a WARNING if the checksum fails, but only after we've checked for the all-zeroes case.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.19 16918

parallel backup only supported by the directory format

[Description]

Parallel backup only in the directory archive format so far

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.20 16920

percentile value @1@ is not between 0 and 1

[Description]

percentile value should be in between 0 and 1.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.21 16921

permission denied for event trigger @1@

[Description]

the no_priv_msg array object is ACL_KIND_EVENT_TRIGGER

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.22 16922

permission denied to change owner of event trigger "@1@\

[Description]

New owner must be a superuser

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.23 16923

permission denied to create event trigger "@1@"

[Description]

It would be nice to allow database owners or even regular users to do this, but there are obvious privilege escalation risks which would have to somehow be plugged first.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.24 16924

pg_largeobject entry for OID @1@, page @2@ has invalid data field size @3@

[Description]

the size of the data field of pg_largeobject entry is less than 0 or greater than LOBLKSIZE.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.25 16926

range constructor flags argument must not be null

[Description]

range constructor flags argument must not be null

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.26 16927

relation "@1@" in @2@ clause not found in FROM clause

[Description]

the list cell is NULL for ensuring the SQL row locking clause such as FOR UPDATE is not found in FROM clause

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.27 16928

removing elements from multidimensional arrays is not supported

[Description]

We can't remove elements from multi-dimensional arrays, since the result might not be rectangular.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.28 16929

renaming an ON SELECT rule is not allowed

[Description]

We disallow renaming ON SELECT rules, because they should always be named "_RETURN".

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.29 16930

replication slot file @1@: checksum mismatch, is @2@, should be @3@

[Description]

verify the CRCs.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.30 16931

replication slot file "@1@" has corrupted length @2@

[Description]

boundary check on length

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.31 16932

replication slot file "@1@" has unsupported version

[Description]

verify version

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.32 16933

eplication slot file "@1@" has wrong magic @2@ instead of @3@

[Description]

verify magic

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.33 16934

replication slot name "@1@" contains invalid character

[Description]

Replication slot names may only contain letters, numbers, and the underscore character

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.34 16935

replication slot name "@1@" is too long

[Description]

Maximum length for identifiers (e.g. table names, column names, function names). Names actually are limited to one less byte than this, because the length must include a trailing zero byte.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.35 16936

replication slot name "@1@" is too short

[Description]

Check whether the passed slot name is valid and report errors at elevel.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.36 16937

Replication slot names may only contain letters, numbers, and the underscore character.

[Description]

Replication slot names may only contain letters, numbers, and the underscore character.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.37 16938

replication slot "@1@" already exists

[Description]

Check for name collision, and identify an allocatable slot. We need to hold ReplicationSlotControlLock in shared mode for this, so that nobody else can change the in_use flags while we're looking at them.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.38 16939

replication slots can only be used if max_replication_slots > 0.

[Description]

replication slots can only be used if max_replication_slots > 0

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.39 16940

replication slots can only be used if wal_level >= archive

[Description]

replication slots can only be used if wal_level >= archive

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.40 16941

replication slot "@1@" does not exist

[Description]

replication slot does not exist

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.41 16942

replication slot "@1@" is already active

[Description]

replication slot is already active

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.42 16943

replication slot "@1@" was not created in this database

[Description]

replication slot was not created in this database

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.43 16944

requested character not valid for encoding: @1@

[Description]

requested character not valid for encoding

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.44 16945

requested starting point @1@/@2@ is ahead of the WAL flush position of this server @3@/@4@

[Description]

requested starting point is ahead of the WAL flush position of this server

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.45 16946

requested starting point @1@/@2@ on timeline @3@ is not in this server's history

[Description]

requested starting point on timeline is not in this server's history

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.46 16947

requested timeline @1@ does not contain minimum recovery point @2@/@3@ on timeline @4@

[Description]

requested timeline does not contain minimum recovery point on timeline

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.47 16948

requested timeline @1@ is not a child of this server's history

[Description]

requested timeline is not a child of this server's history

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.48 16949

requested timeline @1@ is not in this server's history

[Description]

requested timeline is not in this server's history

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.49 16950

RETURNING list entry has type @1@, but column has type @2@.

[Description]

RETURNING list entry and column are of different types.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.50 16951

RETURNING must have at least one column

[Description]

RETURNING must have at least one column.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.51 16952

return type of inverse transition function @1@ is not @2@

[Description]

return type of inverse transition function must exactly match declared mtranstype

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.52 16953

row is too big: size @1@, maximum size @2@

[Description]

row is too big.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.53 16954

ROWS FROM() with multiple functions cannot have a column definition list

[Description]

ROWS FROM() with multiple functions cannot have a column definition list

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.54 16955

rules on materialized views are not supported

[Description]

rules on materialized views are not supported

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.55 16956

@1@ cannot be applied to a function

[Description]

cannot be applied to a function

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.56 16957

@1@ cannot be applied to a join

[Description]

cannot be applied to a join

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.57 16958

@1@ cannot be applied to a WITH query

[Description]

cannot be applied to a WITH query

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.58 16959

@1@ cannot be applied to the nullable side of an outer join

[Description]

cannot be applied to the nullable side of an outer join

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.59 16960

@1@ cannot be applied to VALUES

[Description]

cannot be applied to VALUES

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.60 16961

@1@: cannot cluster specific table(s) in all databases

[Description]

cannot cluster specific table(s) in all databases

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.61 16962

@1@: cannot reindex specific index(es) and system catalogs at the same time

[Description]

cannot reindex specific index(es) and system catalogs at the same time

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.62 16963

@1@: cannot reindex specific index(es) in all databases

[Description]

cannot reindex specific index(es) in all databases

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.63 16964

@1@: cannot reindex specific table(s) and system catalogs at the same time

[Description]

cannot reindex specific table(s) and system catalogs at the same time

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.64 16965

@1@: cannot reindex specific table(s) in all databases

[Description]

cannot reindex specific table(s) in all databases

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.65 16966

@1@: cannot use --create-slot or --drop-slot together with --startpos

[Description]

cannot use create-slot or drop-slot together with startpos

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.66 16967

@1@: cannot use --create-slot or --start together with --drop-slot

[Description]

cannot use create-slot or start-slot together while doing a drop-slot

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.67 16968

@1@: cannot vacuum specific table(s) in all databases

[Description]

cannot vacuum specific table(s) in all databases

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.68 16969

@1@ can only be called in a sql_drop event trigger function

[Description]

can only be called in a sql_drop event trigger function

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.69 16970

@1@: could not access directory "@2@": @3@

[Description]

Trouble in accessing directory

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.70 16971

@1@: could not allocate SIDs: error code @2@

[Description]

could not allocate security identifier(SID) and displays the last error returned by GetLastError().(GetLastError() is a windows specific call which returns one of the 500 System Error Codes)

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.71 16972

@1@: could not change permissions of directory "@2@": @3@

[Description]

could not change permissions of directory

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.72 16973

@1@: could not change permissions of "@2@": @3@

[Description]

Here chmod takes the PGPATH as path and options as S_IRUSR | S_IWUSR

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.73 16974

@1@: could not close directory "@2@": @3@

[Description]

closedir syscall called and errno set accordingly

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.74 16975

@1@: could not create archive status file "@2@": @3@

[Description]

This open syscall takes a temporary path name and flags O_WRONLY | O_CREAT | PG_BINARY and mode as S_IRUSR | S_IWUSR

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.75 16976

@1@: could not create replication slot "@2@": got @3@ rows and @4@ fields, expected @5@ rows and @6@ fields

[Description]

could not create replication slot as rows is not equal to 1 and fields is not greater than or equal to 4

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.76 16977

@1@: could not create symbolic link "@2@": @3@

[Description]

while creating symbolic path for a Xlog directory or tablespace path

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.77 16978

@1@: could not create timeline history file "@2@": @3@

[Description]

This open syscall takes a temporary path name and flags O_WRONLY | O_CREAT | PG_BINARY and mode as S_IRUSR | S_IWUSR

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.78 16979

@1@: could not drop replication slot "@2@": got @3@ rows and @4@ fields, expected @5@ rows and @6@ fields

[Description]

could not drop replication slot as rows and fields are not equal to zero

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.79 16980

@1@: could not fetch default options

[Description]

The function Pqconndefaults() Constructs a default connection options array, which identifies all the available options and shows any default values that are available from the environment etc. On error (eg out of memory), NULL is returned.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.80 16981

@1@: could not find own program executable

[Description]

find_my_exec() finds an absolute path to a valid executable

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.81 16982

@1@: could not fsync file "@2@": @3@

[Description]

could not fsync file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.82 16983

@1@: could not fsync log file "@2@": @3@

[Description]

could not fsync Log file.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.83 16984

@1@: could not identify system: got @2@ rows and @3@ fields, expected @4@ rows and @5@ or more fields

[Description]

Could not identify system as expected number of rows is not equal to 1 and number of fields is not greater than or equal to 3

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.84 16985

@1@: could not locate my own executable path

[Description]

find_my_exec() finds an absolute path to a valid executable

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.85 16986

@1@: could not open directory "@2@": @3@

[Description]

could not open directory

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.86 16987

@1@: could not open file "@2@": @3@

[Description]

could not open file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.87 16988

@1@: could not open log file "@2@": @3@

[Description]

could not open log file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.88 16989

@1@: could not open timeline history file "@2@": @3@

[Description]

could not open timeline history file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.89 16990

@1@: could not parse next timeline's starting point "@2@"

[Description]

could not parse next timeline's starting point

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.90 16991

@1@: could not parse start position "@2@"

[Description]

could not parse start position

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.91 16992

@1@: could not read directory "@2@": @3@

[Description]

could not read directory

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.92 16993

@1@: could not remove promote signal file "@2@": @3@

[Description]

could not remove promote signal file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.93 16994

@1@: could not rename file "@2@" to "@3@": @4@

[Description]

could not rename file(Here we move the completed history file into place with its final name)

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.94 16995

@1@: could not send copy-end packet: @2@

[Description]

PQputCopyEnd - send EOF indication to the backend during COPY IN. After calling this, use PQgetResult() to check command completion status. Returns 1 if successful, 0 if data could not be sent (only possible in nonblock mode), or -1 if an error occurs.

pqFlush - send any data waiting in the output buffer. Return 0 on success, -1 on failure and 1 when not all data could be sent because the socket would block and the connection is non-blocking.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.95 16996

@1@: could not stat file "@2@": @3@

[Description]

could not stat file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.66.96 16997

@1@: could not write timeline history file "@2@": @3@

[Description]

This write operation happens whileWriting the history file to pg_xlog or Writing the history file to disk

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.66.97 16998

@1@: could not write @2@ bytes to log file "@3@": @4@

[Description]

could not write the bytes to log file

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.66.98 16999

@1@: directory name too long

[Description]

directory name too long

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67 Message Numbers Beginning with 17000

2.67.1 17000

@1@: directory "@2@" does not exist

[Description]

directory does not exist,The errno ENOENT indicates that component of path does not exist, or path is an empty string.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.2 17001

@1@: directory "@2@" is not a database cluster directory

[Description]

directory is not a database cluster directory

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.3 17002

SELECT rule's target entry @1@ has different column name from column "@2@"cluster directory

[Description]

resname is required to represent the correct column name in non-resjunk entries of top-level SELECT targetlists, since it will be used as the column title sent to the frontend.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.4 17003

SELECT target entry has type @1@, but column has type @2@.

[Description]

SELECT column does not match target entry

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.5 17004

ShmemIndex entry size is wrong for data structure "@1@": expected @2@, actual @3@

[Description]

ShmemIndex entry size is wrong for data structure.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.6 17005

@1@: incompatible server version @2@; client does not support streaming from server versions newer than @3@

[Description]

incompatible server version ,client does not support streaming from server .ServerMajor and maxServerMajor are calculated as follows;(serverMajor = PQserverVersion(conn) / 100 and maxServerMajor = PG_VERSION_NUM / 100;)where PG_VERSION_NUM is 90401 and PQserverVersion returns the sversion; /* server version, e.g. 70401 for 7.4.1 */

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.7 17006

@1@: incompatible server version @2@; client does not support streaming from server versions older than @3@

[Description]

incompatible server version ,client does not support streaming from server .ServerMajor and minServerMajor are calculated as follows;(serverMajor = PQserverVersion(conn) / 100 and minServerMajor = 903;)where PQserverVersion returns the sversion; /* server version, e.g. 70401 for 7.4.1 */

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.8 17007

@1@: incompatible server version @2@

[Description]

incompatible server version; ServerMajor and maxServerMajor are calculated as follows;(minServerMajor = 903,serverMajor = PQserverVersion(conn) / 100 and maxServerMajor = PG_VERSION_NUM / 100;)where PG_VERSION_NUM is 90401 and PQserverVersion returns the sversion; /* server version, e.g. 70401 for 7.4.1 */

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.9 17008

@1@: invalid --max-rate unit: "@2@"

[Description]

after_num is obtained by passing src string to strtod

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.10 17009

@1@: invalid number of parallel jobs

[Description]

invalid number of parallel jobs

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.11 17010

@1@: invalid tablespace mapping format "@2@", must be "OLDDIR=NEWDIR"

[Description]

invalid tablespace mapping format

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.12 17011

@1@: invalid transfer rate "@2@": @3@

[Description]

invalid transfer rate

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.13 17012

@1@: invalid xlog-method option "@2@", must be "fetch" or "stream"

[Description]

invalid xlog-method option

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.14 17013

@1@ is not allowed with aggregate functions

[Description]

The return type of function LCS_asString is not allowed with aggregate functions.In this error case,the return type of LCS_asString is "FOR some"

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.15 17014

@1@ is not allowed with DISTINCT clause

[Description]

The return type of function LCS_asString is not allowed with aggregate functions.In this error case,the return type of LCS_asString is "FOR some"

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause

2.67.16 17015

@1@ is not allowed with GROUP BY clause

[Description]

The return string of LCS_asString() is not allowed with GROUP BY clause

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.17 17016

@1@ is not allowed with HAVING clause

[Description]

The return string of LCS_asString() is not allowed with HAVING clause

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.18 17017

@1@ is not allowed with set-returning functions in the target list

[Description]

The return string of LCS_asString() is not allowed with set-returning functions in the target list

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.19 17018

@1@ is not allowed with UNION/INTERSECT/EXCEPT

[Description]

The return string of LCS_asString() is not allowed with UNION/INTERSECT/EXCEPT

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.20 17019

@1@ is not allowed with window functions

[Description]

The return string of LCS_asString() is not allowed with window functions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.21 17020

"@1@" is not a materialized view

[Description]

The Relation that is returned by RelationGetRelationName() is not a materialized view

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.22 17021

@1@ is not an ordered-set aggregate, so it cannot have WITHIN GROUP

[Description]

Normal aggregate, so it can't have WITHIN GROUP

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.23 17022

"@1@" is not a table, materialized view, composite type, or foreign table

[Description]

If the particular relation is not a table, materialized view, composite type, or foreign table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.24 17023

"@1@" is not a table, materialized view, index, or foreign table

[Description]

The relation returned by the function RelationGetRelationName() is not a table, materialized view, index, or foreign table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.25 17024

"@1@" is not a table, materialized view, or index

[Description]

The relation is not a table, materialized view, or index

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.26 17025

"@1@" is not a table or materialized view

[Description]

The relation is not a table or materialized view

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.27 17026

"@1@" is not a table, view, materialized view, composite type, index, or foreign table

[Description]

The relation is not a table, view, materialized view, composite type, index, or foreign table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.28 17027

"@1@" is not a table, view, materialized view, composite type, or foreign table

[Description]

The relation is not a table, view, materialized view, composite type, or foreign table.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.29 17028

"@1@" is not a table, view, materialized view, index, or TOAST table

[Description]

The relation is not a table, view, materialized view, index, or TOAST table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.30 17030

"@1@" is not a table, view, materialized view, sequence, or foreign table

[Description]

The relation is not a table, view, materialized view, sequence, or foreign table. Note: Don't allow ALTER TABLE. SET SCHEMA on relations that can't be moved to a different schema, such as indexes and TOAST tables.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.31 17031

"@1@" is not a table, view, or foreign table

[Description]

The relation is not a table, view, or foreign table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.32 17032

"@1@" is not a table, view, sequence, or foreign table

[Description]

The relation is not a table, view, sequence, or foreign table

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.33 17033

@1@ must specify unqualified relation names

[Description]

The return type of LCS_asString() must specify unqualified relation names

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.34 17034

snapbuild state file @1@: checksum mismatch, is @2@, should be @3@

[Description]

snapbuild state file : checksum mismatch

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.35 17035

snapbuild state file "@1@" has unsupported version @2@ instead of @3@

[Description]

snapbuild state file has unsupported version.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.36 17036

snapbuild state file "@1@" has wrong magic @2@ instead of @3@

[Description]

snapbuild state file has wrong magic number

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.37 17037

@1@: new directory is not an absolute path in tablespace mapping: @2@

[Description]

new directory is not an absolute path in tablespace mapping

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.38 17038

@1@: no database specified

[Description]

no database specified for the given program name

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.39 17039

@1@: no slot specified

[Description]

no slot specifiedfor the given program name

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.40 17040

SP-GiST inner tuple size @1@ exceeds maximum @2@

[Description]

SPGiST leaf tuple carries a datum and a heap tuple TID. Inner tuple should be small enough to fit on a page.Values larger than a buffer page cannot be indexed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.41 17041

SSL failed to renegotiate connection before limit expired

[Description]

SSL failed to renegotiate connection before limit expired

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.42 17042

@1@: symlinks are not supported on this platform

[Description]

symlinks are not supported on this platform . Note : Define to 1 if you have the `symlink' function.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.43 17043

@1@: transaction log directory location can only be specified in plain mode

[Description]

transaction log directory location can only be specified in plain mode

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.44 17044

@1@: transaction log directory location must be an absolute path

[Description]

transaction log directory location must be an absolute path

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.45 17045

@1@: transfer rate must be greater than zero

[Description]

transfer rate must be greater than zero

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.46 17046

@1@: transfer rate "@2@" exceeds integer range

[Description]

transfer rate exceeds integer range

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.47 17047

@1@: transfer rate "@2@" is not a valid value

[Description]

transfer rate is not a valid value Note: The second parameter is a out - parameter.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.48 17049

strictness of aggregate's forward and inverse transition functions must match

[Description]

strictness of aggregate's forward and inverse transition functions must match.Note: Insist that forward and inverse transition functions have the same strictness setting. Allowing them to differ would require handling more special cases in advance_windowaggregate and advance_windowaggregate_base, for no discernible benefit. This should have been checked at agg definition time, but we must check again in case either function's strictness property has been changed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.49 17050

string too long to represent as jsonb string

[Description]

string too long to represent as jsonb string. Note :Due to an implementation restriction, jsonb strings cannot exceed 0x0FFFFFF

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.50 17051

@1@: unexpected response to TIMELINE_HISTORY command: got @2@ rows and @3@ fields, expected @4@ rows and @5@ fields

[Description]

unexpected response to TIMELINE_HISTORY command.Note: The response to TIMELINE_HISTORY is a single row result set with two fields: filename and content

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.51 17052

@1@: unexpected result set after end-of-timeline: got @2@ rows and @3@ fields, expected @4@ rows and @5@ fields

[Description]

unexpected result set after end-of-timeline

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.52 17053

@1@: WAL streaming can only be used in plain mode

[Description]

WAL streaming can only be used in plain mode

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.53 17054

system column "@1@" reference in check constraint is invalid

[Description]

system column reference in check constraint is invalid

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.54 17055

time field value out of range: @1@:@2@:@3@

[Description]

time field value out of range

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.55 17056

timestamp out of range: @1@-@2@-@3@ @4@:@5@:@6@

[Description]

timestamp out of range

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.56 17057

too many background workers

[Description]

too many background workers

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.57 17058

too many column names were specified

[Description]

too many column names were specified

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.58 17059

too many dynamic shared memory segments

[Description]

too many dynamic shared memory segments

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.59 17060

too many lexemes in thesaurus entry

[Description]

too many lexemes in thesaurus entry. Note: currently, tsearch_readline can't return lines exceeding 4KB,so overflow of the word counts is impossible.But that may not always be true, so let's check.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.60 17061

too many replication slots active before shutdown

[Description]

too many replication slots active before shutdown

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.61 17062

total size of jsonb array elements exceeds the maximum of @1@ bytes

[Description]

Total size of jsonb array elements exceeds the maximum of 0x0FFFFFFF bytes

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.62 17063

total size of jsonb object elements exceeds the maximum of @1@ bytes

[Description]

total size of jsonb object elements exceeds the maximum of 0x0FFFFFFFbytes

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.63 17064

tuple to be updated was already modified by an operation triggered by the current command

[Description]

tuple to be updated was already modified by an operation triggered by the current command

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.64 17065

type modifier cannot have ORDER BY

[Description]

type modifier cannot have ORDER BY

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.65 17066

"TZ"/"tz"/"OF" format patterns are not supported in to_date

[Description]

format patterns are not supported in to_date

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.66 17067

\\u0000 cannot be converted to text.

[Description]

\\u0000 cannot be converted to text. Note: The function report_json_context() reports a CONTEXT line for bogus JSON input.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.67 17068

Unexpected array element.

[Description]

Unexpected array element.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.68 17070

unexpected pageaddr @1@/@2@ in log segment @3@, offset @4@

[Description]

unexpected pageaddr in log segment offset

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.69 17071

unexpected previous timeline ID @1@ (current timeline ID @2@) in checkpoint record

[Description]

unexpected previous timeline ID in checkpoint record

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.70 17072

unexpected result after CommandComplete: @1@

[Description]

unexpected result after CommandComplete

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.71 17073

unexpected result set after end-of-streaming

[Description]

unexpected result set after end-of-streaming

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.72 17074

unexpected result status for \\watch

[Description]

unexpected result status for \ watch

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.73 17075

unexpected standby message type "@1@", after receiving CopyDone

[Description]

unexpected standby message type ,after receiving CopyDone . Note :If we already received a CopyDone from the frontend, the frontend should not send us anything until we've closed our end of the COPY.XXX: In theory, the frontend could already send the next command before receiving the CopyDone, but libpq doesn't currently allow that.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.74 17076

unexpected timeline ID @1@ in checkpoint record, before reaching minimum recovery point @2@/@3@ on timeline @4@

[Description]

unexpected timeline ID %u in checkpoint record, before reaching minimum recovery point %X/%X on timeline %u

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.75 17077

unexpected timeline ID @1@ in log segment @2@, offset @3@

[Description]

unexpected timeline ID in log segment.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.76 17078

Unicode escape values cannot be used for code point values above 007F when the server encoding is not UTF8.

[Description]

Unicode escape values cannot be used for code point values above 007F when the server encoding is not UTF8.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.77 17079

Unicode high surrogate must not follow a high surrogate.

[Description]

Unicode high surrogate must not follow a high surrogate.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.78 17080

Unicode low surrogate must follow a high surrogate.

[Description]

Unicode low surrogate must follow a high surrogate.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.79 17081

UNNEST() with multiple arguments cannot have a column definition list

[Description]

UNNEST() with multiple arguments cannot have a column definition list

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.80 17082

unsupported LDAP URL scheme: @1@

[Description]

unsupported LDAP URL scheme

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.81 17083

unsupported Unicode escape sequence

[Description]

unsupported Unicode escape sequence

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.82 17084

unterminated format specifier

[Description]

unterminated format specifier

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.83 17085

UTC timezone offset is out of range.

[Description]

UTC timezone offset is out of range.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.84 17086

variable "@1@" shadows a previously defined variable

[Description]

shadows a previously defined variable

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.85 17087

VARIADIC argument must be an array

[Description]

VARIADIC argument must be an array

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.86 17088

\\watch cannot be used with an empty query

[Description]

watch cannot be used with an empty query.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.87 17089

\\watch cannot be used with COPY

[Description]

watch cannot be used with COPY

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.88 17090

WHERE CURRENT OF is not supported for this table type

[Description]

WHERE CURRENT OF is not supported for this table type

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.89 17091

window functions are not allowed in check constraints

[Description]

window functions are not allowed in check constraints.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.90 17092

window functions are not allowed in DEFAULT expressions

[Description]

window functions are not allowed in DEFAULT expressions.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.91 17093

window functions are not allowed in EXECUTE parameters

[Description]

window functions are not allowed in EXECUTE parameters

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.92 17094

window functions are not allowed in functions in FROM

[Description]

window functions are not allowed in functions in FROM

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.93 17095

window functions are not allowed in index expressions

[Description]

window functions are not allowed in index expressions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.94 17096

window functions are not allowed in index predicates

[Description]

window functions are not allowed in index predicates

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.95 17097

window functions are not allowed in JOIN conditions

[Description]

window functions are not allowed in JOIN conditions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.96 17098

window functions are not allowed in @1@

[Description]

window functions are not allowed in expression kind

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.67.97 17099

window functions are not allowed in transform expressions

[Description]

window functions are not allowed in transform expressions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68 Message Numbers Beginning with 17100

2.68.1 17100

window functions are not allowed in trigger WHEN conditions

[Description]

window functions are not allowed in trigger WHEN conditions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.2 17101

window functions are not allowed in window definitions

[Description]

window functions are not allowed in window definitions

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.3 17102

window function @1@ cannot have WITHIN GROUP

[Description]

window function cannot have WITHIN GROUP Note:And, per spec, WITHIN GROUP isn't allowed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.4 17103

window function @1@ requires an OVER clause

[Description]

window function requires an OVER clause. Note:True window functions must be called with a window definition.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.5 17104

WITH CHECK OPTION is supported only on automatically updatable views

[Description]

WITH CHECK OPTION is supported only on automatically updatable views

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.6 17105

WITH CHECK OPTION not supported on recursive views

[Description]

WITH CHECK OPTION not supported on recursive views

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.7 17106

WITHIN GROUP is required for ordered-set aggregate @1@

[Description]

WITHIN GROUP is required for ordered-set aggregate

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.8 17107

WITHIN GROUP specified, but @1@ is not an aggregate function

[Description]

WITHIN GROUP specified, but the function is not an aggregate function

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.9 17108

WITH ORDINALITY cannot be used with a column definition list

[Description]

WITH ORDINALITY cannot be used with a column definition list

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.10 17109

tablespace encryption algorithm option can not be changed

[Description]

tablespace_encryption_algorithm option can not be changed with alter tablespace.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.11 17110

result of USING clause for column "@1@" cannot be cast automatically to type @2@

[Description]

USING clause column value cannot be typecasted automatically to new column type specified.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.12 17111

could not parse contents of file "@1@"

[Description]

Postgresql auto configuration file cannot be parsed

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.13 17115

could not change directory to "@1@": @2@

[Description]

pg_resetxlog process cannot change the directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.14 17116

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.15 17117

cannot duplicate null pointer (internal error)

[Description]

Null pointer cannot be duplicated

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.16 17118

out of memory

[Description]

Process runs out of memory

[System Processing]

Process aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.17 17119

cannot create restricted tokens on this platform: error code @1@

[Description]

Restricted Tokens cannot be created

[System Processing]

WARNING is issued

[Action]

To investigate the cause of the occurrence from the message, and remove cause for the WARNING.

2.68.18 17120

could not open process token: error code @1@

[Description]

Cannot open the process Token

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.19 17121

could not allocate SIDs: error code @1@

[Description]

Cannot allocate the SIDs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.20 17122

could not create restricted token: error code @1@

[Description]

Restricted token could not be created

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.21 17123

could not start process for command "@1@": error code @2@

[Description]

Process could not be started

[System Processing]

Processing could not be initiated

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.22 17124

could not re-execute with restricted token: error code @1@

[Description]

Restricted Token cannot be re-executed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.23 17125

could not get exit code from subprocess: error code @1@

[Description]

Cannot exit from the sub process

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.24 17126

user does not exist

[Description]

user does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.25 17127

user name lookup failure: error code @1@

[Description]

user does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.26 17128

command not found

[Description]

Command cannot be found

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.27 17129

command not executable

[Description]

Command is not executable

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.28 17130

could not determine encoding for codeset "@1@"

[Description]

Corresponding local could not found in PostgreSQL

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.29 17131

could not get junction for "@1@": @2@

[Description]

could not get junction

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.30 17132

could not get junction for "@1@": @2@

[Description]

could not get junction

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.31 17133

lock violation

[Description]

Antivirus software or some other similar software has locked the database file

[System Processing]

Process trying to access the file continues and retries after every 30 seconds

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.32 17134

sharing violation

[Description]

Antivirus software or some other similar software has locked the database file

[System Processing]

Process trying to access the file continues and retries after every 30 seconds

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.33 17135

could not get current working directory: @1@

[Description]

The current working directory path cannot be found

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.34 17138

index row size @1@ exceeds maximum @2@ for index "@3@"

[Description]

The row size of the Index exceeded the maximum limit

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.35 17139

unexpected page type 0x@1@ in BRIN index "@2@" block @3@

[Description]

Unexpected page type in BRIN index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.36 17143

cannot access temporary tables during a parallel operation

[Description]

Temporary tables cannot be accessed during parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.37 17144

cannot insert tuples during a parallel operation

[Description]

Tuples cannot be inserted during the parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.38 17146

attempted to delete invisible tuple

[Description]

An attempt has been made to delete an invisible tuple

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.39 17147

cannot update tuples during a parallel operation

[Description]

Tuples cannot be updated during the parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.40 17148

attempted to update invisible tuple

[Description]

An attempt has been made to update an invisible tuple

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.41 17149

could not truncate file "@1@" to @2@: @3@

[Description]

File could not be truncated due to inaccessibility of the file or file's location

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.42 17150

index "@1@" contains a half-dead internal page

[Description]

Index page is corrupted. This is no harm for processes performing searches. This can be fixed by RE-INDEXING.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.43 17151

sample percentage must be between 0 and 100

[Description]

Sample percentage for sample scan must be between 0 and 100

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.44 17152

cannot retrieve commit timestamp for transaction @1@

[Description]

Cannot retrieve commit timestamp for uncommitted transactions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.45 17153

could not get commit timestamp data

[Description]

Could not get commit timestamp data. "track_commit_timestamp" parameter must be configured

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.46 17154

database is not accepting commands that generate new MultiXactIds to avoid wraparound data loss in database "@1@"

[Description]

Database is not accepting any commands due to transaction wrap around issue. This can be fixed by vacuuming the database and committing/rolling-back the old unfinished prepared transactions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.47 17155

database is not accepting commands that generate new MultiXactIds to avoid wraparound data loss in database with OID @1@

[Description]

Database is not accepting any commands due to transaction wrap around issue. This can be fixed by vacuuming the database and committing/rolling-back the old unfinished prepared transactions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.48 17156

multixact "members" limit exceeded

[Description]

Multixact members limit exceeded.

Execute a database-wide VACUUM in database with OID %u with reduced vacuum_multixact_freeze_min_age and vacuum_multixact_freeze_table_age settings.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.49 17157

MultiXactId @1@ does no longer exist -- apparent wraparound

[Description]

MultiXactID does not exist. Transaction wrap around completed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.50 17158

MultiXactId @1@ has not been created yet -- apparent wraparound

[Description]

multixactId has not been created. Possible transaction wrap around has happend.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.51 17160

postmaster exited during a parallel transaction

[Description]

postmaster exited during a parallel transaction

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.52 17165

cannot PREPARE a transaction that has exported snapshots

[Description]

cannot PREPARE a transaction that has exported snapshots

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.53 17166

cannot commit during a parallel operation

[Description]

cannot commit during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.54 17167

cannot abort during a parallel operation

[Description]

cannot during during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.55 17168

cannot define savepoints during a parallel operation

[Description]

cannot define savepoints during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.56 17169

cannot release savepoints during a parallel operation

[Description]

cannot release savepoints during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.57 17170

cannot rollback to savepoints during a parallel operation

[Description]

cannot rollback to savepoints during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.58 17171

cannot start subtransactions during a parallel operation

[Description]

cannot start subtransactions during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.59 17172

cannot commit subtransactions during a parallel operation

[Description]

cannot commit subtransactions during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.60 17174

new timeline @1@ forked off current database system timeline @2@ before current recovery point @3@/@4@

[Description]

new timeline %u forked off current database system timeline %u before current recovery point %X/%X

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.61 17178

requested timeline @1@ does not contain minimum recovery point @2@/@3@ on timeline @4@

[Description]

minimum recovery point must be part of requested timeline's history

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.62 17179

This means that the backup is corrupted and you will have to use another backup for recovery.

[Description]

This means that the backup is corrupted and you will have to use another backup for recovery

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.63 17180

unexpected previous timeline ID @1@ (current timeline ID @2@) in checkpoint record

[Description]

unexpected previous timeline ID in checkpoint record. Check that the checkpoint record agrees with the current time line.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.64 17181

unexpected timeline ID @1@ in checkpoint record, before reaching minimum recovery point @2@/@3@ on timeline @4@

[Description]

unexpected timeline ID in checkpoint record, before reaching minimum recovery point on timeline

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.65 17182

could not fsync log file @1@: @2@

[Description]

could not fsync the log file. Check that the file exists and is available/accessible with appropriate permissions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.66 17183

could not stat promote trigger file "@1@": @2@

[Description]

Could not stat trigger file. Checking for the existence of trigger file. ensure that the trigger file exists with appropriate permissions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.67 17184

invalid privilege type @1@ for type

[Description]

invalid privilege type for object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.68 17185

invalid privilege type @1@ for column

[Description]

invalid privilege type for the column

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.69 17186

permission denied for event trigger @1@

[Description]

permission denied on the trigger

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.70 17187

event trigger with OID @1@ does not exist

[Description]

Trigger being accessed does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.71 17188

constant of the type @1@ cannot be used here

[Description]

constant of the type regrole cannot be used here

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.72 17189

pg_class index OID value not set when in binary upgrade mode

[Description]

pg_class index OID value not set when in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.73 17190

could not obtain lock on relation "@1@"

[Description]

Lock on a relation could not be obtained. Check the blocking process

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.74 17191

cannot create temporary tables during a parallel operation

[Description]

cannot create temporary tables in parallel mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.75 17197

"@1@" is not a materialized view

[Description]

The object type being accessed is not a materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.76 17198

default value for column "@1@" of relation "@2@" does not exist

[Description]

default value for column of relation does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.68.77 17199

operator @1@ (@2@, @3@) of @4@ does not exist

[Description]

operator does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69 Message Numbers Beginning with 17200

2.69.1 17200

function @1@ (@2@, @3@) of @4@ does not exist

[Description]

function being accessed does not exist. Check if the function is existing with appropriate permissions and search_path settings

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.2 17201

user mapping for user "@1@" on server "@2@" does not exist

[Description]

user mapping for user in server does not exists. Check the mapping user while creating foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.3 17202

unrecognized default ACL object type "@1@"

[Description]

ACL object type is unrecognized. Valid object types are "r", "S", "f", and "T"

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.4 17203

default ACL for user "@1@" in schema "@2@" on @3@ does not exist

[Description]

default ACL for user in schema on does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.5 17204

default ACL for user "@1@" on @2@ does not exist

[Description]

default ACL for user on does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.6 17205

name or argument lists may not contain nulls

[Description]

name or argument lists may not contain nulls

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.7 17206

unsupported object type "@1@"

[Description]

unsupported object type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.8 17207

name list length must be exactly @1@

[Description]

name list length must be exactly 1

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.9 17208

large object OID may not be null

[Description]

large object OID may not be null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.10 17210

argument list length must be exactly @1@

[Description]

argument list length must be exactly 1

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.11 17211

name list length must be at least @1@

[Description]

name list length must be at least 1

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.12 17212

unrecognized object type "@1@"

[Description]

unrecognized object type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.13 17213

aggregates cannot have more than @1@ argument

[Description]

aggregates cannot have more than 1 argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.14 17215

a variadic ordered-set aggregate must use VARIADIC type ANY

[Description]

a variadic ordered-set aggregate must use VARIADIC type ANY

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.15 17216

a hypothetical-set aggregate must have direct arguments matching its aggregated arguments

[Description]

a hypothetical-set aggregate must have direct arguments matching its aggregated arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.16 17218

strictness of aggregate's forward and inverse transition functions must match

[Description]

strictness of aggregate's forward and inverse transition functions must match

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.17 17219

final function with extra arguments must not be declared STRICT

[Description]

final function with extra arguments must not be declared STRICT

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.18 17220

moving-aggregate implementation returns type @1@, but plain implementation returns type @2@

[Description]

moving-aggregate implementation returns type one type but plain implementation returns type other type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.19 17221

function @1@ must accept VARIADIC ANY to be used in this aggregate

[Description]

The function must accept VARIADIC ANY to be used in this aggregate

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.20 17222

constraint "@1@" for domain @2@ does not exist

[Description]

The constraint for domain does not exist. Check the constraint name

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.21 17223

enum label "@1@" already exists

[Description]

enum label already exists

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.22 17224

pg_enum OID value not set when in binary upgrade mode

[Description]

pg_enum OID value not set when in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.23 17225

pg_type OID value not set when in binary upgrade mode

[Description]

pg_type OID value not set when in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.24 17226

"@1@" is not a table or materialized view

[Description]

The object referenced by pg_stattuple utility is not a table or materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.25 17227

only ordered-set aggregates can be hypothetical

[Description]

only ordered-set aggregates can be hypothetical

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.26 17228

aggregate msfunc must be specified when mstype is specified

[Description]

aggregate msfunc must be specified when mstype is specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.27 17229

aggregate minvfunc must be specified when mstype is specified

[Description]

aggregate minvfunc must be specified when mstype is specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.28 17230

aggregate msfunc must not be specified without mstype

[Description]

aggregate msfunc must not be specified without mstype

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.29 17231

aggregate minvfunc must not be specified without mstype

[Description]

aggregate minvfunc must not be specified without mstype

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.30 17232

aggregate msspace must not be specified without mstype

[Description]

aggregate msspace must not be specified without mstype

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.31 17233

aggregate minitcond must not be specified without mstype

[Description]

aggregate minitcond must not be specified without mstype

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.32 17234

event trigger "@1@" already exists

[Description]

event trigger already exists

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.33 17236

could not write to COPY program: @1@

[Description]

could not write to COPY program: %m

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.34 17237

must be superuser to COPY to or from an external program

[Description]

Only superuser can COPY to or from an external program

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.35 17238

COPY FROM not supported with row-level security

[Description]

COPY FROM an external file is not supported when row level security is enabled. Use INSERT statements instead

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.36 17239

COPY force null available only in CSV mode

[Description]

COPY force null available only in CSV mod

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.37 17240

COPY force null only available using COPY FROM

[Description]

COPY force null only available using COPY FROM

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.38 17241

relation referenced by COPY statement has changed

[Description]

relation referenced by COPY statement has changed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.39 17242

could not close pipe to external command: @1@

[Description]

could not close pipe to external command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.40 17243

program "@1@" failed

[Description]

program has failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.41 17244

could not execute command "@1@": @2@

[Description]

could not execute command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.42 17245

cannot copy to materialized view "@1@"

[Description]

cannot copy to materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.43 17246

cannot perform COPY FREEZE because of prior transaction activity

[Description]

cannot perform FREEZE because of prior transaction activity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.44 17247

cannot perform COPY FREEZE because the table was not created or truncated in the current subtransaction

[Description]

cannot perform FREEZE because the table was not created or truncated in the current subtransaction

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.45 17248

too many column names were specified

[Description]

too many column names were specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.46 17249

policies not yet implemented for this command

[Description]

policies not yet implemented for this command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.47 17250

invalid locale name: "@1@"

[Description]

Check if the locale name mentioned is correct.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.48 17251

database "@1@" is used by an active logical replication slot

[Description]

The database referenced is used by a logical replication slot.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.49 17252

option "@1@" cannot be specified with other options

[Description]

When invoking alter database command option cannot be specified with other options

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.50 17253

cannot disallow connections for current database

[Description]

cannot disallow connections for current database

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.51 17254

permission denied to create event trigger "@1@"

[Description]

Permission denied to create event trigger. Must be superuser to create an event trigger.Check permissions on trigger

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.52 17255

unrecognized event name "@1@"

[Description]

Unrecognized event name. Acceptable event name must be provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.53 17256

unrecognized filter variable "@1@"

[Description]

unrecognized filter variable

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.54 17259

event triggers are not supported for @1@

[Description]

event triggers are not supported for certain type of SQL statements

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.55 17260

filter variable "@1@" specified more than once

[Description]

filter variable specified more than once

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.56 17261

event trigger "@1@" does not exist

[Description]

Referenced event trigger does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.57 17262

permission denied to change owner of event trigger "@1@"

[Description]

permission denied to change owner of event trigger. The owner of an event trigger must be a superuser

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.58 17263

@1@ can only be called in a sql_drop event trigger function

[Description]

The function pg_event_trigger_dropped_objects() can only be called in a sql_drop event trigger function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.59 17264

@1@ can only be called in a table_rewrite event trigger function

[Description]

The function pg_event_trigger_table_rewrite_oid() can only be called in a table_rewrite event trigger function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.60 17265

@1@ can only be called in an event trigger function

[Description]

The function pg_event_trigger_ddl_commands() can only be called in a event trigger function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.61 17267

aggregates cannot accept set arguments

[Description]

aggregates cannot accept set arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.62 17268

transform function must not be volatile

[Description]

transform function must not be volatile

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.63 17269

transform function must not be an aggregate function

[Description]

transform function must not be an aggregate function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.64 17270

transform function must not be a window function

[Description]

transform function must not be a window function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.65 17271

transform function must not return a set

[Description]

transform function must not return a set

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.66 17272

transform function must take one argument

[Description]

transform function must take one argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.67 17273

first argument of transform function must be type @1@

[Description]

first argument of transform function must be type internal

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.68 17274

data type @1@ is a pseudo-type

[Description]

data type referenced is a pseudo-type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.69 17275

data type @1@ is a domain

[Description]

data type is a domain

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.70 17276

return data type of FROM SQL function must be @1@

[Description]

return data type of FROM SQL function must be internal

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.71 17277

return data type of TO SQL function must be the transform data type

[Description]

return data type of TO SQL function must be the transform data type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.72 17278

transform for type @1@ language "@2@" already exists

[Description]

transform for type language already exists

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.73 17279

transform for type @1@ language "@2@" does not exist

[Description]

transform for type language does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.74 17280

operator class "@1@" does not exist for access method "@2@"

[Description]

operator class does not exist for access method

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.75 17281

CONCURRENTLY cannot be used when the materialized view is not populated

[Description]

CONCURRENTLY cannot be used when the materialized view is not populated

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.76 17282

CONCURRENTLY and WITH NO DATA options cannot be used together

[Description]

CONCURRENTLY and WITH NO DATA options cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.77 17283

new data for materialized view "@1@" contains duplicate rows without any null columns

[Description]

new data for materialized view contains duplicate rows without any null columns

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.78 17284

WITH CHECK cannot be applied to SELECT or DELETE

[Description]

WITH CHECK cannot be applied to SELECT or DELETE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.79 17285

only WITH CHECK expression allowed for INSERT

[Description]

only WITH CHECK expression allowed for INSERT

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.80 17286

policy "@1@" for table "@2@" already exists

[Description]

policy attempted to create for table already exists

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.81 17287

policy "@1@" for table "@2@" does not exist

[Description]

Policy being attempted to alter does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.82 17288

only USING expression allowed for SELECT, DELETE

[Description]

only USING expression allowed for SELECT, DELETE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.83 17289

referenced relation "@1@" is not a table or foreign table

[Description]

Relation referenced by CREATE OR ALTER TABLE is not a regular table or foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.84 17290

materialized view "@1@" does not exist

[Description]

materialized view \"%s\" does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.85 17291

Use DROP MATERIALIZED VIEW to remove a materialized view.

[Description]

Use DROP MATERIALIZED VIEW to remove a materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.86 17293

inherited constraint "@1@" must be renamed in child tables too

[Description]

inherited constraint must be renamed in child tables too

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.87 17294

cannot rename inherited constraint "@1@"

[Description]

cannot rename inherited constraint

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.88 17295

cannot rewrite table "@1@" used as a catalog table

[Description]

cannot rewrite table used as a catalog table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.89 17296

"@1@" is not a table, view, or foreign table

[Description]

this is not a table, view, or foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.90 17297

"@1@" is not a table, view, materialized view, or index

[Description]

object referenced is not a table, view, materialized view, or index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.91 17298

"@1@" is not a table, materialized view, or foreign table

[Description]

object referenced is not of a type table, materialized view, or foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.69.92 17299

constraint "@1@" of relation "@2@" is not a foreign key or check constraint

[Description]

constraint of relation is not a foreign key or check constraint

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70 Message Numbers Beginning with 17300

2.70.1 17301

"@1@" is not a table, view, sequence, or foreign table

[Description]

object type is not a table, view, sequence, or foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.2 17302

WITH CHECK OPTION is supported only on automatically updatable views

[Description]

WITH CHECK OPTION is supported only on automatically updatable views

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.3 17303

only tables, indexes, and materialized views exist in tablespaces

[Description]

only tables, indexes, and materialized views exist in tablespaces

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.4 17304

cannot move relations in to or out of pg_global tablespace

[Description]

cannot move relations in to or out of pg_global tablespace

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.5 17305

aborting because lock on relation "@1@.@2@" is not available

[Description]

aborting because lock on relation is not available

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.6 17306

no matching relations in tablespace "@1@" found

[Description]

no matching relations in tablespace found

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.7 17307

invalid page in block @1@ of relation @2@

[Description]

invalid page in block of relation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.8 17308

cannot use non-unique index "@1@" as replica identity

[Description]

cannot use non-unique index as replica identity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.9 17309

cannot use non-immediate index "@1@" as replica identity

[Description]

cannot use non-immediate index as replica identity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.10 17310

cannot use expression index "@1@" as replica identity

[Description]

cannot use expression index as replica identity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.11 17311

cannot use partial index "@1@" as replica identity

[Description]

cannot use partial index \"%s\" as replica identity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.12 17312

cannot use invalid index "@1@" as replica identity

[Description]

cannot use invalid index as replica identity

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.13 17313

index "@1@" cannot be used as replica identity because column "@2@" is nullable

[Description]

index \"%s\" cannot be used as replica identity because column \"%s\" is nullable

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.14 17319

could not create an encrypted tablespace because the keystore is not open

[Description]

could not create an encrypted tablespace because the keystore is not open. Open the existing keystore, or set the master encryption key to create and open a new keystore

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.15 17321

tablespace encryption algorithm option cannot be changed

[Description]

tablespace encryption algorithm option cannot be changed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.16 17323

Foreign tables cannot have INSTEAD OF triggers.

[Description]

Foreign tables cannot have INSTEAD OF triggers.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.17 17326

tuple to be updated was already modified by an operation triggered by the current command

[Description]

tuple to be updated was already modified by an operation triggered by the current command. Consider using an AFTER trigger instead of a BEFORE trigger to propagate changes to other rows

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.18 17327

function @1@ should return type @2@

[Description]

function should return an acceptable type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.19 17328

check constraints for domains cannot be marked NO INHERIT

[Description]

check constraints for domains cannot be marked NO INHERIT

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.20 17329

range subtype cannot be @1@

[Description]

range subtype cannot be of psuedo type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.21 17330

range canonical function @1@ must return range type

[Description]

range canonical function must return range type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.22 17331

pg_type array OID value not set when in binary upgrade mode

[Description]

pg_type array OID value not set when in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.23 17332

constraint "@1@" of domain "@2@" is not a check constraint

[Description]

constraint of domain is not a check constraint

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.24 17333

constraint "@1@" for domain "@2@" already exists

[Description]

constraint for domain already exists

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.25 17334

must be superuser to change bypassrls attribute

[Description]

must be superuser to change bypassrls attribute

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.26 17335

pg_authid OID value not set when in binary upgrade mode

[Description]

pg_authid OID value not set when in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.27 17336

must be superuser to alter settings globally

[Description]

must be superuser to alter settings globally

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.28 17338

@1@ cannot be executed from VACUUM or ANALYZE

[Description]

commands VACUUM or ANALYZE cannot be executed from VACUUM or ANALYZE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.29 17340

ON CONFLICT does not support deferrable unique constraints/exclusion constraints as arbiters

[Description]

ON CONFLICT does not support deferrable unique constraints/exclusion constraints as arbiters

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.30 17341

cannot change materialized view "@1@"

[Description]

cannot change materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.31 17342

cannot insert into foreign table "@1@"

[Description]

cannot insert into foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.32 17343

foreign table "@1@" does not allow inserts

[Description]

foreign table \"%s\" does not allow inserts

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.33 17344

cannot update foreign table "@1@"

[Description]

cannot update foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.34 17345

foreign table "@1@" does not allow updates

[Description]

foreign table does not allow updates

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.35 17346

cannot delete from foreign table "@1@"

[Description]

cannot delete from foreign table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.36 17347

foreign table "@1@" does not allow deletes

[Description]

foreign table does not allow deletes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.37 17348

cannot lock rows in materialized view "@1@"

[Description]

cannot lock rows in materialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.38 17349

new row violates check option for view "@1@"

[Description]

new row violates check option for view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.39 17350

new row violates row-level security policy "@1@" for table "@2@"

[Description]

new row violates row-level security policy for table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.40 17351

new row violates row-level security policy for table "@1@"

[Description]

new row violates row-level security policy for table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.41 17352

new row violates row-level security policy "@1@" (USING expression) for table "@2@"

[Description]

new row violates row-level security policy (USING expression) for table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.42 17353

new row violates row-level security policy (USING expression) for table "@1@"

[Description]

new row violates row-level security policy (USING expression) for table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.43 17354

WHERE CURRENT OF is not supported for this table type

[Description]

WHERE CURRENT OF is not supported for this table type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.44 17355

materialized view "@1@" has not been populated

[Description]

materialized view has not been populated. Use the REFRESH MATERIALIZED VIEW command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.45 17356

custom scan "@1@" does not support MarkPos

[Description]

custom-scan does not support MarkPos

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.46 17357

lossy distance functions are not supported in index-only scans

[Description]

lossy distance functions are not supported in index-only scans

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.47 17358

ON CONFLICT DO UPDATE command cannot affect row a second time

[Description]

ON CONFLICT DO UPDATE command cannot affect row a second time. Ensure that no rows proposed for insertion within the same command have duplicate constrained values

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.48 17359

TABLESAMPLE parameter cannot be null

[Description]

TABLESAMPLE parameter cannot be null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.49 17360

TABLESAMPLE REPEATABLE parameter cannot be null

[Description]

TABLESAMPLE REPEATABLE parameter cannot be null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.50 17361

moving-aggregate transition function must not return null

[Description]

moving-aggregate transition function must not return null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.51 17362

could not open configuration directory "@1@": @2@

[Description]

could not open configuration directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.52 17363

could not initialize LDAP: @1@

[Description]

could not initialize LDAP

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.53 17364

LDAP user "@1@" does not exist

[Description]

LDAP user does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.54 17365

LDAP user "@1@" is not unique

[Description]

LDAP user is not unique

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.55 17367

lo_lseek result out of range for large-object descriptor @1@

[Description]

lo_lseek result out of range for large-object descriptor %d

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.56 17368

lo_tell result out of range for large-object descriptor @1@

[Description]

lo_tell result out of range for large-object descriptor

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.57 17369

large object read request is too large

[Description]

large object read request is too large

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.58 17370

ECDH: unrecognized curve name: @1@

[Description]

ECDH: unrecognized curve name

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.59 17371

ECDH: could not create key

[Description]

ECDH: could not create key

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.60 17372

authentication file line too long

[Description]

authentication file line too long

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.61 17373

could not parse LDAP URL "@1@": @2@

[Description]

could not parse LDAP URL

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.62 17374

unsupported LDAP URL scheme: @1@

[Description]

unsupported LDAP URL scheme

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.63 17375

filters not supported in LDAP URLs

[Description]

filters not supported in LDAP URLs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.64 17376

LDAP URLs not supported on this platform

[Description]

LDAP URLs not supported on this platform

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.65 17377

unrecognized address family @1@

[Description]

unrecognized address family

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.66 17378

there is no client connection

[Description]

there is no client connection

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.67 17379

terminating connection because protocol synchronization was lost

[Description]

terminating connection because protocol sync was lost

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.68 17381

@1@ cannot be applied to the nullable side of an outer join

[Description]

SQL row locking clause cannot be applied to the nullable side of an outer join

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.69 17384

constraint in ON CONFLICT clause has no associated index

[Description]

constraint in ON CONFLICT clause has no associated index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.70 17385

ON CONFLICT DO UPDATE not supported with exclusion constraints

[Description]

ON CONFLICT DO UPDATE not supported with exclusion constraints

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.71 17386

there is no unique or exclusion constraint matching the ON CONFLICT specification

[Description]

there is no unique or exclusion constraint matching the ON CONFLICT specification

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.72 17387

@1@ cannot be applied to VALUES

[Description]

SQL row locking cannot be applied to VALUES

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.73 17388

RETURNING must have at least one column

[Description]

RETURNING must have at least one column

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.74 17389

DECLARE SCROLL CURSOR ... @1@ is not supported

[Description]

DECLARE SCROLL CURSOR ... is not supported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.75 17390

materialized views must not use data-modifying statements in WITH

[Description]

materialized views must not use data-modifying statements in WITH

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.76 17391

materialized views must not use temporary tables or views

[Description]

materialized views must not use temporary tables or views

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.77 17392

materialized views may not be defined using bound parameters

[Description]

materialized views may not be defined using bound parameters

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.78 17393

materialized views cannot be unlogged

[Description]

materialized views cannot be UNLOGGED

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.79 17394

@1@ is not allowed with DISTINCT clause

[Description]

SQL row locking clause such as "FOR UPDATE" is not allowed with DISTINCT clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.80 17395

@1@ is not allowed with GROUP BY clause

[Description]

SQL row locking clause such as "FOR UPDATE" is not allowed with GROUP BY clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.81 17396

@1@ is not allowed with HAVING clause

[Description]

SQL row locking clause such as "FOR UPDATE" is not allowed with HAVING clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.82 17397

@1@ is not allowed with aggregate functions

[Description]

%s is not allowed with aggregate functions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.83 17398

@1@ is not allowed with window functions

[Description]

SQL row locking clause such as "FOR UPDATE" is not allowed with window functions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.70.84 17399

@1@ is not allowed with set-returning functions in the target list

[Description]

SQL row locking clause such as "FOR UPDATE" is not allowed with set-returning functions in the target list

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71 Message Numbers Beginning with 17400

2.71.1 17400

@1@ must specify unqualified relation names

[Description]

SQL row locking clause such as "FOR UPDATE" must specify unqualified relation names

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.2 17401

@1@ cannot be applied to a join

[Description]

SQL row locking clause such as "FOR UPDATE" cannot be applied to a join

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.3 17402

@1@ cannot be applied to a function

[Description]

SQL row locking clause such as "FOR UPDATE" cannot be applied to a function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.4 17403

@1@ cannot be applied to a WITH query

[Description]

SQL row locking clause such as "FOR UPDATE" cannot be applied to a WITH query

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.5 17404

relation "@1@" in @2@ clause not found in FROM clause

[Description]

Relation referenced by the SQL in FROM clause is not found

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.6 17405

outer join operator (+) cannot be used with joined table

[Description]

outer join operator (+) cannot be used with joined table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.7 17406

outer join operator (+) cannot be used with subquery

[Description]

outer join operator (+) cannot be used with subquery

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.8 17407

outer join operator (+) is not allowed in operand OR or IN predicate

[Description]

outer join operator (+) is not allowed in operand OR or IN predicate

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.9 17408

incorrect specification in outer join operator(+)

[Description]

incorrect specification in outer join operator(+)

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.10 17409

outer join operator(+) cannot refer to other relations of same query level

[Description]

outer join operator(+) cannot refer to other relations of same query level

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.11 17410

a table may be outer joined to at most one other table

[Description]

a table may be outer joined to at most one other table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.12 17411

multiple outer join operators (+) cannot be specified for one table

[Description]

multiple outer join operators (+) cannot be specified for one table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.13 17412

two tables cannot be outer-joined to each other

[Description]

two tables cannot be outer-joined to each other

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.14 17413

invalid combination of outer join operator (+) and logical operators

[Description]

invalid combination of outer join operator (+) and logical operators

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.15 17414

GROUPING must have fewer than 32 arguments

[Description]

GROUPING must have fewer than 32 arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.16 17415

aggregate functions are not allowed in JOIN conditions

[Description]

aggregate functions are not allowed in JOIN conditions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.17 17416

grouping operations are not allowed in JOIN conditions

[Description]

grouping operations are not allowed in JOIN conditions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.18 17417

aggregate functions are not allowed in FROM clause of their own query level

[Description]

aggregate functions are not allowed in FROM clause of their own query level

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.19 17418

grouping operations are not allowed in FROM clause of their own query level

[Description]

grouping operations are not allowed in FROM clause of their own query level

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.20 17419

aggregate functions are not allowed in functions in FROM

[Description]

aggregate functions are not allowed in functions in FROM

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.21 17420

grouping operations are not allowed in functions in FROM

[Description]

grouping operations are not allowed in functions in FROM

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.22 17421

aggregate functions are not allowed in policy expressions

[Description]

aggregate functions are not allowed in policy expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.23 17422

grouping operations are not allowed in policy expressions

[Description]

grouping operations are not allowed in policy expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.24 17423

aggregate functions are not allowed in window RANGE

[Description]

aggregate functions are not allowed in window RANGE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.25 17424

grouping operations are not allowed in window RANGE

[Description]

grouping operations are not allowed in window RANGE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.26 17425

aggregate functions are not allowed in window ROWS

[Description]

aggregate functions are not allowed in window ROWS

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.27 17426

grouping operations are not allowed in window ROWS

[Description]

grouping operations are not allowed in window ROWS

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.28 17427

grouping operations are not allowed in check constraints

[Description]

grouping operations are not allowed in check constraints

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.29 17428

grouping operations are not allowed in DEFAULT expressions

[Description]

grouping operations are not allowed in DEFAULT expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.30 17429

grouping operations are not allowed in index expressions

[Description]

grouping operations are not allowed in index expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.31 17430

grouping operations are not allowed in index predicates

[Description]

grouping operations are not allowed in index predicates

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.32 17431

grouping operations are not allowed in transform expressions

[Description]

grouping operations are not allowed in transform expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.33 17432

grouping operations are not allowed in EXECUTE parameters

[Description]

grouping operations are not allowed in EXECUTE parameters

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.34 17433

grouping operations are not allowed in trigger WHEN conditions

[Description]

grouping operations are not allowed in trigger WHEN conditions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.35 17434

grouping operations are not allowed in @1@

[Description]

grouping operations are not allowed in the SQL constructs like GROUP BY

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.36 17435

outer-level aggregate cannot contain a lower-level variable in its direct arguments

[Description]

outer-level aggregate cannot contain a lower-level variable in its direct arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.37 17436

window functions are not allowed in functions in FROM

[Description]

window functions are not allowed in functions in FROM

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.38 17437

window functions are not allowed in policy expressions

[Description]

window functions are not allowed in policy expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.39 17438

window functions are not allowed in window definitions

[Description]

window functions are not allowed in window definitions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.40 17439

window functions are not allowed in DEFAULT expressions

[Description]

window functions are not allowed in DEFAULT expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.41 17440

window functions are not allowed in index expressions

[Description]

window functions are not allowed in index expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.42 17441

window functions are not allowed in index predicates

[Description]

window functions are not allowed in index predicates

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.43 17442

window functions are not allowed in transform expressions

[Description]

window functions are not allowed in transform expressions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.44 17443

window functions are not allowed in @1@

[Description]

window functions are not allowed in the SQL constructs like GROUP BY

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.45 17444

aggregate functions are not allowed in a recursive query's recursive term

[Description]

aggregate functions are not allowed in a recursive query's recursive term

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.46 17445

Direct arguments of an ordered-set aggregate must use only grouped columns.

[Description]

Direct arguments of an ordered-set aggregate must use only grouped columns

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.47 17446

arguments to GROUPING must be grouping expressions of the associated query level

[Description]

arguments to GROUPING must be grouping expressions of the associated query level

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.48 17447

multiple column definition lists are not allowed for the same function

[Description]

multiple column definition lists are not allowed for the same function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.49 17448

ROWS FROM() with multiple functions cannot have a column definition list

[Description]

ROWS FROM() with multiple functions cannot have a column definition list. Put a separate column definition list for each function inside ROWS FROM()

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.50 17449

WITH ORDINALITY cannot be used with a column definition list

[Description]

WITH ORDINALITY cannot be used with a column definition list. Put the column definition list inside ROWS FROM().

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.51 17450

tablesample method @1@ does not exist

[Description]

tablesample method does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.52 17452

tablesample method @1@ does not support REPEATABLE

[Description]

tablesample method does not support REPEATABLE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.53 17453

TABLESAMPLE clause can only be applied to tables and materialized views

[Description]

TABLESAMPLE clause can only be applied to tables and materialized views

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.54 17454

CUBE is limited to 12 elements

[Description]

CUBE is limited to 12 elements

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.55 17455

Omit the parentheses in this OVER clause.

[Description]

Omit the parentheses in this OVER clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.56 17456

an aggregate with DISTINCT must have at least one argument

[Description]

an aggregate with DISTINCT must have at least one argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.57 17457

SELECT DISTINCT must have at least one column

[Description]

SELECT DISTINCT must have at least one column

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.58 17458

ASC/DESC is not allowed in ON CONFLICT clause

[Description]

ASC/DESC is not allowed in ON CONFLICT clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.59 17459

NULLS FIRST/LAST is not allowed in ON CONFLICT clause

[Description]

NULLS FIRST/LAST is not allowed in ON CONFLICT clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.60 17460

ON CONFLICT DO UPDATE requires inference specification or constraint name

[Description]

ON CONFLICT DO UPDATE requires inference specification or constraint name

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.61 17461

ON CONFLICT is not supported with system catalog tables

[Description]

ON CONFLICT is not supported with system catalog tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.62 17462

ON CONFLICT is not supported on table "@1@" used as a catalog table

[Description]

ON CONFLICT is not supported on table used as a catalog table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.63 17463

argument of @1@ must be type @2@, not type @3@

[Description]

argument of the SQL construct must be of acceptable type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.64 17464

argument declared @1@ is not a range type but type @2@

[Description]

argument declared \"anyrange\" is not a range type but type %s

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.65 17465

column @1@.@2@ does not exist

[Description]

column does not exist.Re-check the column name referenced.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.66 17466

syntax error at or near "(+)"

[Description]

syntax error at or near "(+)"

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.67 17467

could not find element type for data type @1@

[Description]

could not find element type for data type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.68 17468

WITHIN GROUP specified, but @1@ is not an aggregate function

[Description]

WITHIN GROUP specified, but the function is not an aggregate function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.69 17469

FILTER specified, but @1@ is not an aggregate function

[Description]

FILTER specified, but the function is not an aggregate function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.70 17470

WITHIN GROUP is required for ordered-set aggregate @1@

[Description]

WITHIN GROUP is required for ordered-set aggregate

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.71 17471

OVER is not supported for ordered-set aggregate @1@

[Description]

OVER is not supported for ordered-set aggregate

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.72 17472

@1@ is not an ordered-set aggregate, so it cannot have WITHIN GROUP

[Description]

The function is not an ordered-set aggregate, so it cannot have WITHIN GROUP

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.73 17476

VARIADIC argument must be an array

[Description]

VARIADIC argument must be an array

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.74 17479

system column "@1@" reference in check constraint is invalid

[Description]

system column reference in check constraint is invalid

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.75 17480

primary key constraints are not supported on foreign tables

[Description]

primary key constraints are not supported on foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.76 17481

unique constraints are not supported on foreign tables

[Description]

unique constraints are not supported on foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.77 17482

foreign key constraints are not supported on foreign tables

[Description]

foreign key constraints are not supported on foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.78 17483

exclusion constraints are not supported on foreign tables

[Description]

exclusion constraints are not supported on foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.79 17484

LIKE is not supported for creating foreign tables

[Description]

LIKE is not supported for creating foreign tables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.80 17485

rules on materialized views are not supported

[Description]

rules on materialized views are not supported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.81 17486

@1@ failed: @2@

[Description]

function call for poll() failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.82 17488

could not map anonymous shared memory: @1@

[Description]

could not map anonymous shared memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.83 17489

huge pages not supported on this platform

[Description]

huge pages not supported on this platform

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.84 17490

could not create shared memory segment: error code @1@

[Description]

could not create shared memory segment

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.85 17491

@1@: invalid argument: "@2@"

[Description]

invalid argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.86 17492

WAL archival cannot be enabled when wal_level is "minimal"

[Description]

WAL archival cannot be enabled when wal_level is "minimal"

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.87 17493

postmaster became multithreaded during startup

[Description]

postmaster became multithreaded during startup

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.88 17494

data directory "@1@" does not exist

[Description]

data directory does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.89 17495

performing immediate shutdown because data directory lock file is invalid

[Description]

performing immediate shutdown because data directory lock file is invalid

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.90 17497

invalid processing mode in background worker

[Description]

invalid processing mode in background worker

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.91 17498

could not create inherited socket: error code @1@

[Description]

could not create inherited socket

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.71.92 17499

could not open backend variables file "@1@": @2@

[Description]

could not open backend variables file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72 Message Numbers Beginning with 17500

2.72.1 17500

could not read from backend variables file "@1@": @2@

[Description]

could not read from backend variables file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.2 17501

could not map view of backend variables: error code @1@

[Description]

could not map view of backend variables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.3 17502

could not unmap view of backend variables: error code @1@

[Description]

could not unmap view of backend variables

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.4 17503

could not open file "@1@" : @2@

[Description]

could not open WAL file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.5 17504

could not write to log segment @1@ at offset @2@, length @3@: @4@

[Description]

could not write to log segment

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.6 17507

invalid timeline @1@

[Description]

invalid timeline

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.7 17508

could not stat file "@1@": @2@

[Description]

could not stat control file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.8 17509

could not find WAL file "@1@"

[Description]

could not find WAL file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.9 17510

could not stat file or directory "@1@": @2@

[Description]

could not stat file or directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.10 17511

file name too long for tar format: "@1@"

[Description]

file name too long for tar format

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.11 17512

could not send end-of-streaming message to primary: @1@

[Description]

could not send end-of-streaming message to primary

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.12 17513

error reading result of streaming command: @1@

[Description]

error reading result of streaming command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.13 17514

unexpected result after CommandComplete: @1@

[Description]

unexpected result after CommandComplete

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.14 17515

could not receive timeline history file from the primary server: @1@

[Description]

could not receive timeline history file from the primary server

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.15 17516

logical decoding requires wal_level >= logical

[Description]

logical decoding requires wal_level >= logical

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.16 17517

logical decoding requires a database connection

[Description]

logical decoding requires a database connection

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.17 17518

logical decoding cannot be used while in recovery

[Description]

logical decoding cannot be used while in recovery

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.18 17519

cannot use physical replication slot for logical decoding

[Description]

cannot use physical replication slot for logical decoding

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.19 17520

replication slot "@1@" was not created in this database

[Description]

replication slot was not created in this database

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.20 17521

cannot create logical replication slot in transaction that has performed writes

[Description]

cannot create logical replication slot in transaction that has performed writes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.21 17522

must be superuser or replication role to use replication slots

[Description]

must be superuser or replication role to use replication slots

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.22 17523

array must be one-dimensional

[Description]

The provided input array must be one-dimensional

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.23 17524

array must not contain nulls

[Description]

The provided input array must not contain nulls

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.24 17525

array must have even number of elements

[Description]

The provided input array must have even number of elements

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.25 17526

logical decoding output plugin "@1@" produces binary output, but function "@2@" expects textual data

[Description]

logical decoding output plugin produces binary output, but function expects textual data

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.26 17527

only superusers can query or manipulate replication origins

[Description]

only superusers can query or manipulate replication origins

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.27 17528

cannot query or manipulate replication origin when max_replication_slots = 0

[Description]

cannot query or manipulate replication origin when max_replication_slots = 0

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.28 17529

cannot manipulate replication origins during recovery

[Description]

cannot manipulate replication origins during recovery

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.29 17530

could not find free replication origin OID

[Description]

could not find free replication origin OID

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.30 17531

could not drop replication origin with OID @1@, in use by PID @2@

[Description]

could not drop replication origin with OID as it is in use by a process

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.31 17532

replication checkpoint has wrong magic @1@ instead of @2@

[Description]

replication checkpoint has wrong magic number instead of a correct magic number provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.32 17533

could not read file "@1@": read @2@ of @3@

[Description]

could not read file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.33 17534

could not find free replication state, increase max_replication_slots

[Description]

could not find free replication state, increase max_replication_slots

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.34 17535

replication slot checkpoint has wrong checksum @1@, expected @2@

[Description]

replication slot checkpoint has wrong checksum value, expected value is shown

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.35 17536

replication origin with OID @1@ is already active for PID @2@

[Description]

replication origin with OID is already active for process with PID

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.36 17537

could not find free replication state slot for replication origin with OID @1@

[Description]

could not find free replication state slot for replication origin with OID %u

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.37 17539

no replication origin is configured

[Description]

no replication origin is configured

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.38 17540

could not write to data file for XID @1@: @2@

[Description]

could not write to data file for XID

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.39 17541

could not read from reorderbuffer spill file: @1@

[Description]

could not read from reorderbuffer spill file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.40 17542

could not read from reorderbuffer spill file: read @1@ instead of @2@ bytes

[Description]

could not read from reorderbuffer spill file: read instead of bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.41 17543

could not read from file "@1@": read @2@ instead of @3@ bytes

[Description]

could not read from file : read some bytes instead of actual bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.42 17545

snapbuild state file "@1@" has wrong magic number: @2@ instead of @3@

[Description]

snapbuild state file has wrong magic number: instead of actual magic number

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.43 17546

snapbuild state file "@1@" has unsupported version: @2@ instead of @3@

[Description]

snapbuild state file has unsupported version: instead of acutal version number

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.44 17547

checksum mismatch for snapbuild state file "@1@": is @2@, should be @3@

[Description]

checksum mismatch for snapbuild state file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.45 17548

replication slot name "@1@" is too short

[Description]

replication slot name is too short

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.46 17549

replication slot name "@1@" is too long

[Description]

replication slot name \"%s\" is too long

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.47 17550

replication slot name "@1@" contains invalid character

[Description]

replication slot name \"%s\" contains invalid character

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.48 17551

replication slot "@1@" already exists

[Description]

replication slot already exists invalid character

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.49 17552

all replication slots are in use

[Description]

all replication slots are in use character

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.50 17553

replication slot "@1@" does not exist

[Description]

replication slot does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.51 17554

replication slot "@1@" is active for PID @2@

[Description]

replication slot \"%s\" is already active for PID

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.52 17555

could not remove directory "@1@"

[Description]

could not remove directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.53 17556

replication slots can only be used if max_replication_slots > 0

[Description]

replication slots can only be used if max_replication_slots > 0

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.54 17557

replication slots can only be used if wal_level >= replica

[Description]

replication slots can only be used if wal_level >= archive

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.55 17559

replication slot file "@1@" has wrong magic number: @2@ instead of @3@

[Description]

replication slot file has wrong magic number

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.56 17560

replication slot file "@1@" has unsupported version @2@

[Description]

replication slot file has unsupported version

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.57 17561

replication slot file "@1@" has corrupted length @2@

[Description]

replication slot file has corrupted length

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.58 17562

checksum mismatch for replication slot file "@1@": is @2@, should be @3@

[Description]

checksum mismatch for replication slot file \"%s\": is %u, should be %u

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.59 17563

too many replication slots active before shutdown

[Description]

too many replication slots active before shutdown

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.60 17564

terminating walreceiver due to timeout

[Description]

terminating walreceiver due to timeout

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.61 17566

could not seek to beginning of file "@1@": @2@

[Description]

could not seek to beginning of file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.62 17567

cannot use a logical replication slot for physical replication

[Description]

cannot use a logical replication slot for physical replication

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.63 17568

requested starting point @1@/@2@ on timeline @3@ is not in this server's history

[Description]

While streaming WALs during standby recovery. Requested starting point on timeline is not in this server's history

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.64 17570

could not convert table "@1@" to a view because it has row security enabled

[Description]

could not convert table to a view because it has row security enabled

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.65 17571

could not convert table "@1@" to a view because it has row security policies

[Description]

could not convert table to a view because it has row security policies

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.66 17573

renaming an ON SELECT rule is not allowed

[Description]

renaming an ON SELECT rule is not allowed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.67 17574

infinite recursion detected in policy for relation "@1@"

[Description]

infinite recursion detected in policy for relation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.68 17575

cannot insert into column "@1@" of view "@2@"

[Description]

cannot insert into column of view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.69 17576

cannot update column "@1@" of view "@2@"

[Description]

cannot update column of view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.70 17577

INSERT with ON CONFLICT clause cannot be used with table that has INSERT or UPDATE rules

[Description]

INSERT with ON CONFLICT clause cannot be used with table that has INSERT or UPDATE rules

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.71 17578

NEW variables in ON UPDATE rules cannot reference columns that are part of a multiple assignment in the subject UPDATE command

[Description]

NEW variables in ON UPDATE rules cannot reference columns that are part of a multiple assignment in the subject UPDATE command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.72 17579

exceeded maxAllocatedDescs (@1@) while trying to execute command "@2@"

[Description]

exceeded maxAllocatedDescs while trying to execute command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.73 17580

could not duplicate handle for "@1@": @2@

[Description]

could not duplicate handle for the segment

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.74 17581

invalid flags for opening a large object: @1@

[Description]

invalid flags for opening a large object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.75 17582

invalid whence setting: @1@

[Description]

invalid whence setting

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.76 17583

invalid large object write request size: @1@

[Description]

invalid large object write request size

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.77 17584

canceling statement due to lock timeout

[Description]

canceling statement due to lock timeout. Check the process holding the lock.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.78 17585

@1@: invalid command-line argument: @2@

[Description]

invalid command-line argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.79 17586

fastpath function calls not supported in a replication connection

[Description]

fastpath function calls not supported in a replication connection

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.80 17587

extended query protocol not supported in a replication connection

[Description]

extended query protocol not supported in a replication connection

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.81 17588

cannot execute @1@ during a parallel operation

[Description]

cannot execute SQL commands such as CREATE during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.82 17589

too many lexemes in thesaurus entry

[Description]

too many lexemes in thesaurus entry

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.83 17590

input data type is not an array

[Description]

input data type is not an array

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.84 17591

searching for elements in multidimensional arrays is not supported

[Description]

searching for elements in multidimensional arrays is not supported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.85 17593

data type @1@ is not an array type

[Description]

data type is not an array type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.86 17594

cannot accumulate null arrays

[Description]

cannot accumulate null arrays

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.87 17595

cannot accumulate empty arrays

[Description]

cannot accumulate empty arrays

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.88 17596

cannot accumulate arrays of different dimensionality

[Description]

cannot accumulate arrays of different dimensionality

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.89 17597

removing elements from multidimensional arrays is not supported

[Description]

removing elements from multidimensional arrays is not supported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.90 17598

thresholds must be one-dimensional array

[Description]

thresholds must be one-dimensional array

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.72.91 17599

thresholds array must not contain NULLs

[Description]

thresholds array must not contain NULLs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73 Message Numbers Beginning with 17600

2.73.1 17600

date field value out of range: @1@-@2@-@3@

[Description]

date field value out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.2 17601

date out of range: @1@-@2@-@3@

[Description]

date out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.3 17602

time field value out of range: @1@:@2@:@3@

[Description]

time field value out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.4 17608

localized string format value too long

[Description]

localized string format value too long

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.5 17610

invalid line specification: A and B cannot both be zero

[Description]

invalid line specification: A and B cannot both be zero

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.6 17611

function "close_sl" not implemented

[Description]

function \"close_sl\" not implemented

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.7 17612

invalid input syntax for type @1@

[Description]

invalid input syntax for type json

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.8 17613

"\\u" must be followed by four hexadecimal digits.

[Description]

must be followed by four hexadecimal digits. Check the syntax

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.9 17614

unsupported Unicode escape sequence

[Description]

unsupported Unicode escape sequence

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.10 17615

key value must be scalar, not array, composite, or json

[Description]

key value must be scalar, not array, composite, or json

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.11 17616

could not determine data type for argument @1@

[Description]

could not determine data type for argument 1

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.12 17617

could not determine data type for argument @1@

[Description]

could not determine data type for argument 2

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.13 17618

field name must not be null

[Description]

field name must not be null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.14 17619

argument list must have even number of elements

[Description]

argument list must have even number of elements

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.15 17620

could not determine data type for argument @1@

[Description]

could not determine data type for argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.16 17621

argument @1@ cannot be null

[Description]

argument cannot be null

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.17 17622

array must have two columns

[Description]

array must have two columns

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.18 17623

null value not allowed for object key

[Description]

null value not allowed for object key

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.19 17624

mismatched array dimensions

[Description]

mismatched array dimensions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.20 17625

string too long to represent as jsonb string

[Description]

string too long to represent as jsonb string

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.21 17626

argument list must have even number of elements

[Description]

invalid number or arguments: object must be matched key value pairs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.22 17629

object keys must be strings

[Description]

object keys must be strings

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.23 17630

number of jsonb object pairs exceeds the maximum allowed (@1@)

[Description]

number of jsonb object pairs exceeds the maximum allowed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.24 17631

number of jsonb array elements exceeds the maximum allowed (@1@)

[Description]

number of jsonb array elements exceeds the maximum allowed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.25 17632

total size of jsonb array elements exceeds the maximum of @1@ bytes

[Description]

total size of jsonb array elements exceeds the maximum number of bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.26 17633

total size of jsonb object elements exceeds the maximum of @1@ bytes

[Description]

total size of jsonb object elements exceeds the maximum number of bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.27 17634

cannot call @1@ on a scalar

[Description]

cannot call this function on a scalar input

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.28 17635

cannot call @1@ on an array

[Description]

cannot call this function on an array input

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.29 17636

cannot get array length of a scalar

[Description]

cannot get array length of a scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.30 17637

cannot get array length of a non-array

[Description]

cannot get array length of a non-array

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.31 17639

function returning record called in context that cannot accept type record

[Description]

function returning record called in context that cannot accept type record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.32 17640

cannot deconstruct an array as an object

[Description]

cannot deconstruct an array as an object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.33 17641

cannot deconstruct a scalar

[Description]

cannot deconstruct a scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.34 17642

cannot extract elements from a scalar

[Description]

cannot extract elements from a scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.35 17643

cannot extract elements from an object

[Description]

cannot extract elements from an object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.36 17644

cannot call @1@ on a non-array

[Description]

cannot call this function on a non-array input

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.37 17645

first argument of @1@ must be a row type

[Description]

first argument of this function must be a row type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.38 17646

argument of @1@ must be an array of objects

[Description]

argument of must be an array of objects

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.39 17647

cannot call @1@ on an object

[Description]

cannot call this function on an object input

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.40 17648

cannot delete from scalar

[Description]

cannot delete from scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.41 17649

cannot delete from object using integer index

[Description]

cannot delete from object using integer subscript

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.42 17650

cannot set path in scalar

[Description]

cannot set path in scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.43 17651

cannot delete path in scalar

[Description]

cannot delete path in scalar

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.44 17652

invalid concatenation of jsonb objects

[Description]

invalid concatenation of jsonb objects

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.45 17659

cannot merge addresses from different families

[Description]

cannot merge addresses from different families

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.46 17660

invalid scale in external "numeric" value

[Description]

invalid scale in external \"numeric\" value

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.47 17661

start value cannot be NaN

[Description]

While generating a numeric series - start value cannot be NaN

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.48 17662

stop value cannot be NaN

[Description]

stop value cannot be NaN

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.49 17663

step size cannot be NaN

[Description]

step size cannot be NaN

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.50 17664

percentile value @1@ is not between 0 and 1

[Description]

percentile value %g is not between 0 and 1

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.51 17665

invalid input syntax for type @1@: "@2@"

[Description]

invalid input syntax for type pg_lsn

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.52 17666

function can only be called when server is in binary upgrade mode

[Description]

function can only be called when server is in binary upgrade mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.53 17673

malformed range literal: "@1@"

[Description]

malformed range literal. Check the input string format

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.54 17674

invalid input syntax for type @1@: "@2@"

[Description]

invalid input syntax for numeric time zone

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.55 17675

numeric time zone "@1@" out of range

[Description]

numeric time zone out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.56 17676

timestamp out of range: @1@-@2@-@3@ @4@:@5@:@6@

[Description]

timestamp out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.57 17677

interval units "@1@" not supported because months usually have fractional weeks

[Description]

interval units \"%s\" not supported because months usually have fractional weeks

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.58 17678

invalid external pg_snapshot data

[Description]

invalid external txid_snapshot data

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.59 17679

unterminated format() type specifier

[Description]

unterminated format specifier

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.60 17680

number is out of range

[Description]

number is out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.61 17681

width argument position must be ended by "$"

[Description]

width argument position must be ended by \"$\"

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.62 17682

type @1@ is not composite

[Description]

type is not composite

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.63 17683

keystore location "@1@" is too long

[Description]

While configuring a keystore, the error is "keystore location mentioned is too long".

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.64 17684

keystore does not exist

[Description]

keystore does not exist.Make sure keystore_location points to the correct location. If the setting is correct, set the master encryption key to create the keystore.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.65 17685

must be superuser to manipulate keystore

[Description]

must be superuser to manipulate keystore

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.66 17686

function "@1@" is not supported by this build

[Description]

function \"%s\" is not supported by this build

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.67 17687

file "@1@" is not a keystore

[Description]

file \"%s\" is not a keystore

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.68 17688

lock file "@1@" is empty

[Description]

lock file is empty. Check if the lockfile is corrupt.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.69 17689

could not access directory "@1@": @2@

[Description]

could not access directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.70 17690

bind_textdomain_codeset failed

[Description]

bind_textdomain_codeset failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.71 17691

invalid value for parameter "@1@": "@2@"

[Description]

parameter \"%s\" requires a numeric value

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.72 17692

cannot set parameters during a parallel operation

[Description]

cannot set parameters during a parallel operation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.73 17693

permission denied to set parameter "@1@"

[Description]

permission denied to set parameter

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.74 17694

must be superuser to execute ALTER SYSTEM command

[Description]

must be superuser to execute ALTER SYSTEM command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.75 17696

parameter "@1@" could not be set

[Description]

parameter could not be set

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.76 17698

could not seek in tuplestore temporary file

[Description]

could not seek in tuplestore temporary file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.73.77 17699

could not read from tuplestore temporary file: read only @1@ of @2@ bytes

[Description]

could not read from tuplestore temporary file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74 Message Numbers Beginning with 17700

2.74.1 17703

user does not exist

[Description]

user does not exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.2 17704

could not open directory "@1@": @2@

[Description]

could not open directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.3 17705

could not read directory "@1@": @2@

[Description]

could not read directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.4 17706

could not stat file "@1@": @2@

[Description]

could not stat file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.5 17707

could not open file "@1@": @2@

[Description]

could not open file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.6 17708

directory name too long

[Description]

directory name too long

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.7 17709

multiple "=" signs in tablespace mapping

[Description]

multiple signs in tablespace mapping

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.8 17710

invalid tablespace mapping format "@1@", must be "OLDDIR=NEWDIR"

[Description]

invalid tablespace mapping format must be OLDDIR=NEWDIR

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.9 17711

old directory is not an absolute path in tablespace mapping: @1@

[Description]

old directory is not an absolute path in tablespace mapping

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.10 17712

new directory is not an absolute path in tablespace mapping: @1@

[Description]

new directory is not an absolute path in tablespace mapping

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.11 17713

transfer rate "@1@" is not a valid value

[Description]

backup transfer rate is not a valid value

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.12 17714

invalid transfer rate "@1@": @2@

[Description]

invalid transfer rate

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.13 17715

transfer rate must be greater than zero

[Description]

transfer rate must be greater than zero

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.14 17716

invalid --max-rate unit: "@1@"

[Description]

invalid --max-rate unit

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.15 17717

transfer rate "@1@" exceeds integer range

[Description]

Transfer rate exceeds integer range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.16 17718

transfer rate "@1@" is out of range

[Description]

Transfer rate is out of range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.17 17719

incompatible server version @1@

[Description]

incompatible server version

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.18 17720

server returned unexpected response to BASE_BACKUP command; got @1@ rows and @2@ fields, expected @3@ rows and @4@ fields

[Description]

server returned unexpected response to BASE_BACKUP command; got rows and fields, expected rows and fields

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.19 17721

invalid wal-method option "@1@", must be "fetch", "stream", or "none"

[Description]

invalid xlog-method option : must be fetch or stream

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.20 17722

WAL directory location can only be specified in plain mode

[Description]

transaction log directory location can only be specified in plain mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.21 17723

could not create symbolic link "@1@": @2@

[Description]

could not create symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.22 17724

symlinks are not supported on this platform

[Description]

symlinks are not supported on this platform

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.23 17725

cannot use --create-slot together with --drop-slot

[Description]

cannot use --create-slot together with --drop-slot

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.24 17726

@1@ needs a slot to be specified using --slot

[Description]

needs a slot to be specified using --slot

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.25 17728

could not open log file "@1@": @2@

[Description]

could not open log file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.26 17729

invalid fsync interval "@1@"

[Description]

invalid fsync interval

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.27 17730

could not parse start position "@1@"

[Description]

could not parse start position

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.28 17731

no slot specified

[Description]

no slot specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.29 17732

no target file specified

[Description]

no target file specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.30 17733

no database specified

[Description]

no database specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.31 17734

at least one action needs to be specified

[Description]

at least one action needs to be specified

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.32 17735

cannot use --create-slot or --start together with --drop-slot

[Description]

cannot use --create-slot or --start together with --drop-slot

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.33 17736

cannot use --create-slot or --drop-slot together with --startpos

[Description]

cannot use --create-slot or --drop-slot together with --startpos

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.34 17737

could not establish database-specific replication connection

[Description]

could not establish database-specific replication connection

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.35 17738

could not create archive status file "@1@": @2@

[Description]

could not create archive status file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.36 17740

server reported unexpected history file name for timeline @1@: @2@

[Description]

server reported unexpected history file name for timeline

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.37 17741

could not create timeline history file "@1@": @2@

[Description]

could not create timeline history file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.38 17742

could not write timeline history file "@1@": @2@

[Description]

could not write timeline history file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.39 17743

could not rename file "@1@" to "@2@": @3@

[Description]

could not rename file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.40 17744

incompatible server version @1@; client does not support streaming from server versions older than @2@

[Description]

incompatible server version; client does not support streaming from server versions older than

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.41 17745

incompatible server version @1@; client does not support streaming from server versions newer than @2@

[Description]

incompatible server version; client does not support streaming from server versions newer than

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.42 17746

starting timeline @1@ is not present in the server

[Description]

starting timeline is not present in the server

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.43 17747

server reported unexpected next timeline @1@, following timeline @2@

[Description]

server reported unexpected next timeline, following timeline

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.44 17748

server stopped streaming timeline @1@ at @2@/@3@, but reported next timeline @4@ to begin at @5@/@6@

[Description]

server stopped streaming a timeline, but reported next timeline

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.45 17749

unexpected result set after end-of-timeline: got @1@ rows and @2@ fields, expected @3@ rows and @4@ fields

[Description]

unexpected result set after end-of-timeline: got unexpected rows and fields

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.46 17750

could not parse next timeline's starting point "@1@"

[Description]

could not parse next timeline's starting point

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.47 17751

invalid socket: @1@

[Description]

socket not open

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.48 17752

could not send copy-end packet: @1@

[Description]

could not send copy-end packet

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.49 17754

could not create replication slot "@1@": got @2@ rows and @3@ fields, expected @4@ rows and @5@ fields

[Description]

could not create replication slot : got unexpected rows and fields

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.50 17755

could not drop replication slot "@1@": got @2@ rows and @3@ fields, expected @4@ rows and @5@ fields

[Description]

could not drop replication slot : got rows and fields mismatch with, expected rows and fields

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.51 17758

WSAStartup failed: @1@

[Description]

WSAStartup failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.52 17759

could not create communication channels: @1@

[Description]

could not create communication channels

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.53 17761

unrecognized command received from master: "@1@"

[Description]

unrecognized command on communication channel

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.54 17762

invalid message received from worker: "@1@"

[Description]

invalid message received from worker

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.55 17764

could not write to the communication channel: @1@

[Description]

could not write to the communication channel

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.56 17765

select() failed: @1@

[Description]

error in ListenToWorkers()

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.57 17766

pgpipe: could not create socket: error code @1@

[Description]

pgpipe: could not create socket

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.58 17767

pgpipe: could not bind: error code @1@

[Description]

pgpipe: could not bind

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.59 17768

pgpipe: could not listen: error code @1@

[Description]

pgpipe: could not listen

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.60 17769

pgpipe: getsockname() failed: error code @1@

[Description]

pgpipe: getsockname() failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.61 17770

pgpipe: could not create second socket: error code @1@

[Description]

pgpipe: could not create second socket

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.62 17771

pgpipe: could not connect socket: error code @1@

[Description]

pgpipe: could not connect socket

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.63 17773

unexpected COPY statement syntax: "@1@"

[Description]

unexpected COPY statement syntax

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.64 17774

options -s/--schema-only and -a/--data-only cannot be used together

[Description]

options -s/--schema-only and -a/--data-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.65 17775

options -c/--clean and -a/--data-only cannot be used together

[Description]

options -c/--clean and -a/--data-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.66 17776

option --if-exists requires option -c/--clean

[Description]

option --if-exists requires option -c/--clean

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.67 17777

invalid number of parallel jobs

[Description]

%s: invalid number of parallel jobs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.68 17778

parallel backup only supported by the directory format

[Description]

parallel backup only supported by the directory format

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.69 17779

Exported snapshots are not supported by this server version.

[Description]

Exported snapshots are not supported by this server version

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.70 17780

unexpected policy command type: @1@

[Description]

unexpected policy command type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.71 17781

options -g/--globals-only and -r/--roles-only cannot be used together

[Description]

options -g/--globals-only and -r/--roles-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.72 17782

options -g/--globals-only and -t/--tablespaces-only cannot be used together

[Description]

options -g/--globals-only and -t/--tablespaces-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.73 17783

option --if-exists requires option -c/--clean

[Description]

option --if-exists requires option -c/--clean

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.74 17784

options -r/--roles-only and -t/--tablespaces-only cannot be used together

[Description]

options -r/--roles-only and -t/--tablespaces-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.75 17785

options -d/--dbname and -f/--file cannot be used together

[Description]

options -d/--dbname and -f/--file cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.76 17786

options -c/--clean and -a/--data-only cannot be used together

[Description]

options -c/--clean and -a/--data-only cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.77 17787

cannot specify both --single-transaction and multiple jobs

[Description]

cannot specify both --single-transaction and multiple jobs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.78 17788

@1@: could not start server: @2@

[Description]

could not start server

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.79 17789

@1@: could not start server: error code @2@

[Description]

could not start server: error code

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.80 17790

encoding conversion error on line @1@

[Description]

encoding conversion error on line

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.81 17791

invalid value for numeric type "@1@" on line @2@

[Description]

invalid value for numeric type on line

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.82 17793

@1@: could not locate my own executable path

[Description]

could not locate my own executable path

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.83 17794

lookup failed for type @1@

[Description]

lookup failed for type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.84 17795

didn't get a return item from function

[Description]

didn't get a return item from function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.85 17796

couldn't fetch $_TD

[Description]

couldn't fetch $_TD

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.86 17797

didn't get a return item from trigger function

[Description]

didn't get a return item from trigger function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.87 17798

event trigger functions cannot have declared arguments

[Description]

event trigger functions cannot have declared arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.74.88 17799

GET STACKED DIAGNOSTICS cannot be used outside an exception handler

[Description]

GET STACKED DIAGNOSTICS cannot be used outside an exception handler

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75 Message Numbers Beginning with 17800

2.75.1 17800

cannot return non-composite value from function returning composite type

[Description]

cannot return non-composite value from function returning composite type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.2 17804

@1@ cannot be used as a role name here

[Description]

Reserved name cannot be used as a role name here

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.3 17805

@1@ is not allowed with UNION/INTERSECT/EXCEPT

[Description]

Locking clause is not allowed with UNION/INTERSECT/EXCEPT

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.4 17806

@1@: could not access directory "@2@": @3@

[Description]

Failure in accessing directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.5 17807

could not allocate SIDs: error code @1@

[Description]

Failure in allocating SIDs

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.6 17808

could not change permissions of "@1@": @2@

[Description]

Failure in changing the permissions of a file/directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.7 17809

@1@: could not close directory "@2@": @3@

[Description]

Failure in closing directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.8 17810

could not close directory "@1@": @2@

[Description]

Failure in closing a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.9 17811

could not create restricted token: error code @1@

[Description]

Failure in creating restricted token

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.10 17812

could not fsync file "@1@": @2@

[Description]

Failure in syncing the file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.11 17813

could not get exit code from subprocess: error code @1@

[Description]

Failure in getting the exit code of a child process

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.12 17816

could not open process token: error code @1@

[Description]

Failure in opening process token

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.13 17818

could not read directory "@1@": @2@

[Description]

Failure in reading from a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.14 17821

could not re-execute with restricted token: error code @1@

[Description]

re-executing with a restricted token is not allowed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.15 17822

@1@: could not remove promote signal file "@2@": @3@

[Description]

Failure in removing promote signal file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.16 17823

could not start process for command "@1@": error code @2@

[Description]

Process start failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.17 17824

could not write @1@ bytes to log file "@2@": @3@

[Description]

Failure in writing to a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.18 17825

@1@: directory "@2@" does not exist

[Description]

directory doesn't exist

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.19 17826

@1@: directory "@2@" is not a database cluster directory

[Description]

directory is not a database cluster directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.20 17827

@1@: invalid argument for option -f: "@2@"

[Description]

Invalid argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.21 17828

@1@: invalid argument for option -t: "@2@"

[Description]

Invalid argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.22 17829

keystore location "@1@" is too long

[Description]

keystore location is more than 1024 characters

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.23 17830

@1@: oldest multitransaction ID (-m) must not be 0

[Description]

The provided oldest multitransaction ID (-m) must not be 0

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.24 17832

out of memory

[Description]

out of memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.25 17833

replication connection using slot "@1@" is unexpectedly database specific

[Description]

replication connection using slot specified is unexpectedly database specific

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.26 17834

@1@: the PID file "@2@" is empty

[Description]

Wrong PID file is found, it is empty

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.27 17835

@1@: too many command-line arguments (first is "@2@")

[Description]

too many command-line arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.28 17836

@1@: transaction ID (-c) must be either 0 or greater than or equal to 2

[Description]

Provided transaction ID (-c) must be either 0 or greater than or equal to 2

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.29 17837

unexpected response to TIMELINE_HISTORY command: got @1@ rows and @2@ fields, expected @3@ rows and @4@ fields

[Description]

Response from server to TIMELINE_HISTORY command is wrong from the expected

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.30 17838

"@1@" is a symbolic link, but symbolic links are not supported on this platform

[Description]

Symbolic links are not supported in this platform

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.31 17839

"@1@" is not a BRIN index

[Description]

The provided index is not a BRIN index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.32 17840

"@1@" is not a directory or symbolic link

[Description]

Specified path is not a directory or symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.33 17841

"@1@" is not a directory

[Description]

The specified path is not a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.34 17842

"@1@" is not a regular file

[Description]

The speicifed file is not a regular file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.35 17843

"@1@" is not a symbolic link

[Description]

The specified path/file is not a symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.36 17844

"@1@" is not a table, view, materialized view, sequence, or foreign table

[Description]

Object is not a table, view, materialized view, sequence, or foreign table to do the alter relation

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.37 17845

"@1@": stopping truncate due to conflicting lock request

[Description]

Truncating table is stopped due to conflicting lock request by vacuum

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.38 17846

\\watch cannot be used with an empty query

[Description]

\\watch comamnd cannot be used with an empty query

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.39 17847

\\watch cannot be used with COPY

[Description]

\\watch command cannot be used along with COPY command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.40 17848

aggregate cannot accept shell type @1@

[Description]

Shell type is not allowed in aggregate functions

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.41 17849

aggregates cannot have output arguments

[Description]

Defining aggregates with output arguments is not supported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.42 17850

an ordered-set aggregate with a VARIADIC direct argument must have one VARIADIC aggregated argument of the same data type

[Description]

an ordered-set aggregate with a VARIADIC direct argument must have one VARIADIC aggregated argument of the same data type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.43 17852

argument @1@: key must not be null

[Description]

Invalid key value

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.44 17853

argument of lo_read exceeds integer range

[Description]

The length argument of lo_read exceeds integer range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.45 17854

argument of lo_truncate exceeds integer range

[Description]

The length argument of lo_truncate exceeds integer range

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.46 17855

argument of lo_write exceeds integer range

[Description]

The provided index is not a BRIN index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.47 17856

background worker "@1@": only dynamic background workers can request notification

[Description]

only dynamic background workers can request notification

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.48 17857

BKPBLOCK_HAS_DATA not set, but data length is @1@ at @2@/@3@

[Description]

BKPBLOCK_HAS_DATA not set, but data length is present in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.49 17858

BKPBLOCK_HAS_DATA set, but no data included at @1@/@2@

[Description]

BKPBLOCK_HAS_DATA set, but no data in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.50 17859

BKPBLOCK_SAME_REL set but no previous rel at @1@/@2@

[Description]

BKPBLOCK_SAME_REL set but no previous rel is provided in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.51 17860

BKPIMAGE_HAS_HOLE not set, but hole offset @1@ length @2@ at @3@/@4@

[Description]

BKPIMAGE_HAS_HOLE not set, but hole offset is provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.52 17861

BKPIMAGE_HAS_HOLE set, but hole offset @1@ length @2@ block image length @3@ at @4@/@5@

[Description]

BKPIMAGE_HAS_HOLE set, but hole offset is not provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.53 17862

BKPIMAGE_IS_COMPRESSED set, but block image length @1@ at @2@/@3@

[Description]

BKPIMAGE_IS_COMPRESSED set, but block image length is not provided.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.54 17863

cannot allocate multiple Perl interpreters on this platform

[Description]

cannot allocate multiple Perl interpreters on this platform

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.55 17864

cannot alter type of a column used in a policy definition

[Description]

cannot alter type of a column used in a policy definition

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.56 17865

cannot call @1@ on a non-object

[Description]

The parameter is not a Json Object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.57 17866

cannot change logged status of table "@1@" because it is temporary

[Description]

Temporary table logged status cannot be changed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.58 17867

cannot copy from materialized view "@1@"

[Description]

Copy command cannot be executed on a matrerialized view

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.59 17868

cannot delete tuples during a parallel operation

[Description]

Delete operation is not allowed in parallel mode

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.60 17869

cannot determine OID of function lo_lseek64

[Description]

lo_lseek64 function is not defined

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.61 17870

cannot determine OID of function lo_tell64

[Description]

lo_tell64 function is not defined

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.62 17871

cannot determine OID of function lo_truncate64

[Description]

lo_truncate64 function is not defined

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.63 17872

cannot display a value of a shell type

[Description]

Shell type cannot be displayed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.64 17873

cannot duplicate null pointer (internal error)

[Description]

The given input is a null pointer

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.65 17874

cannot refresh materialized view "@1@" concurrently

[Description]

Cannot refresh materialized view concurrently

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.66 17875

cannot set system attribute "@1@"

[Description]

Cannot set system attributes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.67 17876

cannot setup replication origin when one is already setup

[Description]

replication origin is already setup

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.68 17877

cannot use DISTINCT with WITHIN GROUP

[Description]

cannot use DISTINCT with WITHIN GROUP

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.69 17878

cannot use multiple ORDER BY clauses with WITHIN GROUP

[Description]

cannot use multiple ORDER BY clauses with WITHIN GROUP sql query

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.70 17879

cannot use special role specifier in DROP ROLE

[Description]

cannot use special role specifier in DROP ROLE

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.71 17880

cannot use VARIADIC with WITHIN GROUP

[Description]

cannot use VARIADIC with WITHIN GROUP

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.72 17881

constraint "@1@" of relation "@2@" is not a foreign key constraint

[Description]

constraint is not a foreign key constraint

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.73 17882

conversion from numeric to Decimal failed

[Description]

conversion from numeric to Decimal failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.74 17883

COPY data transfer failed: @1@

[Description]

Failed in data transfer of COPY command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.75 17884

corrupted line pointer: offset = @1@, size = @2@

[Description]

item pointer of a page is corrupted

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.76 17885

could not change table "@1@" to logged because it references unlogged table "@2@"

[Description]

could not change table logged status because it references unlogged table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.77 17886

could not change table "@1@" to unlogged because it references logged table "@2@"

[Description]

could not change table logged status because it references logged table

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.78 17887

could not close directory "@1@": @2@

[Description]

Failure in closing a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.79 17888

could not close directory "@1@": @2@

[Description]

Failure in closing a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.80 17889

could not close file "@1@": @2@

[Description]

Failure in file close

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.81 17890

could not close pipe to external command: @1@

[Description]

Failure in closing the pipe command to external command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.82 17891

could not close target file "@1@": @2@

[Description]

Failure in closing target file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.83 17892

could not convert Python Unicode object to bytes

[Description]

could not convert Python Unicode object to bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.84 17893

could not create any Unix-domain sockets

[Description]

Failure in creating Unix-domain sockets

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.85 17894

could not create directory "@1@": @2@

[Description]

Failure in creating a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.86 17895

could not create internal procedure "@1@": @2@

[Description]

could not create internal procedure

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.87 17896

could not create symbolic link at "@1@": @2@

[Description]

Failure in creating a symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.88 17897

could not execute command "@1@": @2@

[Description]

could not execute command if it is not copy stream

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.89 17898

could not import a module for Decimal constructor

[Description]

Non decimal data found

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.75.90 17899

could not initialize globals

[Description]

could not initialize globals in pl/python function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76 Message Numbers Beginning with 17900

2.76.1 17901

could not look up effective user ID @1@: @2@

[Description]

Getting the current user details failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.2 17902

could not look up local user ID @1@: @2@

[Description]

Lookup user name failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.3 17903

could not map dynamic shared memory segment

[Description]

Attaching to a dynamci shared memory segment failed.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.4 17904

could not open directory "@1@": @2@

[Description]

Failure in opening the directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.5 17905

could not open file "@1@" for reading: @2@

[Description]

Failure in opening a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.6 17906

could not open file "@1@" for truncation: @2@

[Description]

Faliure in opening a file for truncating it's size

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.7 17907

could not open file "@1@": @2@

[Description]

Failure in opening the file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.8 17908

could not open parent table of index @1@

[Description]

Failure in opening the parent relation of an index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.9 17909

could not open source file "@1@": @2@

[Description]

Failure in opening a source file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.10 17910

could not open target file "@1@": @2@

[Description]

Failure in opening target file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.11 17911

could not read directory "@1@": @2@

[Description]

Failure in reading from a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.12 17912

could not read directory "@1@": @2@

[Description]

Failure in reading from a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.13 17913

could not read file "@1@": @2@

[Description]

Failure in reading a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.14 17914

could not read symbolic link "@1@": @2@

[Description]

Failure in reading a symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.15 17915

could not read time zone file "@1@": @2@

[Description]

Failure in reading timezone file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.16 17916

could not remove directory "@1@": @2@

[Description]

Failure in removing a directory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.17 17917

could not remove file "@1@": @2@

[Description]

Failure in removing a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.18 17918

could not remove symbolic link "@1@": @2@

[Description]

Failure in removing a symolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.19 17920

could not seek in source file: @1@

[Description]

Failure in executing seek system call in source file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.20 17921

could not seek in target file "@1@": @2@

[Description]

Failure in executing seek system call in target file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.21 17923

could not split return value from trigger: @1@

[Description]

Trigger return value couldn't be splitted

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.22 17924

could not stat file "@1@": @2@

[Description]

stat system call failed on a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.23 17925

could not stat file "@1@": @2@

[Description]

Failure in stat system call

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.24 17926

could not truncate file "@1@" to @2@: @3@

[Description]

Failure in truncating a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.25 17927

could not write file "@1@": @2@

[Description]

Failure in writing to a file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.26 17928

could not write to file "@1@", wrote @2@ of @3@: @4@

[Description]

Failure in writing to a file.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.27 17929

data file "@1@" in source is not a regular file

[Description]

The data file is not a regular file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.28 17930

database connection requirement not indicated during registration

[Description]

database connection requirement not indicated during background worker registration

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.29 17931

declared name @1@ is already defined

[Description]

declared name has been defined already

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.30 17934

EVP error code @1@

[Description]

Non zero error message. The error number returned by ERR_get_error

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.31 17935

EVP error code @1@

[Description]

EVP error code

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.32 17936

FOR value should be positive integer

[Description]

FOR loop value should be positive integer

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.33 17937

foreign key referenced-columns list must not contain duplicates

[Description]

The provided foreign key referenced-columns list contain duplicates

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.34 17938

foreign-data wrapper "@1@" does not support IMPORT FOREIGN SCHEMA

[Description]

IMPORT FOREIGN SCHEMA doesn't supported by the foerign data wrapper

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.35 17939

improper use of "*"

[Description]

improper use of \"*\" in the indirection reference

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.36 17941

initial position must not be null

[Description]

First member of the array must not be nul

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.37 17942

invalid action (CREATE) for regular file

[Description]

Regular files are created with open_target_file function, not with this

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.38 17943

invalid block_id @1@ at @2@/@3@

[Description]

invalid block_id in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.39 17944

Invalid character value.

[Description]

Invalid XML character value.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.40 17945

invalid compressed image at @1@/@2@, block @3@

[Description]

The provided index is not a BRIN index

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.41 17947

invalid input syntax for type @1@: "@2@"

[Description]

invalid input syntax for type txid_snapshot

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.42 17948

invalid line number: @1@

[Description]

Provided line number is wrong in the sql query

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.43 17949

invalid magic number in dynamic shared memory segment

[Description]

Invalid dynamic shared memory segment

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.44 17950

invalid MultiXactId: @1@

[Description]

Invalid multixactid parameter

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.45 17951

invalid value "@1@" for "@2@"

[Description]

Invalid argument

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.46 17953

invalid value in ECOBPG_NCHAR on line @1@. The valid value is UTF16LE/ UTF16BE/ UTF32LE/ UTF32BE/ SJIS/ COBOL_EUC.

[Description]

Invalid ECOBPG_NCHAR environment variable value

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.47 17954

Junk view columns are not updatable.

[Description]

Write operation Junk view columns are not updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.48 17955

length of nvarchar type is not assigned

[Description]

length of nvarchar type is not assigned

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.49 17956

local user with ID @1@ does not exist

[Description]

Lookup user name failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.50 17957

lost connection to parallel worker

[Description]

Error while reading message queue may caused the worker to be shutdown

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.51 17958

Malformed declaration: missing version.

[Description]

Version number missing in xml document/content

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.52 17959

Missing encoding in text declaration.

[Description]

missing encoding in xml document/content

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.53 17960

more than one row returned for \\gset

[Description]

more than one row returned for \\gset command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.54 17961

must be owner of event trigger @1@

[Description]

must be owner of the even trigger

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.55 17962

national characters is not supported on non-utf8 databases.

[Description]

national characters is not supported on non-utf8 databases.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.56 17963

neither BKPIMAGE_HAS_HOLE nor BKPIMAGE_IS_COMPRESSED set, but block image length is @1@ at @2@/@3@

[Description]

neither BKPIMAGE_HAS_HOLE nor BKPIMAGE_IS_COMPRESSED set, but block impage length is provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.57 17964

nested service specifications not supported in service file "@1@", line @2@

[Description]

nested service specifications not supported in service file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.58 17965

no Decimal attribute in module

[Description]

no Decimal attribute in module

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.59 17966

no EVP error reported

[Description]

The errorcode returned by ERR_get_error() function is zero.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.60 17967

no rows returned for \\gset

[Description]

no rows returned for \\gset command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.61 17968

no SSL error reported

[Description]

no SSL error reported

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.62 17969

not enough arguments for cursor "@1@"

[Description]

syntax error

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.63 17970

number of parameters must be between 0 and 65535

[Description]

number of parameters must be between 0 and 65535

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.64 17972

operator not allowed in variable definition

[Description]

Only sizeof operation is allowed in variable definition

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.65 17973

operator too long

[Description]

The length of the operator is more than or equal to 64 characters

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.66 17974

out of memory

[Description]

out of memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.67 17975

out of memory

[Description]

out of memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.68 17976

out-of-order block_id @1@ at @2@/@3@

[Description]

Out-of-order blocks in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.69 17977

Parsing XML declaration: '?>' expected.

[Description]

Provided XML declaration is unfinished

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.70 17978

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.71 17979

permission denied to reassign objects

[Description]

Insufficient privileges on the object

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.72 17980

pgpipe: could not accept connection: error code @1@

[Description]

Failure in reading a symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.73 17981

record with invalid length at @1@/@2@

[Description]

record with invalid length in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.74 17982

requested character not valid for encoding: @1@

[Description]

Invalid character for the encoding

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.75 17984

source file list is empty

[Description]

Source file list is empty

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.76 17985

Space required.

[Description]

Space required in the specified location of XML content.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.77 17986

SPI_execute failed: @1@

[Description]

Failure in SPI_execute function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.78 17987

SPI_execute_plan failed: @1@

[Description]

Failure in SPI_execute_plan function

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.79 17988

SSL error code @1@

[Description]

SSL has reported some error

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.80 17989

standalone accepts only 'yes' or 'no'.

[Description]

XML standalone accepts only 'yes' or 'no'.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.81 17990

STDIN/STDOUT not allowed with PROGRAM

[Description]

STDIN/STDOUT not allowed with PROGRAM in copy command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.82 17991

symbolic link "@1@" target is too long

[Description]

Symolic link target length is more than the specified length

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.83 17992

symbolic link target too long for tar format: file name "@1@", target "@2@"

[Description]

provided symbolic link target name is too long for tar format

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.84 17993

tablesample method @1@ requires @2@ argument, not @3@

[Description]

Invalid number of tablespample arguments

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.85 17995

The server (version @1@) does not support editing function source.

[Description]

The server does not support editing function source.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.86 17996

time zone "@1@" appears to use leap seconds

[Description]

The provided timezone appears to have leap seconds

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.87 17997

too many arguments for cursor "@1@"

[Description]

syntax error

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.76.88 17999

type modifier cannot have ORDER BY

[Description]

type modifier cannot have ORDER BY clause

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77 Message Numbers Beginning with 18000

2.77.1 18000

unexpected EOF while reading file "@1@"

[Description]

unexpected EOF reach while reading file

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.2 18001

unexpected page modification for directory or symbolic link "@1@"

[Description]

unexpected page modification for directory or symbolic link

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.3 18002

unexpected result set after end-of-streaming

[Description]

unexpected data after end-of-streaming

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.4 18003

unexpected result status for \\watch

[Description]

unexpected result status for \\watch command

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.5 18004

unexpected standby message type "@1@", after receiving CopyDone

[Description]

unexpected standby message type after copyDone

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.6 18005

Unix-domain socket path "@1@" is too long (maximum @2@ bytes)

[Description]

unix-domain socket path has crossed more than 100 bytes

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.7 18006

UNNEST() with multiple arguments cannot have a column definition list

[Description]

UNNEST() with multiple arguments cannot have a column definition list

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.8 18008

Unrecognized libxml error code: @1@.

[Description]

Unknown code error - the default error

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.9 18009

unrecognized object type in default privileges: @1@

[Description]

Unrecognized object type

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.10 18010

unterminated /* comment

[Description]

unterminated /* comment in the sql query

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.11 18011

User "@1@" has an expired password.

[Description]

user's password has been expired

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.12 18012

User "@1@" has no password assigned.

[Description]

no password has assigned to user

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.13 18013

user name lookup failure: error code @1@

[Description]

Lookup user name failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.14 18014

View columns that are not columns of their base relation are not updatable.

[Description]

Write operation View columns that are not columns of their base relation are not updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.15 18015

View columns that refer to system columns are not updatable.

[Description]

Write operation View columns that refer to system columns are not updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.16 18016

View columns that return whole-row references are not updatable.

[Description]

Write operation View columns that return whole-row references are not updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.17 18017

Views containing DISTINCT are not automatically updatable.

[Description]

Write operation Views containing DISTINCT clause are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.18 18018

Views containing GROUP BY are not automatically updatable.

[Description]

Write operation Views containing GROUP BY clause are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.19 18019

Views containing HAVING are not automatically updatable.

[Description]

Write operation Views containing HAVING clause are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.20 18020

Views containing LIMIT or OFFSET are not automatically updatable.

[Description]

write operation Views containing LIMIT or OFFSET are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.21 18021

Views containing TABLESAMPLE are not automatically updatable.

[Description]

Write operation Views containing TABLESAMPLE are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.22 18022

Views containing UNION, INTERSECT, or EXCEPT are not automatically updatable.

[Description]

Write operation Views containing UNION, INTERSECT, or EXCEPT are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.23 18023

Views containing WITH are not automatically updatable.

[Description]

Write operation Views containing WITH are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.24 18024

Views that do not select from a single table or view are not automatically updatable.

[Description]

Write operation Views that do not select from a single table or view are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.25 18025

Views that have no updatable columns are not automatically updatable.

[Description]

Write operation Views that have no updatable columns are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.26 18026

Views that return aggregate functions are not automatically updatable.

[Description]

Write operation Views that return aggregate functions are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.27 18027

Views that return set-returning functions are not automatically updatable.

[Description]

Write operation Views that return set-returning functions are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.28 18028

Views that return window functions are not automatically updatable.

[Description]

Write operation Views that return window functions are not automatically updatable.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.29 18029

WAL file is from different database system: incorrect XLOG_BLCKSZ in page header

[Description]

WAL file is from a different database not generated by these binaries because of mismatch in WAL block size

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.30 18030

WAL file is from different database system: incorrect XLOG_SEG_SIZE in page header

[Description]

WAL file is from a different database not generated by these binaries because of mismatch in WAL segment size

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.31 18034

window function @1@ cannot have WITHIN GROUP

[Description]

window function cannot have WITHIN GROUP

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.32 18035

window function @1@ requires an OVER clause

[Description]

True window functions must be called with a window definition

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.33 18036

WITH CHECK OPTION not supported on recursive views

[Description]

WITH CHECK OPTION not supported on recursive views

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.34 18038

"@1@" must be registered in shared_preload_libraries and session_preload_libraries

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.35 18039

"@1@" must be registered in shared_preload_libraries

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.36 18044

duplicate lock detected

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.37 18049

internal error. memory not allocated.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.38 18050

internal error. unknown code.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.39 18058

ROS has not been formated yet.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.40 18061

could not read from SMC evacuating temporary file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.41 18066

vci_index_size requires 1 argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.42 18067

cannot alter table because the table is indexed by VCI

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.43 18068

ALTER INDEX SET TABLESPACE is not supported for VCI

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.44 18069

REINDEX is not supported for VCI

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.45 18072

access method "@1@" does not support EXCLUDE clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.46 18073

access method "@1@" does not support index on temporary table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.47 18074

access method "@1@" does not support to CREATE INDEX on the expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.48 18075

access method "@1@" does not support concurrent index drop

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.49 18076

access method "@1@" does not support concurrent index build

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.50 18077

access method "@1@" does not support partial-index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.51 18078

access method "@1@" does not support index on materialized view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.77.52 18079

compression buffer is full

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.77.53 18091

could not start background process : postmaster died

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.54 18092

could not stop background process

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.55 18093

could not register background process

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.56 18097

could not open file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.77.57 18099

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.78 Message Numbers Beginning with 18100

2.78.1 18103

could not identify a comparison function for type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.2 18104

aggregate @1@ needs to have compatible input type and transition type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.3 18105

aggregate function calls cannot be nested

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.4 18106

cannot pass more than @1@ argument to a function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.5 18108

value out of range: underflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.6 18109

value out of range: overflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.7 18112

access method "@1@" does not work under full_page_writes=off

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.8 18113

slot name must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.9 18114

options array must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.10 18115

cannot create a RETURNING list for a relation containing dropped columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.11 18116

path element at position @1@ is null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.12 18117

path element at position @1@ is not an integer: "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.13 18118

role with OID @1@ does not exist

[Description]

An error occurred during DB Server processing in the database.

[System Processing]

Processing will be aborted.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.78.14 18119

BKPBLOCK_HAS_DATA not set, but data length is @1@ at @2@/@3@

[Description]

BKPBLOCK_HAS_DATA not set, but data length is present in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.15 18120

BKPBLOCK_HAS_DATA set, but no data included at @1@/@2@

[Description]

BKPBLOCK_HAS_DATA set, but no data in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.16 18121

BKPBLOCK_SAME_REL set but no previous rel at @1@/@2@

[Description]

BKPBLOCK_SAME_REL set but no previous rel is provided in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.17 18122

BKPIMAGE_HAS_HOLE not set, but hole offset @1@ length @2@ at @3@/@4@

[Description]

BKPIMAGE_HAS_HOLE not set, but hole offset is provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.18 18123

BKPIMAGE_HAS_HOLE set, but hole offset @1@ length @2@ block image length @3@ at @4@/@5@

[Description]

BKPIMAGE_HAS_HOLE set, but hole offset is not provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.19 18124

BKPIMAGE_IS_COMPRESSED set, but block image length @1@ at @2@/@3@

[Description]

BKPIMAGE_IS_COMPRESSED set, but block image length is not provided.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.20 18126

invalid block_id @1@ at @2@/@3@

[Description]

invalid block_id in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.21 18127

neither BKPIMAGE_HAS_HOLE nor BKPIMAGE_IS_COMPRESSED set, but block image length is @1@ at @2@/@3@

[Description]

neither BKPIMAGE_HAS_HOLE nor BKPIMAGE_IS_COMPRESSED set, but block impage length is provided

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.22 18128

out-of-order block_id @1@ at @2@/@3@

[Description]

Out-of-order blocks in WAL record

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.23 18129

could not look up effective user ID @1@: @2@

[Description]

Getting the current user details failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.24 18130

could not look up effective user ID @1@: @2@

[Description]

Getting the current user details failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.25 18131

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.26 18132

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.27 18133

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.28 18134

pclose failed: @1@

[Description]

pclose system call failed

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.29 18135

Valid values are "none", "AES128", and "AES256".

[Description]

Wrong tablespace encryption algorithm is passed during CREATE TABLESPACE command.

[System Processing]

Processing will be aborted

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.30 18136

parameter "parallel" must be SAFE, RESTRICTED, or UNSAFE

[Description]

Invalid parallel option is passed for the function to be created with CREATE FUNCTION command.

[System Processing]

Processing will be aborted

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.31 18137

Sets the maximum number of parallel processes per executor node.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.78.32 18139

Sets the planner's estimate of the cost of passing each tuple (row) from worker to master backend.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.78.33 18140

Sets the planner's estimate of the cost of starting up worker processes for parallel query.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.78.34 18144

no EVP error reported

[Description]

The errorcode returned by ERR_get_error() function is zero.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.35 18145

WARNING: password file "@1@" has group or world access; permissions should be u=rw (0600) or less

[Description]

Password file has group or world access.

[System Processing]

WARNING is issued

[Action]

To investigate the cause of the occurrence from the message, and remove cause for the WARNING.

2.78.36 18146

WARNING: password file "@1@" is not a plain file

[Description]

Password file is not a plain file.

[System Processing]

WARNING is issued

[Action]

To investigate the cause of the occurrence from the message, and remove cause for the WARNING.

2.78.37 18147

nested /* ... */ comments

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.38 18148

Please log in (using, e.g., "su") as the (unprivileged) user that willown the server process.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.39 18149

could not change permissions of directory "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.40 18150

Check your installation or specify the correct path using the option -L.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.41 18151

invalid locale settings; check LANG and LC_* environment variables

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.42 18152

You must identify the directory where the data for this database systemwill reside. Do this with either the invocation option -D or theenvironment variable PGDATA.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.78.43 18153

Data page checksums are disabled.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.78.44 18154

Data page checksums are enabled.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.78.45 18155

index "@1@" cannot be used as replica identity because column @2@ is a system column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.46 18157

parameter value for ALTER SYSTEM must not contain a newline

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.47 18162

multiple Python libraries are present in session

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.48 18163

Only one Python major version can be used in one session.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.49 18164

syncing target data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.50 18168

reading user-defined tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.51 18169

requested compression not available in this installation -- archive will be uncompressed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.52 18170

WARNING: unexpected extra results during COPY of table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.53 18171

Synchronized snapshots on standby servers are not supported by this server version.Run with --no-synchronized-snapshots instead if you do not needsynchronized snapshots.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.54 18172

TCP user timeout

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.55 18173

Cancel queries that conflict with recovery during hot standby promotion.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.56 18174

could not load library "vci.so": @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.57 18175

debug_helper must be loaded via shared_preload_libraries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.58 18176

debug_helper injects error

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.59 18177

More details may be available in the server log.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.60 18178

Kill all remaining database processes and restart the database.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.61 18179

deadlock detected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.62 18180

VCI parallel execution is blocked by other operation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.63 18181

not enough maximum share memory for parallel query (@1@ bytes requested)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.64 18182

You possibly need to raise the configuration parameter "vci.shared_work_mem" value to be at least @1@kB.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.65 18183

You may need to increase max_worker_processes.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.66 18184

unable to map dynamic shared memory segment

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.67 18185

too many workers already @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.68 18186

Failed while creating memory context "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.69 18187

Failed on request of size @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.70 18188

failed to shm_open()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.71 18189

could not open file "@1@": @2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.72 18190

could not get process AffinityMask: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.73 18191

Failed system call was DuplicateHandle.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.74 18192

could not create semaphore: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.75 18193

Failed system call was GetModuleHandle("ntdll.dll").

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.76 18194

could not get address of "NtQuerySystemInformation": error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.77 18195

Failed system call was GetModuleHandle("NtQuerySystemInformation").

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.78 18196

could not get system processor performance information : error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.79 18197

Failed system call was NtQuerySystemInformation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.80 18198

cannot find vci.smc_directory: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.78.81 18199

could not create shared memory segment: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79 Message Numbers Beginning with 18200

2.79.1 18200

Failed system call was OpenFileMapping(name=@1@).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.2 18201

Failed system call was MapViewOfFileEx.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.3 18202

could not map shared memory segment

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.4 18203

could not initialize security descriptor: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.5 18204

Failed system call was InitializeSecurityDescriptor.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.6 18205

could not set security descriptor DACL: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.7 18206

Failed system call was SetSecurityDescriptorDacl.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.8 18207

Failed system call was CreateFileMapping(size=@1@, name=@2@).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.9 18208

could not get priority class: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.10 18209

Failed system call was GetPriorityClass.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.11 18210

could not set priority class=@1@: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.12 18211

Failed system call was SetPriorityClass.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.13 18212

pgx_prewarm_vci requires one argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.14 18213

relation cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.15 18214

@1@(VCI index regclass)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.16 18215

@1@ is not VCI index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.17 18216

extension '@1@' does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.18 18217

function '@1@.@2@(

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.19 18218

Disable VCI by 'SELECT vci_disable();'

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.20 18219

internal error. unsupported compression format.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.21 18220

column missed in VCI index creation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.22 18221

This must never happen. Give up to use VCI index.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.23 18222

internal error: unsupported compression type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.24 18223

relation full

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.25 18224

internal error. unsupported compression type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.26 18225

Use DROP INDEX "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.27 18226

unexpected index access method call : "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.28 18227

duplicated columns in vci index creation: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.29 18228

duplicated columns are specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.30 18229

data type @1@ is not supported for access method "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.31 18230

unexpected attribute length

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.32 18231

You must drop index "@1@" before using this command.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.33 18232

DROP INDEX and CREATE INDEX instead

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.34 18233

only VCI index is supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.35 18234

extension "@1@" cannot specify a schema name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.36 18235

cannot cluster tables including @1@ index(es)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.37 18236

Use DROP INDEX @1@ first

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.38 18237

Use DROP INDEX to remove an vci index and try again without CONCURRENTLY option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.39 18238

Try again without CONCURRENTLY option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.40 18239

extension "@1@" prohibits this operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.41 18240

extension "@1@" prohibits this operation on access method "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.42 18241

extension "@1@" prohibits this operation on operation class "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.43 18242

extension "@1@" prohibits this operation on operation family "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.44 18243

extension "@1@" prohibits this operation on view "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.45 18244

database @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.46 18245

undefined lock state

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.47 18246

This might happen when CREATE INDEX fails. "DROP INDEX @1@;" and CREATE INDEX again may help.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.48 18247

incompatible VCI version: expected (@1@, @2@), stored (@3@, @4@).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.49 18248

This can happen when accessing old database with newer VCI modules. DROP and CREATE INDEX may help.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.50 18249

internal error. unsupported parameter.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.51 18250

Normally relations of VCI index are smaller than the table relation, therefore this error must not happen. Disable VCI by 'SELECT vci_disable();'

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.52 18251

data relation full

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.53 18252

vci index "@1@" corrupted

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.54 18253

TID (@1@,@2@) has been deleted from table "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.55 18254

try to insert TID (@1@,@2@) into ROS twice: extentId=@3@, index=@4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.56 18255

try to delete TID (@1@,@2@) into local delete list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.57 18256

try to delete TID (@1@,@2@) into delete vector twice

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.58 18257

too many WOS rows over estimation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.59 18258

The number of devices exceeds the upper bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.60 18259

database connection requirement not indicated during registration

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.61 18260

invalid processing mode in background worker

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.62 18261

terminating VCI worker process due to administrator command

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.63 18262

"@1@" is not directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.64 18263

could not create directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.65 18264

could not stat directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.66 18265

needs to set at least @1@ to "max_worker_processes"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.67 18266

You will specify more than vci.control_max_workers + (# of CPU cores) * @1@ + 1 to the configuration parameter "max_worker_processes".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.68 18267

extension "@1@" cannot be installed under this version of PostgreSQL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.69 18268

crash_emulation must be loaded via shared_preload_libraries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.79.70 18269

standby mode is not supported by single-user servers

[Description]

An error occurred during DB Server processing in the database.

[System Processing]

Processing will be aborted.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.79.71 18270

constraint "@1@" conflicts with inherited constraint on relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.72 18271

constraint "@1@" conflicts with NOT VALID constraint on relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.73 18272

constraint "@1@" conflicts with NOT VALID constraint on child table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.74 18274

only one of --source-pgdata or --source-server can be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.75 18275

internal error. failed to split

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.76 18276

invalid attribute number @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.77 18277

duplicated columns in vci index creation: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.78 18278

duplicated columns are specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.79 18279

cannot use "ctid" column with other columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.80 18280

The "vci_column_ids" option is required when "ctid" column is specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.81 18281

The "vci_column_ids" option cannot be used without "ctid" column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.82 18282

index name cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.83 18283

table oid cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.84 18284

array of column names cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.85 18285

storage option cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.86 18286

column name cannot be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.87 18287

column "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.88 18288

SPI_connect failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.89 18289

SPI_prepare failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.90 18290

cannot execute multi-query in vci_create()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.91 18291

You might fold the index name with double quotation marks.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.92 18292

SPI_execp failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.93 18293

SPI_finish failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.94 18294

unterminated quoted string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.95 18295

failed to parse vci_create() options.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.96 18296

failed to parse a vci_create() options: an invalid pair

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.97 18297

unrecognized options: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.98 18298

WARNING: could not find where to insert IF EXISTS in statement "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.79.99 18299

could not find function definition for function with OID @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80 Message Numbers Beginning with 18300

2.80.1 18300

could not create the spiexceptions module

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80.2 18301

could not create exception "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80.3 18302

exclusive backup not in progress

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80.4 18303

USING expression contains a whole-row table reference.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80.5 18304

cannot COPY to/from client in a SQL function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.80.6 18305

calculated CRC checksum does not match value stored in file

[Description]

An error occurred reading the pg_control file.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.7 18306

byte ordering mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.8 18307

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.9 18308

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.10 18310

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.11 18311

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.12 18312

operator family "@1@" of access method @2@ is missing operator(s) for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.13 18313

operator family "@1@" of access method @2@ is missing support function(s) for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.14 18314

operator class "@1@" of access method @2@ is missing operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.15 18315

operator class "@1@" of access method @2@ is missing operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.16 18316

posting list is too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Reduce the value of maintenance_work_mem.

2.80.17 18317

Reduce maintenance_work_mem.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.18 18318

GIN pending list cannot be cleaned up during recovery.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.19 18319

"@1@" is not a GIN index

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.20 18320

cannot access temporary indexes of other sessions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.21 18321

operator family "@1@" of access method @2@ contains support procedure @3@ with different left and right input types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.22 18322

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.23 18323

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.24 18324

operator family "@1@" of access method @2@ contains operator @3@ with invalid strategy number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.25 18325

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.26 18326

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.27 18327

operator class "@1@" of access method @2@ is missing support function @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.28 18328

operator class "@1@" of access method @2@ is missing support function @3@ or @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.29 18329

Valid values are "on", "off", and "auto".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.30 18330

operator family "@1@" of access method @2@ contains support procedure @3@ with different left and right input types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.31 18331

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.32 18332

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.33 18333

operator family "@1@" of access method @2@ contains operator @3@ with invalid strategy number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.34 18334

operator family "@1@" of access method @2@ contains unsupported ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.35 18335

operator family "@1@" of access method @2@ contains incorrect ORDER BY opfamily specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.36 18336

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.37 18337

operator class "@1@" of access method @2@ is missing support function @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.38 18338

operator family "@1@" of access method @2@ contains support procedure @3@ with different left and right input types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.39 18339

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.40 18340

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.41 18341

operator family "@1@" of access method @2@ contains operator @3@ with invalid strategy number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.42 18342

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.43 18343

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.44 18344

operator family "@1@" of access method @2@ lacks support function for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.45 18345

operator family "@1@" of access method @2@ is missing operator(s) for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.46 18346

operator class "@1@" of access method @2@ is missing operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.47 18347

operator family "@1@" of access method @2@ is missing cross-type operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.48 18348

access method "@1@" is not of type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.49 18349

index access method "@1@" does not have a handler

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.50 18350

This can be caused by an interrupted VACUUM in version 9.3 or older, before upgrade. Please REINDEX it.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.51 18351

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.52 18352

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.53 18353

operator family "@1@" of access method @2@ contains operator @3@ with invalid strategy number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.54 18354

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.55 18355

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.56 18356

operator family "@1@" of access method @2@ is missing operator(s) for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.57 18357

operator family "@1@" of access method @2@ is missing support function for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.58 18358

operator class "@1@" of access method @2@ is missing operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.59 18359

operator family "@1@" of access method @2@ is missing cross-type operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.60 18360

operator family "@1@" of access method @2@ contains support procedure @3@ with different left and right input types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.61 18361

operator family "@1@" of access method @2@ contains function @3@ with invalid support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.62 18362

operator family "@1@" of access method @2@ contains function @3@ with wrong signature for support number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.63 18363

operator family "@1@" of access method @2@ contains operator @3@ with invalid strategy number @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.64 18364

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.65 18365

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.66 18366

operator family "@1@" of access method @2@ is missing operator(s) for types @3@ and @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.67 18367

operator family "@1@" of access method @2@ is missing support function @3@ for type @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.68 18368

operator class "@1@" of access method @2@ is missing operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.69 18369

Make sure the configuration parameter "@1@" is set on the master server.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.70 18370

Make sure the configuration parameter "@1@" is set.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.71 18371

Execute a database-wide VACUUM in that database.You might also need to commit or roll back old prepared transactions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.72 18372

database "@1@" must be vacuumed before @2@ more MultiXactId is used

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.80.73 18373

database with OID @1@ must be vacuumed before @2@ more MultiXactId is used

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.80.74 18374

This command would create a multixact with @1@ members, but the remaining space is only enough for @2@ member.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.75 18375

Execute a database-wide VACUUM in database with OID @1@ with reduced vacuum_multixact_freeze_min_age and vacuum_multixact_freeze_table_age settings.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.76 18376

database with OID @1@ must be vacuumed before @2@ more multixact member is used

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.77 18377

Execute a database-wide VACUUM in that database with reduced vacuum_multixact_freeze_min_age and vacuum_multixact_freeze_table_age settings.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.78 18378

Expected a write-ahead log switchpoint location.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.79 18379

requested timeline @1@ is not in this server's history

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.80 18380

Failed while allocating a WAL reading processor.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.81 18381

could not read two-phase state from WAL at @1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.82 18382

expected two-phase state data is not present in WAL at @1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.83 18383

Stop the postmaster and vacuum that database in single-user mode.You might also need to commit or roll back old prepared transactions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.84 18384

The database cluster was initialized with LOBLKSIZE @1@, but the server was compiled with LOBLKSIZE @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.80.85 18387

@1@ "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.86 18388

aborting backup due to backend exiting before pg_stop_backup was called

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.87 18389

a backup is already in progress in this session

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.88 18390

non-exclusive backup in progress

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

Try using pg_stop_backup('f') to stop a non-exclusive backup.

2.80.89 18391

non-exclusive backup is not in progress

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

Try using pg_stop_backup('t') to stop an exclusive backup.

2.80.90 18392

pg_class heap OID value not set when in binary upgrade mode

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.80.91 18393

return type of inverse transition function @1@ is not @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.92 18394

return type of combine function @1@ is not @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.93 18395

combine function with transition type @1@ must not be declared STRICT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.94 18396

return type of serialization function @1@ is not @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.95 18397

return type of deserialization function @1@ is not @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.96 18398

aggregate mfinalfunc must not be specified without mstype

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.80.97 18399

serialization functions may be specified only when the aggregate transition data type is @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81 Message Numbers Beginning with 18400

2.81.1 18400

must specify both or neither of serialization and deserialization functions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.2 18401

permission denied to create access method "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.3 18402

must be superuser to drop access methods

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.4 18403

handler function is not specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.5 18404

DO INSTEAD NOTHING rules are not supported for COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.6 18405

conditional DO INSTEAD rules are not supported for COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.7 18406

DO ALSO rules are not supported for the COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.8 18407

multi-statement DO INSTEAD rules are not supported for COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.9 18408

COPY query must have a RETURNING clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.10 18409

FORCE_NULL column "@1@" not referenced by COPY

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.11 18410

There is @1@ active slot

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.12 18411

There is @1@ other session using the database.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.13 18412

There is @1@ prepared transaction using the database.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.14 18413

access method "@1@" does not exist, skipping

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.81.15 18414

Must be superuser to create an event trigger.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.16 18415

filter value "@1@" not recognized for filter variable "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.17 18416

The owner of an event trigger must be a superuser.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.18 18417

Use CREATE EXTENSION ... CASCADE to install required extensions too.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.19 18418

file "@1@" is too large

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.20 18420

index creation on system columns is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.21 18421

Create a unique index with no WHERE clause on one or more columns of the materialized view.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.22 18422

join estimator function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.23 18423

operator attribute "@1@" cannot be changed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.24 18424

All roles are members of the PUBLIC role.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.25 18425

role "@1@" could not be removed from policy "@2@" on "@3@"

[Description]

A warning has occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.26 18426

You might need to add an explicit cast.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.27 18427

You might need to specify "USING @1@::@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.28 18428

@1@ depends on column "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.29 18429

tablespace location should not be inside the data directory

[Description]

A warning has occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.30 18430

Open the existing keystore, or set the master encryption key to create and open a new keystore

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.31 18431

Tablespace "@1@" does not exist.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.32 18432

Foreign tables cannot have TRUNCATE triggers.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.33 18433

Foreign tables cannot have constraint triggers.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.34 18434

Consider using an AFTER trigger instead of a BEFORE trigger to propagate changes to other rows.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.35 18435

type input function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.36 18436

type output function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.37 18437

type receive function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.38 18438

type send function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.39 18439

type modifier input function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.40 18440

type modifier output function @1@ should not be volatile

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that functions are not marked as volatile.

2.81.41 18441

You must specify an operator class for the range type or define a default operator class for the subtype.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.42 18442

Use ALTER TABLE instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.43 18443

VACUUM option DISABLE_PAGE_SKIPPING cannot be used with FULL

[Description]

The DISABLE_PAGE_SKIPPING option cannot be used with VACUUM FULL or ANALYZE commands.

[System Processing]

Processing is aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.44 18444

oldest multixact is far in the past

[Description]

Terminated normally but a warning was output.

[System Processing]

Continues processing.

[Action]

Close open transactions with multixacts soon to avoid wraparound problems.

2.81.45 18445

Close open transactions with multixacts soon to avoid wraparound problems.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.46 18446

Unrecognized key word: "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.47 18447

Conflicting "datestyle" specifications.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.48 18448

Cannot specify months in time zone interval.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.49 18449

Cannot specify days in time zone interval.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.50 18450

PostgreSQL does not support leap seconds.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.51 18451

UTC timezone offset is out of range.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.52 18452

You can use REPEATABLE READ instead.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.53 18453

Conversion between @1@ and @2@ is not supported.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.54 18454

Cannot change "client_encoding" now.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.55 18455

cannot change client_encoding during a parallel operation

[Description]

This error occurs if a function wants to set client_encoding and is invoked by the parallel query.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that client_encoding is not set by the parallel query operation.

2.81.56 18456

Valid values are "local" and "cascaded".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.57 18457

Key conflicts exist.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.58 18458

Key conflicts with existing key.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.59 18459

Failing row contains @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.60 18460

Use the REFRESH MATERIALIZED VIEW command.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.61 18461

combine function for aggregate @1@ must be declared as STRICT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.62 18462

Ensure that no rows proposed for insertion within the same command have duplicate constrained values.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.63 18463

could not send tuple to shared-memory queue

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.81.64 18464

BSD authentication failed for user "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.65 18465

Connection matched pg_hba.conf line @1@: "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.66 18466

could not translate name

[Description]

An error occurred while translating domain name to Kerberos realm name in SSL.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the domain name is written correctly.

2.81.67 18467

realm name too long

[Description]

An error occurred while translating domain name to Kerberos realm name in SSL.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the domain name is written correctly.

2.81.68 18468

translated account name too long

[Description]

An error occurred while translating account name to Kerberos user name in SSL.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the account name is written correctly.

2.81.69 18469

pam_set_item(PAM_RHOST) failed: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.70 18470

LDAP search for filter "@1@" on server "@2@" returned @3@ entry.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.71 18471

RADIUS response from @1@ has corrupt length: @2@ (actual length @3@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.72 18472

private key file "@1@" is not a regular file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.73 18473

private key file "@1@" must be owned by the database user or root

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.74 18474

terminating connection due to unexpected postmaster exit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the server is still running.

2.81.75 18475

Role "@1@" does not exist.

[Description]

The user does not exist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.76 18476

User "@1@" has an expired password.

[Description]

The password is blank.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.77 18477

Password does not match for user "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.78 18478

Specify exactly one connection type per line.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.79 18479

Specify one address range per line.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.80 18480

Specify an address range in CIDR notation, or provide a separate netmask.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.81 18481

Specify exactly one authentication type per line.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.82 18482

extensible node type "@1@" already exists

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.83 18483

ExtensibleNodeMethods "@1@" was not registered

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.84 18484

whole row unique index inference specifications are not supported

[Description]

The whole row unique index inference specifications are not supported.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.81.85 18485

It is SQL to which the outer joined operator is not supported. Please change to SQL that is using the joined table.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.86 18486

too many grouping sets present (maximum 4096)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the items in the GROUPING SET are less than the maximum allowable value.

2.81.87 18487

Put a separate column definition list for each function inside ROWS FROM().

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.88 18488

Use separate UNNEST() calls inside ROWS FROM(), and attach a column definition list to each one.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.89 18489

Put the column definition list inside ROWS FROM().

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.90 18490

For example, ON CONFLICT (column_name).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.91 18491

operator precedence change: @1@ is now lower precedence than @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.92 18492

There is an ordered-set aggregate @1@, but it requires @2@ direct arguments, not @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.93 18493

To use the hypothetical-set aggregate @1@, the number of hypothetical direct arguments (here @2@) must match the number of ordering columns (here @3@).

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.94 18494

There is an ordered-set aggregate @1@, but it requires at least @2@ direct arguments.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.95 18495

Could not choose a best candidate function. You might need to add explicit type casts.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.96 18496

FILTER is not implemented for non-aggregate window functions

[Description]

FILTER is not yet supported with true window functions.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.81.97 18497

The combining JOIN type must be INNER or LEFT for a LATERAL reference.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.98 18498

Perhaps you meant to reference the column "@1@.@2@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.81.99 18499

There is a column named "@1@" in table "@2@", but it cannot be referenced from this part of the query.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82 Message Numbers Beginning with 18500

2.82.1 18500

Perhaps you meant to reference the column "@1@.@2@" or the column "@3@.@4@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.2 18501

This error usually means that PostgreSQL's request for a shared memory segment exceeded your kernel's SHMMAX parameter, or possibly that it is less than your kernel's SHMMIN parameter.The PostgreSQL documentation contains more information about shared memory configuration.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.3 18502

This error usually means that PostgreSQL's request for a shared memory segment exceeded your kernel's SHMALL parameter. You might need to reconfigure the kernel with larger SHMALL.The PostgreSQL documentation contains more information about shared memory configuration.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.4 18503

This error does *not* mean that you have run out of disk space. It occurs either if all available shared memory IDs have been taken, in which case you need to raise the SHMMNI parameter in your kernel, or because the system's overall limit for shared memory has been reached.The PostgreSQL documentation contains more information about shared memory configuration.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.5 18504

This error usually means that PostgreSQL's request for a shared memory segment exceeded available memory, swap space, or huge pages. To reduce the request size (currently @1@ bytes), reduce PostgreSQL's shared memory usage, perhaps by reducing shared_buffers or max_connections.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.6 18505

wrote crash dump to file "@1@"

[Description]

An error occurred.

[System Processing]

None

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.7 18506

background worker "@1@": must be registered in shared_preload_libraries

[Description]

The background worker must be registered in shared_preload_libraries.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.8 18507

too many background workers

[Description]

Up to max_worker_processes background worker can be registered with the current settings.

[System Processing]

Processing will be aborted.

[Action]

Consider increasing the value of configuration parameter max_worker_processes.

2.82.9 18508

Up to @1@ background worker can be registered with the current settings.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.10 18509

Consider increasing the configuration parameter "max_worker_processes".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.11 18510

checkpoints are occurring too frequently (@1@ second apart)

[Description]

Checkpoints are occurring too frequently.

[System Processing]

Continues processing.

[Action]

Consider increasing the value of configuration parameter max_wal_size.

2.82.12 18511

using stale statistics instead of current ones because stats collector is not responding

[Description]

Using stale statistics instead of current ones because the statistics collector is not responding.

[System Processing]

Continues processing.

[Action]

Contact Fujitsu technical support.

2.82.13 18512

ending log output to stderr

[Description]

Ending log output to stderr.

[System Processing]

Continues processing.

[Action]

Future log output will be output to the log destination.

2.82.14 18513

Future log output will go to log destination "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.15 18514

Set the LC_ALL environment variable to a valid locale.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.16 18515

@1@: could not find the database systemExpected to find it in the directory "@2@",but could not open file "@3@": @4@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.17 18516

Valid values are: "false", 0, "true", 1, "database".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.18 18517

@1@ was not reloaded

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.82.19 18518

shutdown at recovery target

[Description]

Terminated normally, but a log message was output.

[System Processing]

None

[Action]

No action required.

2.82.20 18519

Failed process was running: @1@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.21 18520

could not fork checkpointer process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.22 18521

could not fork worker process: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.23 18522

could not parse connection string: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.82.24 18523

Could not identify system: got @1@ rows and @2@ fields, expected @3@ rows and @4@ or more fields.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.25 18524

Increase max_replication_slots and try again.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.26 18525

logical decoding found consistent point at @1@/@2@

[Description]

Transaction ID has finished. There are no more running transactions.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.27 18527

There are no running transactions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.28 18528

logical decoding found initial starting point at @1@/@2@

[Description]

The transaction needs to finish before building a snapshot.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.29 18530

Logical decoding will begin using saved snapshot.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.30 18531

could not parse file name "@1@"

[Description]

Could not parse file name in pg_logical/snapshots.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.31 18532

Replication slot names may only contain lower case letters, numbers, and the underscore character.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.32 18533

Free one or increase max_replication_slots.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.33 18534

standby "@1@" is now a synchronous standby with priority @2@

[Description]

Inform the user that the standby server is now a synchronous standby with priority number.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.34 18535

synchronous_standby_names parser failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the value of synchronous_standby_names, which may come from postgresql.conf or the SQL command line.

2.82.35 18536

End of WAL reached on timeline @1@ at @2@/@3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.36 18537

primary server contains no more WAL on requested timeline @1@

[Description]

The primary server contains no more WALs on the requested timeline.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.37 18538

could not close log segment @1@: @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.38 18539

This server's history forked from timeline @1@ at @2@/@3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.39 18540

requested starting point @1@/@2@ is ahead of the WAL flush position of this server @3@/@4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.40 18541

terminating walsender process after promotion

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.41 18542

invalid page in block @1@ of relation @2@; zeroing out page

[Description]

In invalid page was found in the relation.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.42 18543

snapshot too old

[Description]

The snapshot is too old.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.43 18544

could not flush dirty data: @1@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.44 18545

could not determine dirty data size: @1@

[Description]

Could not determine dirty data size when flushing data.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.45 18546

could not munmap() while flushing data: @1@

[Description]

An error is returned from the nunmap function.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.82.46 18547

dynamic shared memory control segment is corrupt

[Description]

Dynamic shared memory control segment is corrupt.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.47 18548

Set dynamic_shared_memory_type to a value other than "none".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.48 18549

@1@ failed: @2@

[Description]

An error occurred for epoll_ctl.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.49 18550

@1@ failed: @2@

[Description]

An error occurred for epoll_wait.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.50 18551

while updating tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.51 18552

while deleting tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.52 18553

while locking tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.53 18554

while locking updated version (@1@,@2@) of tuple in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.54 18555

while inserting index tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.55 18556

while checking uniqueness of tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.56 18557

while rechecking updated tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.57 18558

while checking exclusion constraint on tuple (@1@,@2@) in relation "@3@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.58 18559

The source process with PID @1@ is not running anymore.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.59 18560

Process @1@ waits for @2@ on @3@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.60 18561

page verification failed, calculated checksum @1@ but expected @2@

[Description]

The calculated checksum is different from the checksum in the page head.

[System Processing]

Continues processing.

[Action]

No action required.

2.82.61 18562

could not open file "@1@" (target block @2@): previous segment is only @3@ blocks

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.82.62 18563

terminating connection because of crash of another server process

[Description]

The postmaster has commanded this server process to roll back the current transaction and exit, because another server process exited abnormally and possibly corrupted shared memory.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.82.63 18564

The postmaster has commanded this server process to roll back the current transaction and exit, because another server process exited abnormally and possibly corrupted shared memory.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.64 18565

terminating connection due to idle-in-transaction timeout

[Description]

Processing was canceled.

[System Processing]

Processing will be aborted.

[Action]

Check the message text.

2.82.65 18566

"max_stack_depth" must not exceed @1@kB.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.66 18567

Increase the platform's stack depth limit via "ulimit -s" or local equivalent.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.67 18568

invalid affix flag "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.68 18569

affix flag "@1@" is out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.69 18570

invalid character in affix flag "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.70 18571

invalid affix flag "@1@" with "long" flag value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.71 18572

invalid affix alias "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.72 18573

invalid number of flag vector aliases

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.73 18574

Missing array dimension value.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.74 18575

Missing "@1@" after array dimensions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.75 18576

Array contents must start with "{".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.76 18577

Unexpected "@1@" character.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.77 18578

Unexpected array element.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.78 18579

Unmatched "@1@" character.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.79 18580

Multidimensional arrays must have sub-arrays with matching dimensions.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.80 18581

Junk after closing right brace.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.81 18582

array slice subscript must provide both boundaries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

When assigning to a slice of an empty array value, slice boundaries must be fully specified.

2.82.82 18583

When assigning to a slice of an empty array value, slice boundaries must be fully specified.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.83 18585

This time zone name appears in the configuration file for time zone abbreviation "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.84 18586

invalid size: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.82.85 18587

Invalid size unit: "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.86 18588

Valid units are "bytes", "kB", "MB", "GB", and "TB".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.87 18589

Input data is missing padding, is truncated, or is otherwise corrupted.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.88 18590

Character with value 0x@1@ must be escaped.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.89 18591

Unicode high surrogate must not follow a high surrogate.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.90 18592

Unicode low surrogate must follow a high surrogate.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.91 18593

\\u0000 cannot be converted to text.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.92 18595

Escape sequence "\\@1@" is invalid.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.93 18596

The input string ended unexpectedly.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.94 18597

Expected end of input, but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.95 18598

Expected JSON value, but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.82.96 18599

Expected string, but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83 Message Numbers Beginning with 18600

2.83.1 18600

Expected array element or "]", but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.2 18601

Expected "," or "]", but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.3 18602

Expected string or "}", but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.4 18603

Expected ":", but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.5 18604

Expected "," or "}", but found "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.6 18605

Token "@1@" is invalid.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.7 18606

JSON data, line @1@: @2@@3@@4@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.8 18607

The arguments of json_build_object() must consist of alternating keys and values.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.9 18608

Object keys should be text.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.10 18609

Due to an implementation restriction, jsonb strings cannot exceed @1@ bytes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.11 18610

Try calling the function in the FROM clause using a column definition list.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.12 18611

cannot replace existing key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Try using the function jsonb_set to replace the key value.

2.83.13 18612

Try using the function jsonb_set to replace key value.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.14 18613

levenshtein argument exceeds maximum length of @1@ characters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.15 18615

string is not a valid identifier: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

The string may have unclosed double quotation marks.

2.83.16 18616

String has unclosed double quotes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.17 18617

Quoted identifier must not be empty.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.18 18618

No valid identifier before ".".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.19 18619

No valid identifier after ".".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.20 18620

Apply system library package updates.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.21 18621

invalid command name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.22 18624

Valid values are "[]", "{}", "()", and "<>".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.23 18625

Junk after "empty" key word.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.24 18626

Missing left parenthesis or bracket.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.25 18627

Missing comma after lower bound.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.26 18628

Too many commas.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.27 18629

Junk after right parenthesis or bracket.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.28 18630

Key is not present in table "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.29 18631

Key is still referenced from table "@1@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.30 18632

Numeric time zones must have "-" or "+" as first character.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.31 18633

timestamp out of range: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.32 18634

distance in phrase operator should not be greater than @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.33 18635

distance in phrase operator should be non-negative and less than @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.34 18636

lexeme array may not contain nulls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.35 18637

weight array may not contain nulls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.36 18638

unrecognized weight: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.37 18639

For a single "@1@" use "@2@@3@".

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.38 18640

This probably indicates that the version of libxml2 being used is not compatible with the libxml2 header files that PostgreSQL was built with.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.39 18641

Make sure keystore_location points to the correct location. If the setting is correct, set the master encryption key to create the keystore.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.40 18642

keystore has been opened

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.83.41 18643

auto-open keystore has been opened

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.83.42 18644

Compile with --with-openssl to use transparent data encryption.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.43 18645

Specify keystore_location parameter in postgresql.conf.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.44 18646

The length of the passphrase must be between @1@ and @2@ bytes.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.45 18647

Check if keystore_location parameter points to a correct directory.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.46 18648

TRAP: ExceptionalCondition: bad arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.83.47 18649

TRAP: @1@("@2@", File: "@3@", Line: @4@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.83.48 18650

Server has FUNC_MAX_ARGS = @1@, library has @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.49 18651

Server has INDEX_MAX_KEYS = @1@, library has @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.50 18652

Server has NAMEDATALEN = @1@, library has @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.51 18654

Server has FLOAT8PASSBYVAL = @1@, library has @2@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.52 18655

Magic block has unexpected length or padding difference.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.53 18656

Either another server is starting, or the lock file is the remnant of a previous server startup crash.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.54 18657

could not open file "@1@": @2@; continuing anyway

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Continues processing.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.55 18658

lock file "@1@" contains wrong PID: @2@ instead of @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.56 18659

Specify a path outside the data directory.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.57 18660

Specify a path outside the transaction log directory.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.58 18661

replication connection authorized: user=@1@ SSL enabled (protocol=@2@, cipher=@3@, compression=@4@)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.83.59 18662

connection authorized: user=@1@ database=@2@ SSL enabled (protocol=@3@, cipher=@4@, compression=@5@)

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.83.60 18663

must be superuser or replication role to start walsender

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.61 18665

@1@: could not access directory "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.62 18666

Run initdb or pg_basebackup to initialize a PostgreSQL data directory.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.63 18667

@1@ does not know where to find the server configuration file.You must specify the --config-file or -D invocation option or set the PGDATA environment variable.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.64 18668

@1@ does not know where to find the database system data.This can be specified as "data_directory" in "@2@", or by the -D invocation option, or by the PGDATA environment variable.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.65 18669

@1@ does not know where to find the "hba" configuration file.This can be specified as "hba_file" in "@2@", or by the -D invocation option, or by the PGDATA environment variable.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.66 18670

@1@ does not know where to find the "ident" configuration file.This can be specified as "ident_file" in "@2@", or by the -D invocation option, or by the PGDATA environment variable.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.67 18671

Value exceeds integer range.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.68 18672

"temp_buffers" cannot be changed after any temporary tables have been accessed in the session.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.69 18673

Cannot enable parameter when "log_statement_stats" is true.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.70 18674

Cannot enable "log_statement_stats" when "log_parser_stats", "log_planner_stats", or "log_executor_stats" is true.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.71 18675

query-specified return tuple and function return type are not compatible

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.83.72 18676

query would be affected by row-level security policy for table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

To disable the policy for the table owner, use ALTER TABLE NO FORCE ROW LEVEL SECURITY.

2.83.73 18677

To disable the policy for the table's owner, use ALTER TABLE NO FORCE ROW LEVEL SECURITY.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.74 18678

Entry in time zone file "@1@", line @2@, conflicts with entry in file "@3@", line @4@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.75 18679

cannot have more than @1@ runs for an external sort

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.76 18680

Duplicate keys exist.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.77 18681

The source transaction is not running anymore.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.83.78 18682

cannot create restricted tokens on this platform: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.79 18683

@1@: could not open process token: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.80 18684

@1@: could not allocate SIDs: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.81 18685

@1@: could not create restricted token: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.82 18686

@1@: could not start process for command "@2@": error code @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.83 18687

@1@: could not re-execute with restricted token: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.84 18688

@1@: could not get exit code from subprocess: error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.85 18689

You must run @1@ as the PostgreSQL superuser.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.86 18690

@1@: lock file "@2@" existsIs a server running? If not, delete the lock file and try again.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.87 18691

The database server was not shut down cleanly.Resetting the transaction log might cause data to be lost.If you want to proceed anyway, use -f to force reset.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.88 18692

If you are sure the data directory path is correct, execute touch @1@and try again.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.83.89 18693

user does not exist

[Description]

user does not exist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.90 18694

command not executable

[Description]

The command cannot be executed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.91 18695

command not found

[Description]

The command cannot be found.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.92 18696

The server (version @1@) does not support editing view definitions.

[Description]

The server does not support editing the view function.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.93 18697

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.83.94 18698

There is no previous error.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.83.95 18699

Query buffer is empty.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84 Message Numbers Beginning with 18700

2.84.1 18700

The server (version @1@) does not support showing view definitions.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.2 18701

view name is required

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.3 18702

\\pset: allowed Unicode column line styles are single, double

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.4 18703

\\pset: allowed Unicode header line styles are single, double

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.5 18704

Pager won't be used for less than @1@ line.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.6 18705

could not parse reloptions array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.7 18706

The connection to the server was lost. Attempting reset:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.8 18707

canceled by user

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.9 18708

trying to exit copy mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.10 18709

\\crosstabview: statement did not return a result set

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.11 18710

\\crosstabview: query must return at least three columns

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.12 18711

\\crosstabview: vertical and horizontal headers must be different columns

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.13 18712

\\crosstabview: data column must be specified when query returns more than three columns

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.14 18713

\\crosstabview: maximum number of columns (@1@) exceeded

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.15 18714

\\crosstabview: query result contains multiple data values for row "@1@", column "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.16 18715

\\crosstabview: column number @1@ is out of range 1..@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.17 18716

\\crosstabview: ambiguous column name: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.18 18717

\\crosstabview: column name not found: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.19 18718

The server (version @1@) does not support access methods.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.20 18719

Did not find any text search parser named "@1@".

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.21 18720

could not find own program executable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.22 18721

buffer size is wrong

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.23 18722

source or destination file is not specified

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.24 18723

too many command-line arguments (first is "@1@")

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.25 18724

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.84.26 18725

could not create file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.27 18726

could not read file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.28 18727

could not write to file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.29 18728

could not fsync file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.30 18729

could not close file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.31 18730

user does not exist

[Description]

user does not exist.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.32 18731

user name lookup failure: error code @1@

[Description]

User name lookup failed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.33 18732

Cannot add header to table content: column count of @1@ exceeded.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.34 18733

Cannot add cell to table content: total cell count of @1@ exceeded.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.35 18734

invalid output format (internal error): @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.36 18735

could not connect to database @1@: out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.84.37 18736

cannot reindex specific schema(s) in all databases

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.38 18737

cannot reindex specific schema(s) and system catalogs at the same time

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.39 18738

reindexing of schema "@1@" in database "@2@" failed: @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.40 18739

number of parallel jobs must be at least 1

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.41 18741

out of memory

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.84.42 18742

could not obtain lock on relation "@1@"This usually means that someone requested an ACCESS EXCLUSIVE lock on the table after the pg_dump parent process had gotten the initial ACCESS SHARE lock on the table.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.43 18743

schema "@1@" not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.44 18744

table "@1@" not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.45 18745

index "@1@" not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.46 18746

function "@1@" not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.47 18747

trigger "@1@" not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.48 18748

WARNING: don't know how to set owner for object type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.49 18749

archive was made on a machine with larger integers, some operations might fail

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.50 18750

archive is compressed, but this installation does not support compression -- no data will be available

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.51 18751

invalid creation date in header

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.52 18753

Synchronized snapshots are not supported by this server version.Run with --no-synchronized-snapshots instead if you do not needsynchronized snapshots.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.53 18754

no matching tables were found for pattern "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.54 18755

Error message from server: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.55 18756

WARNING: owner of schema "@1@" appears to be invalid

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.56 18757

WARNING: owner of data type "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.57 18758

WARNING: owner of operator "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.58 18759

WARNING: owner of operator class "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.59 18760

WARNING: owner of operator family "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.60 18761

WARNING: owner of aggregate function "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.61 18762

WARNING: owner of function "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.62 18763

WARNING: owner of table "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.63 18764

WARNING: typtype of data type "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.64 18765

bogus value in proargmodes array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.65 18766

could not parse proallargtypes array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.66 18767

could not parse proargmodes array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.67 18768

could not parse proargnames array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.68 18769

could not parse proconfig array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.69 18770

unrecognized proparallel value for function "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.70 18771

bogus value in pg_cast.castfunc or pg_cast.castmethod field

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.71 18772

bogus value in pg_cast.castmethod field

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.72 18773

bogus transform definition, at least one of trffromsql and trftosql should be nonzero

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.73 18774

bogus value in pg_transform.trffromsql field

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.74 18775

bogus value in pg_transform.trftosql field

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.75 18777

WARNING: invalid type "@1@" of access method "@2@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.76 18778

aggregate function @1@ could not be dumped correctly for this database version; ignored

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.77 18779

could not parse initial GRANT ACL list (@1@) or initial REVOKE ACL list (@2@) for object "@3@" (@4@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.84.78 18780

could not parse reloptions array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.84.79 18782

source server must not be in recovery mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.80 18783

full_page_writes must be enabled in the source server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.81 18784

error running query (@1@) in source server: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.82 18785

unexpected result set from query

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.83 18786

unrecognized result "@1@" for current WAL insert location

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.84 18787

could not fetch file list: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.85 18788

unexpected result set while fetching file list

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.86 18789

could not send query: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.87 18790

could not set libpq connection to single row mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.88 18791

unexpected result while fetching remote files: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.89 18792

unexpected result set size while fetching remote files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.90 18793

unexpected data types in result set while fetching remote files: @1@ @2@ @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.91 18794

unexpected result format while fetching remote files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.92 18795

unexpected null values in result while fetching remote files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.93 18796

unexpected result length while fetching remote files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.94 18797

could not fetch remote file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.95 18798

unexpected result set while fetching remote file "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.84.96 18799

could not send COPY data: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85 Message Numbers Beginning with 18800

2.85.1 18801

could not send file list: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.2 18802

could not send end-of-COPY: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.3 18803

unexpected result while sending file list: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.4 18804

could not read WAL record at @1@/@2@: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.5 18805

could not read WAL record at @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.6 18806

could not find previous WAL record at @1@/@2@: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.7 18807

could not find previous WAL record at @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.8 18808

WAL record modifies a relation, but record type is not recognized: lsn: @1@/@2@, rmgr: @3@, info: @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.9 18809

cannot be executed by "root"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.10 18810

You must run @1@ as the PostgreSQL superuser.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.11 18811

source and target clusters are from different systems

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.12 18812

clusters are not compatible with this version of pg_rewind

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.13 18813

target server needs to use either data checksums or "wal_log_hints = on"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.14 18814

target server must be shut down cleanly

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.15 18815

source data directory must be shut down cleanly

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.16 18816

invalid control file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.17 18817

could not find common ancestor of the source and target cluster's timelines

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.18 18818

backup label buffer too small

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.19 18819

unexpected control file CRC

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.20 18820

unexpected control file size @1@, expected @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.21 18822

syntax error in history file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.22 18823

Expected a numeric timeline ID.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.23 18824

Expected a write-ahead log switchpoint location.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.24 18825

invalid data in history file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.25 18826

Timeline IDs must be in increasing sequence.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.26 18827

invalid data in history file

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.27 18828

Timeline IDs must be less than child timeline's ID.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.28 18829

invalid record offset at @1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.29 18830

contrecord is requested by @1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.30 18831

record length @1@ at @2@/@3@ too long

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.31 18832

there is no contrecord flag at @1@/@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.32 18833

invalid contrecord length @1@ at @2@/@3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.33 18834

invalid resource manager ID @1@ at @2@/@3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.34 18835

record with incorrect prev-link @1@/@2@ at @3@/@4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.35 18836

incorrect resource manager data checksum in record at @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.36 18837

invalid magic number @1@ in log segment @2@, offset @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.37 18838

invalid info bits @1@ in log segment @2@, offset @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.38 18839

WAL file is from different database system: WAL file database system identifier is @1@, pg_control database system identifier is @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.39 18840

WAL file is from different database system: incorrect XLOG_SEG_SIZE in page header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.40 18841

WAL file is from different database system: incorrect XLOG_BLCKSZ in page header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.41 18842

unexpected pageaddr @1@/@2@ in log segment @3@, offset @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.42 18843

out-of-sequence timeline ID @1@ (after @2@) in log segment @3@, offset @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.43 18844

record with invalid length at @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.44 18845

invalid compressed image at @1@/@2@, block @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.45 18847

WARNING: Calculated CRC checksum does not match value stored in file.Either the file is corrupt, or it has a different layout than this programis expecting. The results below are untrustworthy.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.46 18848

byte ordering mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.47 18849

possible byte ordering mismatchThe byte ordering used to store the pg_control file might not match the oneused by this program. In that case the results below would be incorrect, andthe PostgreSQL installation would be incompatible with this data directory.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.48 18850

too many command-line arguments (first is "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.49 18851

out of memory

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.85.50 18852

cannot duplicate null pointer (internal error)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.51 18853

command not executable

[Description]

The command cannot be executed.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.52 18854

command not found

[Description]

The command cannot be found.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.53 18855

WARNING: online backup mode is activeShutdown will not complete until pg_stop_backup() is called.

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.85.54 18856

@1@: WARNING: cannot create restricted tokens on this platform

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.85.55 18857

@1@: WARNING: could not locate all job object functions in system API

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.85.56 18858

@1@: cannot be run as rootPlease log in (using, e.g., "su") as the (unprivileged) user that willown the server process.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.57 18859

out of memory

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.85.58 18860

cannot duplicate null pointer (internal error)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.59 18861

out of memory

[Description]

There was insufficient free space in the client's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- Modify the application to reduce memory usage.

2.85.60 18862

replication slots can only be used with WAL streaming

[Description]

Replication slots can only be used with WAL streaming.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.61 18863

WAL directory location must be an absolute path

[Description]

The transaction log directory location must be an absolute path.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.62 18864

Make sure the WAL archive area specified by archive_command parameter is writable and not full.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.63 18865

query result has too many rows to fit in a Perl array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.85.64 18867

query result has too many rows to fit in a Python list

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.65 18868

'@1@' is an invalid keyword argument for this function

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.66 18869

invalid SQLSTATE code

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.67 18870

PGresult is not an error result

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.85.68 18871

extraneous data in "t" message

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86 Message Numbers Beginning with 18900

2.86.1 18954

invalid operator "@1@" in @2@ section

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.2 18955

invalid format parameter "@1@" of field "@2@" in @3@ section

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.3 18956

timestamp parameter must be set with pair of the begin and end timestamp : "@1@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.4 18957

invalid timestamp parameters, the end timestamp must advance to the begin timestamp: begin = "@1@", end = "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.5 18958

pgaudit must be loaded via shared_preload_libraries

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.6 18959

pgaudit must be set log_replication_commands.

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.7 18960

"pgaudit.config_file" must be specify when pgaudit is loaded

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.8 18961

error invalid token "@1@" in "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.9 18962

redundant @1@ section defined in file "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.10 18963

invalid parameter "@1@" in "@2@" in file "@3@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.11 18964

invalid operator "@1@" in file "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.12 18965

syntax error near token "@1@" in file "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.13 18966

unrecognized configuration token "@1@" in "@2@" in file "@3@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.14 18967

could not make FIFO special file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.15 18968

could not open FIFO special file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.16 18969

could not read from named pipe: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.17 18970

could not write audit log "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.18 18971

could not open audit log file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.19 18972

disabling automatic rotation

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.86.20 18973

pgaudit extension initialized

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.86.21 18974

following_async_walsenders parser failed

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.22 18975

Cannot specify "*" as standby names in "synchronous_standby_names" when "following_async_walsenders" is enabled

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.23 18976

Cannot enable "following_async_walsenders" when "*" is specify as standby names in "synchronous_standby_names"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.24 18977

Cannot specify the standby name (@1@) in "synchronous_standby_names" because it has been specified in "following_async_walsenders"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.25 18978

Cannot specify the standby name (@1@) in "following_async_walsenders" because it has been specified in "synchronous_standby_names"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.26 18979

tablespace "@1@" in the tablespaces list file does not exist

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.27 18980

no resource to backup with the copy command

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.28 18981

results of copying file does not exist

[Description]

The backup data may be corrupted.

[System Processing]

Processing will be aborted.

[Action]

Copy the backup data to the backup storage directory from backup media.

2.86.29 18982

Backup using the copy command has not been done

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.30 18983

option -Y is necessary because backup has been performed with the copy command

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.31 18984

option -Y must not be specified because backup has not been performed with the copy command

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.32 18985

could not set permissions of file "@1@": @2@ (errno=@3@)

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.33 18986

copy command "@1@" failed (mode=@2@): @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.34 18987

tablespace name "@1@" has been overlapped in the tablespaces list file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.35 18988

file "@1@" does not exist or is not a regular file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.36 18989

tablespace "@1@" can not be specified in the tablespaces list file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.37 18990

the tablespace name specified in the tablespaces list file could not be acquired: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.86.38 18991

@1@: COPY FROM command must be specified

[Description]

COPY FROM command must be specified.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.86.39 18992

@1@: cannot launch more than @2@ workers

[Description]

The number of workers is too many

[System Processing]

Processing will be aborted.

[Action]

If the number of workers is high, reduce it.

2.86.40 18993

@1@: no table name specified

[Description]

No table name specified.

[System Processing]

Processing will be aborted.

[Action]

Please specify the table name you would load data.

2.86.41 18994

@1@: COPY TO command cannot be available

[Description]

COPY TO command cannot be available.

[System Processing]

Processing will be aborted.

[Action]

Please specify COPY FROM command.

2.86.42 18995

load failed

[Description]

Load failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.86.43 18996

could not start @1@ background processes

[Description]

Could not start %d background processes.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.86.44 18997

You might need to increase max_worker_processes.

[Description]

You might need to increase max_worker_processes.

[System Processing]

Processing will be aborted.

[Action]

You might need to increase max_worker_processes

2.86.45 18998

postmaster exited during a parallel loading

[Description]

postmaster exited during a parallel loading.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.86.46 18999

COPY statement cannot be null

[Description]

COPY statement cannot be null.

[System Processing]

Processing will be aborted.

[Action]

Please specify COPY FROM statement.

2.87 Message Numbers Beginning with 19000

2.87.1 19000

number of workers must not be negative

[Description]

The number of workers must not be negative.

[System Processing]

Processing will be aborted.

[Action]

Please specify more than one.

2.87.2 19001

lack of max_prepared_transactions

[Description]

Lack of max_prepared_transactions.

[System Processing]

Processing will be aborted.

[Action]

Please increase max_prepared_transactions.

2.87.3 19002

max_prepared_transactions must be set at least @1@

[Description]

Lack of max_prepared_transactions.

[System Processing]

Processing will be aborted.

[Action]

Please increase max_prepared_transactions.

2.87.4 19003

pgx_loader only available using COPY FROM

[Description]

pgx_loader can be available only COPY FROM command.

[System Processing]

Processing will be aborted.

[Action]

Please specify COPY FROM statement.

2.87.5 19004

failed to execute SPI returned @1@

[Description]

Could not execute SPI.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.6 19005

@1@ the prepared transaction with gid: "@2@"

[Description]

The prepared transaction has been completed.

[System Processing]

Continues processing.

[Action]

No action required.

2.87.7 19006

failed to delete the record with id: @1@(SPI returned: @2@)

[Description]

Could not delete the row in pgx_loader_state table.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.8 19007

could not write to the shared message queue for PID @1@: "@2@"

[Description]

Could not write to the shared memory message queue.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.9 19008

COPY FROM instructs the PostgreSQL server process to read a file. You may want a client-side facility such as pgx_loader command.

[Description]

Failed to read the file.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.87.10 19009

failed to add new prepared transaction "@1@" by worker(@2@)

[Description]

Failed to add new prepared transaction.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.11 19010

failed to fetch id column from "@1@" by worker(@2@)

[Description]

Failed to fetch the id column.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.12 19011

cannot uniquely identify the id

[Description]

Could not uniquely identify the id.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.13 19012

record with gid: "@1@" and master_pid: @2@ might already exist

[Description]

Could not uniquely identify the id.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.14 19013

failed to update state column of record with id: @1@

[Description]

Failed to update the state column.

[System Processing]

Processing will be aborted.

[Action]

Please refer to the server log, and determine the cause of the error.

2.87.15 19014

could not get the status of file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.16 19015

could not open directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.17 19016

could not stat file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.18 19017

invalid value "@1@" for "@2@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.19 19018

could not open file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.20 19019

could not close file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.87.21 19020

parallel worker failed to initialize

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.22 19021

More details may be available in the server log.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.87.23 19022

operator family "@1@" of access method @2@ contains support procedure @3@ with different left and right input types

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.24 19023

operator family "@1@" of access method @2@ contains invalid ORDER BY specification for operator @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.25 19024

operator family "@1@" of access method @2@ contains operator @3@ with wrong signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.26 19025

operator family "@1@" of access method @2@ is missing cross-type operator(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.27 19026

could not determine data type for argument @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.28 19027

@1@: data directory is of wrong version File "@2@" contains "@3@", which is not compatible with this program's version "@4@".

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.87.29 19028

@1@: could not clear search_path: @2@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.87.30 19029

@1@: query returned @2@ row instead of one: @3@

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.87.31 19030

@1@: could not stat file "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.32 19031

@1@: could not open directory "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.33 19032

@1@: could not read directory "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.34 19033

@1@: could not open file "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.35 19034

@1@: could not fsync file "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.36 19035

@1@: could not rename file "@2@" to "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.37 19036

password too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.38 19037

block number out of range: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.39 19038

corrupted BRIN index: inconsistent range map

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.40 19039

invalid overflow block number @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.41 19040

removing stale two-phase state from memory for transaction @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.87.42 19041

removing future two-phase state from memory for transaction @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.87.43 19042

cannot PREPARE a transaction that has manipulated logical replication workers

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.87.44 19043

cannot PREPARE a transaction that has manipulated logical replication workers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.45 19044

could not open write-ahead log directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.46 19045

could not generate secret authorization token

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.47 19046

cannot use IN SCHEMA clause when using GRANT/REVOKE ON SCHEMAS

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.48 19047

permission denied for statistics object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.49 19048

permission denied for publication @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.50 19049

permission denied for subscription @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.51 19050

must be owner of statistics object @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.52 19051

must be owner of publication @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.53 19052

must be owner of subscription @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.54 19053

publication with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.55 19054

subscription with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.56 19055

statistics object with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.57 19056

cannot add NO INHERIT constraint to partitioned table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.58 19057

statistics object "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.59 19058

must specify relation and object name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.60 19059

publication relation "@1@" in publication "@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.61 19060

empty range bound specified for partition "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.62 19061

partition "@1@" would overlap partition "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.63 19062

"@1@" is a partitioned table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.64 19063

"@1@" is a system table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.65 19064

table "@1@" cannot be replicated

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.66 19065

relation "@1@" is already member of publication "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.67 19066

publication "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.68 19067

subscription "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.69 19068

publication "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.70 19069

subscription "@1@" already exists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.71 19070

statistics object "@1@" already exists in schema "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.72 19071

column "@1@" of relation "@2@" appears more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.73 19072

collation "default" cannot be copied

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.74 19073

unrecognized collation provider: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.75 19074

could not convert locale name "@1@" to language tag: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.76 19075

must be superuser to import system collations

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.77 19076

no usable system locales were found

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.87.78 19077

cannot copy from partitioned table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.79 19078

cannot route inserted tuples to a foreign table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.80 19079

database "@1@" is being used by logical replication subscription

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.81 19080

statistics object "@1@" does not exist, skipping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.82 19081

publication "@1@" does not exist, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.87.83 19082

extension "@1@" has no installation script nor update path for version "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.84 19083

user mapping for "@1@" already exists for server "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.85 19084

third argument of cast function must be type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.86 19085

cannot create unique index on partitioned table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.87 19086

invalid list syntax for "publish" option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.88 19087

unrecognized "publish" value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.89 19088

unrecognized publication parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.90 19089

must be superuser to create FOR ALL TABLES publication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.91 19090

publication "@1@" is defined as FOR ALL TABLES

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.92 19091

relation "@1@" is not part of the publication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.93 19092

permission denied to change owner of publication "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.94 19093

invalid sequence option SEQUENCE NAME

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.95 19094

identity column type must be smallint, integer, or bigint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.96 19095

MAXVALUE (@1@) is out of range for sequence data type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.97 19096

MINVALUE (@1@) is out of range for sequence data type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.98 19097

cannot change ownership of identity sequence

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.99 19098

only a single relation is allowed in CREATE STATISTICS

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.87.100 19099

relation "@1@" is not a table, foreign table, or materialized view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88 Message Numbers Beginning with 19100

2.88.1 19100

only simple column references are allowed in CREATE STATISTICS

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.2 19101

statistics creation on system columns is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.3 19102

column "@1@" cannot be used in statistics because its type @2@ has no default btree

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.4 19103

cannot have more than @1@ columns in statistics

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.5 19104

extended statistics require at least 2 columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.6 19105

duplicate column name in statistics definition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.7 19106

unrecognized statistics kind "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.8 19107

unrecognized subscription parameter: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.9 19115

publication name "@1@" used more than once

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.10 19116

must be superuser to create subscriptions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.11 19117

could not connect to the publisher: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.12 19118

tables were not subscribed, you will have to run @1@ to subscribe the tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.13 19119

cannot set @1@ for enabled subscription

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.14 19120

cannot enable subscription that does not have a slot name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.15 19121

ALTER SUBSCRIPTION with refresh is not allowed for disabled subscriptions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.16 19122

ALTER SUBSCRIPTION ... REFRESH is not allowed for disabled subscriptions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.17 19123

could not drop the replication slot "@1@" on publisher

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.18 19124

permission denied to change owner of subscription "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.19 19125

could not receive list of replicated tables from the publisher: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.20 19127

"@1@" is not partitioned

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.21 19128

cannot partition using more than @1@ columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.22 19129

cannot truncate only a partitioned table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.23 19130

cannot inherit from partitioned table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.24 19131

cannot inherit from partition "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.25 19132

partition constraint of relation "@1@" is violated by some row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.26 19133

cannot add column to a partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.27 19134

cannot recursively add identity column to table that has child tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.28 19135

cannot remove constraint from only the partitioned table when partitions exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.29 19136

column "@1@" of relation "@2@" is an identity column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.30 19137

column "@1@" is marked NOT NULL in parent table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.31 19139

column "@1@" of relation "@2@" must be declared NOT NULL before identity can be added

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.32 19140

column "@1@" of relation "@2@" is already an identity column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.33 19141

column "@1@" of relation "@2@" already has a default value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.34 19142

column "@1@" of relation "@2@" is not an identity column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.35 19144

cannot drop column "@1@" because it is part of the partition key of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.36 19145

cannot drop column from only the partitioned table when partitions exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.37 19148

cannot alter column "@1@" because it is part of the partition key of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.38 19149

cannot change inheritance of a partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.39 19150

cannot change inheritance of partitioned table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.40 19151

cannot inherit from a partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.41 19152

trigger "@1@" prevents table "@2@" from becoming an inheritance child

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.42 19153

relation "@1@" is not a partition of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.43 19154

cannot change table "@1@" to unlogged because it is part of a publication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.44 19155

unrecognized partitioning strategy "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.45 19156

cannot use "list" partition strategy with more than one column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.46 19157

column "@1@" appears more than once in partition key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.47 19158

column "@1@" named in partition key does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.48 19159

cannot use system column "@1@" in partition key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.49 19160

functions in partition key expression must be marked IMMUTABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.50 19162

partition key expressions cannot contain system column references

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.51 19163

cannot use constant expression as partition key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.52 19164

could not determine which collation to use for partition expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.53 19166

"@1@" is already a partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.54 19167

cannot attach a typed table as partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.55 19168

cannot attach inheritance child as partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.56 19169

cannot attach inheritance parent as partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.57 19170

cannot attach a permanent relation as partition of temporary relation "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.58 19171

cannot attach as partition of temporary relation of another session

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.59 19172

cannot attach temporary relation of another session as partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.60 19173

table "@1@" contains column "@2@" not found in parent "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.61 19174

trigger "@1@" prevents table "@2@" from becoming a partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.62 19175

ROW triggers with transition tables are not supported on partitions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.63 19176

ROW variable naming in the REFERENCING clause is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.64 19177

ROW triggers with transition tables are not supported on inheritance children

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.65 19178

transition table name can only be specified for an AFTER trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.66 19179

TRUNCATE triggers with transition tables are not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.67 19180

transition tables cannot be specified for triggers with more than one event

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.68 19181

transition tables cannot be specified for triggers with column lists

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.69 19182

NEW TABLE can only be specified for an INSERT or UPDATE trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.70 19183

NEW TABLE cannot be specified multiple times

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.71 19184

OLD TABLE can only be specified for a DELETE or UPDATE trigger

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.72 19185

OLD TABLE cannot be specified multiple times

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.73 19186

OLD TABLE name and NEW TABLE name cannot be the same

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.74 19187

attribute @1@ of type @2@ has been dropped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.75 19188

attribute @1@ of type @2@ has wrong type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.76 19189

new row for relation "@1@" violates partition constraint

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.77 19190

no partition of relation "@1@" found for row

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.78 19191

cannot update table "@1@" because it does not have a replica identity and publishes updates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.79 19192

cannot delete from table "@1@" because it does not have a replica identity and publishes deletes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.80 19193

cannot use relation "@1@.@2@" as logical replication target

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.81 19194

namespace URI must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.82 19195

row filter expression must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.83 19196

column filter expression must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.84 19197

null is not allowed in column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.85 19198

UNENCRYPTED PASSWORD is no longer supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.88.86 19199

sequence option "@1@" not supported here

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89 Message Numbers Beginning with 19200

2.89.1 19200

unrecognized row security option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.2 19201

only one DEFAULT value is allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.3 19202

only one PATH value per column is allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.4 19203

conflicting or redundant NULL / NOT NULL declarations for column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.5 19204

unrecognized column option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.6 19205

malformed SCRAM message

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.7 19206

invalid SCRAM response

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.8 19207

could not generate random salt

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.9 19208

client requires SCRAM channel binding, but it is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.10 19209

client uses authorization identity, but it is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.11 19210

client requires an unsupported SCRAM extension

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.12 19211

non-printable characters in SCRAM nonce

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.13 19212

could not generate random nonce

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.14 19213

unexpected SCRAM channel-binding attribute in client-final-message

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.15 19214

SASL authentication is not supported in protocol version 2

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.16 19215

expected SASL response, got message type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.17 19216

client selected an invalid SASL authentication mechanism

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.18 19217

private key file "@1@" cannot be reloaded because it requires a passphrase

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.19 19218

could not set the cipher list (no valid ciphers available)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.20 19219

could not initialize SSL connection: SSL context not set up

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.21 19220

could not open DH parameters file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.22 19221

could not load DH parameters file: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.23 19222

invalid DH parameters: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.24 19223

invalid DH parameters: p is not prime

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.25 19224

invalid DH parameters: neither suitable generator or safe prime

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.26 19225

DH: could not load DH parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.27 19226

DH: could not set DH parameters: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.28 19227

could not parse RADIUS server list "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.29 19228

could not parse RADIUS port list "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.30 19229

could not parse RADIUS secret list "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.31 19230

could not parse RADIUS identifiers list "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.32 19231

ON CONFLICT clause is not supported with partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.33 19232

@1@ cannot be applied to a table function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.34 19233

@1@ cannot be applied to a named tuplestore

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.35 19234

aggregate functions are not allowed in partition key expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.36 19235

grouping operations are not allowed in partition key expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.37 19236

aggregate function calls cannot contain set-returning function calls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.38 19237

window functions are not allowed in partition key expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.39 19238

relation "@1@" cannot be the target of a modifying statement

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.40 19239

set-returning functions must appear at top level of FROM

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.41 19240

only one FOR ORDINALITY column is allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.42 19241

column name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.43 19242

namespace name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.44 19243

only one default namespace is allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.45 19244

could not determine polymorphic type because input has type @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.46 19245

DEFAULT is not allowed in this context

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.47 19246

@1@ must not return a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.48 19247

source for a multiple-column UPDATE item must be a sub-SELECT or ROW() expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.49 19248

set-returning functions are not allowed in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.50 19249

cannot use subquery in partition key expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.51 19250

window function calls cannot contain set-returning function calls

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.52 19251

function name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.53 19252

could not find a function named "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.54 19253

set-returning functions are not allowed in JOIN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.55 19254

set-returning functions are not allowed in policy expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.56 19255

set-returning functions are not allowed in window definitions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.57 19256

set-returning functions are not allowed in check constraints

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.58 19257

set-returning functions are not allowed in DEFAULT expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.59 19258

set-returning functions are not allowed in index expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.60 19259

set-returning functions are not allowed in index predicates

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.61 19260

set-returning functions are not allowed in transform expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.62 19261

set-returning functions are not allowed in EXECUTE parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.63 19262

set-returning functions are not allowed in trigger WHEN conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.64 19263

set-returning functions are not allowed in partition key expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.65 19264

cannot create partitioned table as inheritance child

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.66 19265

multiple identity specifications for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.67 19266

primary key constraints are not supported on partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.68 19267

unique constraints are not supported on partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.69 19268

foreign key constraints are not supported on partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.70 19269

both default and identity specified for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.71 19270

exclusion constraints are not supported on partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.72 19271

invalid bound specification for a list partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.73 19272

invalid bound specification for a range partition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.74 19273

FROM must specify exactly one value per partitioning column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.75 19274

TO must specify exactly one value per partitioning column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.76 19275

cannot specify NULL in range bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.77 19276

every bound following MAXVALUE must also be MAXVALUE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.78 19277

every bound following MINVALUE must also be MINVALUE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.79 19278

specified value cannot be cast to type @1@ for column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.80 19279

invalid connection string syntax: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.81 19280

error while shutting down streaming COPY: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.82 19281

could not create replication slot "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.83 19282

invalid query response

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.84 19283

the query interface requires a database connection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.85 19284

cannot start logical replication workers when max_replication_slots = 0

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.86 19285

out of logical replication worker slots

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.89.87 19286

out of background worker slots

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.89.88 19287

logical replication worker slot @1@ is empty, cannot attach

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.89 19288

replication origin "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.90 19289

replication origin with OID @1@ does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.91 19290

logical replication target relation "@1@.@2@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.92 19291

built-in type @1@ not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.93 19292

data type "@1@.@2@" required for logical replication does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.94 19293

initial slot snapshot too large

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.95 19294

could not fetch table info for table "@1@.@2@" from publisher: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.96 19295

table "@1@.@2@" not found on publisher

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.97 19296

could not fetch table info for table "@1@.@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.98 19297

could not start initial contents copy for table "@1@.@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.99 19298

table copy could not start transaction on publisher

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.89.100 19299

table copy could not finish transaction on publisher

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90 Message Numbers Beginning with 19300

2.90.1 19300

ORIGIN message sent out of order

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.2 19301

invalid logical replication message type "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.3 19302

terminating logical replication worker due to timeout

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.4 19303

subscription has no replication slot set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.5 19304

invalid proto_version

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.6 19305

proto_version "@1@" out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.7 19306

invalid publication_names syntax

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.8 19307

client sent proto_version=@1@ but we only support protocol @2@ or lower

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.9 19308

client sent proto_version=@1@ but we only support protocol @2@ or higher

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.10 19309

publication_names parameter missing

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.11 19310

number of synchronous standbys (@1@) must be greater than zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.12 19311

IDENTIFY_SYSTEM has not been run before START_REPLICATION

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.13 19312

cannot execute new commands while WAL sender is in stopping mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.14 19313

cannot execute SQL commands in WAL sender for physical replication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.15 19314

cannot convert partitioned table "@1@" to a view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.16 19315

cannot convert partition "@1@" to a view

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.17 19316

cannot insert into column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.18 19317

column "@1@" can only be updated to DEFAULT

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.19 19319

statistics object "@1@.@2@" could not be computed for relation "@3@.@4@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.90.20 19324

out of shared memory (@1@ bytes requested)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.21 19325

terminating logical replication worker due to administrator command

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.22 19326

case conversion failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.23 19327

formatting field "@1@" is only supported in to_char

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.24 19328

expected json array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.25 19329

malformed json array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.26 19330

macaddr8 data out of range to convert to macaddr

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.27 19331

log format "@1@" is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.28 19332

cannot convert infinity to numeric

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.29 19333

collation provider LIBC is not supported on this platform

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.30 19334

collations with different collate and ctype values are not supported by ICU

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.31 19335

could not open collator for locale "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.32 19336

collation "@1@" has no actual version, but a version was specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.33 19337

collation "@1@" has version mismatch

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.34 19338

could not open ICU converter for encoding "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.35 19339

@1@ failed: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.36 19340

@1@ failed: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.37 19341

@1@ does not support the "global" option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.38 19342

@1@ does not support the "global" option

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.39 19343

transaction ID @1@ is in the future

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.40 19344

collation failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.41 19345

sort key generation failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.42 19346

DEFAULT namespace is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.43 19347

row path filter must not be empty string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.44 19348

column path filter must not be empty string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.45 19349

more than one value returned by column XPath expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.46 19350

could not find function information for function "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.47 19351

encoding "@1@" not supported by ICU

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.48 19352

could not attach to dynamic shared area

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.49 19353

\\@1@ command ignored; use \\endif or Ctrl-C to exit current \\if block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.50 19354

\\elif: cannot occur after \\else

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.51 19355

\\elif: no matching \\if

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.52 19356

\\else: cannot occur after \\else

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.53 19357

\\else: no matching \\if

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.54 19358

\\endif: no matching \\if

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.55 19359

shell command argument contains a newline or carriage return: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.56 19360

Did not find any settings for role "@1@" and database "@2@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.57 19361

Did not find any text search parsers.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.58 19362

Did not find any text search configurations.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.59 19363

The server (version @1@) does not support publications.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.60 19364

Did not find any publication named "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.61 19365

Did not find any publications.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.62 19366

The server (version @1@) does not support subscriptions.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.63 19367

\\if: escaped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.64 19368

query ignored; use \\endif or Ctrl-C to exit current \\if block

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.65 19369

reached EOF without finding closing \\endif(s)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.66 19370

unrecognized collation provider: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.67 19371

unrecognized value "@1@" for "@2@": Boolean expected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.68 19372

invalid value "@1@" for "@2@": integer

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.69 19373

invalid variable name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.70 19374

could not write to output file: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.71 19375

no matching schemas were found for pattern "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.72 19376

WARNING: owner of publication "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.90.73 19377

subscriptions not dumped because current user is not a superuser

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.90.74 19378

WARNING: owner of subscription "@1@" appears to be invalid

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.90.75 19379

could not parse subpublications array

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.90.76 19380

failed sanity check, parent table with OID @1@ of pg_rewrite entry with OID @2@ not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.77 19381

invalid number of parents @1@ for table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.78 19382

could not rename file "@1@" to "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.79 19383

failed to remove WAL directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.80 19384

failed to remove contents of WAL directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.81 19385

could not open file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.82 19386

failed to remove data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.83 19387

failed to remove contents of data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.84 19388

failed to remove WAL directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.85 19389

failed to remove contents of WAL directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.86 19390

data directory "@1@" not removed at user's request

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.87 19391

WAL directory "@1@" not removed at user's request

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.88 19392

changes to tablespace directories will not be undone

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.89 19393

could not finish writing WAL files: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.90 19394

cannot stream write-ahead logs in tar mode to stdout

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.91 19395

--no-slot cannot be used with slot name

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.92 19396

could not open compressed file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.93 19397

could not seek in compressed file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.94 19398

could not read compressed file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.90.95 19399

compressed segment file "@1@" has incorrect uncompressed size @2@, skipping

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91 Message Numbers Beginning with 19400

2.91.1 19400

could not parse end position "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.2 19401

--endpos may only be specified with --start

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.3 19402

could not get size of write-ahead log file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.4 19403

could not fsync existing write-ahead log file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.5 19404

could not open write-ahead log file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.6 19405

@1@: could not create temporary replication slot "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.7 19406

could not compress data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.8 19407

could not reset compression stream

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.9 19408

could not initialize compression library

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.10 19409

implementation error: tar files can't have more than one open file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.11 19410

could not create tar header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.12 19411

could not change compression parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.13 19412

unlink not supported with compression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.14 19413

could not close compression stream

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.15 19414

archive location "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.16 19416

could not remove file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.17 19417

could not read archive location "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.18 19418

could not close archive location "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.19 19419

could not open archive location "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.20 19420

invalid file name argument

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.21 19421

failed to get system locale name for "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.22 19422

must specify archive location

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.23 19423

must specify oldest kept WAL file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.24 19424

too many command-line arguments

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.25 19425

This utility can only upgrade from PostgreSQL version 8.4 and later.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.26 19426

This utility can only upgrade to PostgreSQL version @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.27 19427

This utility cannot be used to downgrade to older major PostgreSQL versions.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.28 19428

Old cluster data and binary directories are from different major versions.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.29 19429

New cluster data and binary directories are from different major versions.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.30 19430

encodings for database "@1@" do not match: old "@2@", new "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.31 19431

lc_collate values for database "@1@" do not match: old "@2@", new "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.32 19432

lc_ctype values for database "@1@" do not match: old "@2@", new "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.33 19433

New cluster database "@1@" is not empty: found relation "@2@.@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.34 19434

could not open file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.35 19435

could not add execute permission to file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.36 19436

database user "@1@" is not the install user

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.37 19437

could not determine the number of users

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.38 19438

Only the install user can be defined in the new cluster.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.39 19439

The source cluster contains prepared transactions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.40 19440

The target cluster contains prepared transactions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.41 19441

The source cluster contains roles starting with "pg_"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.42 19442

The target cluster contains roles starting with "pg_"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.43 19443

failed to get the current locale

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.44 19444

failed to restore old locale "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.45 19445

could not get control data using @1@: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.46 19446

@1@: pg_resetwal problem

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.47 19447

@1@: controldata retrieval problem

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.48 19448

The source cluster lacks some required control information:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.49 19449

The target cluster lacks some required control information:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.50 19450

Cannot continue without required control information, terminating

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.51 19451

old and new pg_controldata alignments are invalid or do not matchLikely one cluster is a 32-bit install, the other 64-bit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.52 19452

old and new pg_controldata block sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.53 19453

old and new pg_controldata maximum relation segment sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.54 19454

old and new pg_controldata WAL block sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.55 19455

old and new pg_controldata WAL segment sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.56 19456

old and new pg_controldata maximum identifier lengths are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.57 19457

old and new pg_controldata maximum indexed columns are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.58 19458

old and new pg_controldata maximum TOAST chunk sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.59 19459

old and new pg_controldata large-object chunk sizes are invalid or do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.60 19460

old and new pg_controldata date/time storage types do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.61 19461

old cluster does not use data checksums but the new one does

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.62 19462

old cluster uses data checksums but the new one does not

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.63 19463

old and new cluster pg_controldata checksum versions do not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.64 19464

Unable to rename @1@ to @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.65 19465

could not get pg_ctl version data using @1@: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.66 19466

could not get pg_ctl version output from @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.67 19467

command too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.68 19468

could not write to log file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.69 19469

There were problems executing "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.70 19470

could not open file "@1@" for reading: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.71 19471

You must have read and write access in the current directory.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.72 19472

check for "@1@" failed: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.73 19473

"@1@" is not a directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.74 19474

check for "@1@" failed: not a regular file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.75 19475

check for "@1@" failed: cannot read file (permission denied)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.76 19476

check for "@1@" failed: cannot execute (permission denied)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.77 19477

error while copying relation "@1@.@2@": could not open file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.78 19478

error while copying relation "@1@.@2@": could not create file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.79 19479

error while copying relation "@1@.@2@": could not read file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.80 19480

error while copying relation "@1@.@2@": could not write file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.81 19481

error while copying relation "@1@.@2@" ("@3@" to "@4@"): @5@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.82 19482

error while creating link for relation "@1@.@2@" ("@3@" to "@4@"): @5@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.83 19483

error while copying file ("@1@" to "@2@"): could not open file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.84 19484

error while copying file ("@1@" to "@2@"): could not create file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.85 19485

error while copying file ("@1@" to "@2@"): could not read file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.86 19486

error while copying file ("@1@" to "@2@"): could not write file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.87 19487

error while copying file ("@1@" to "@2@"): @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.88 19488

error while linking file ("@1@" to "@2@"): @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.89 19489

error while copying relation "@1@.@2@": could not stat file "@3@": @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.90 19490

error while copying relation "@1@.@2@": partial page found in file "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.91 19491

@1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.92 19492

Remove the problem functions from the old cluster to continue.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.93 19493

Checking for presence of required libraries

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.94 19494

could not load library "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.95 19495

Failed to match up old and new tables in database "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.96 19496

which is an index on "@1@.@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.97 19497

which is an index on OID @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.98 19498

which is the TOAST table for "@1@.@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.91.99 19499

which is the TOAST table for OID @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92 Message Numbers Beginning with 19500

2.92.1 19500

No match found in old cluster for new relation with OID @1@ in database "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.2 19501

No match found in new cluster for old relation with OID @1@ in database "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.3 19502

mappings for database "@1@":

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.4 19503

@1@.@2@: @3@ to @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.5 19505

source databases:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.6 19506

target databases:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.7 19507

Database: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.8 19508

relname: @1@.@2@: reloid: @3@ reltblspace: @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.9 19509

@1@: cannot be run as root

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.10 19510

invalid old port number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.11 19511

invalid new port number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.12 19512

Running in verbose mode

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.13 19513

Try "@1@ --help" for more information.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.14 19514

old cluster binaries reside

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.15 19515

new cluster binaries reside

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.16 19516

old cluster data resides

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.17 19517

new cluster data resides

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.18 19518

could not determine current directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.19 19519

cannot run pg_upgrade from inside the new cluster data directory on Windows

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.20 19520

pg_upgrade upgrades a PostgreSQL cluster to a different major version.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.21 19521

Usage:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.22 19522

pg_upgrade [OPTION]...

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.23 19523

Options:

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.24 19524

-b, --old-bindir=BINDIR old cluster executable directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.25 19525

-B, --new-bindir=BINDIR new cluster executable directory (default same directory as pg_upgrade)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.26 19526

-c, --check check clusters only, don't change any data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.27 19527

-d, --old-datadir=DATADIR old cluster data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.28 19528

-D, --new-datadir=DATADIR new cluster data directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.29 19529

-j, --jobs=NUM number of simultaneous processes or threads to use

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.30 19530

-k, --link link instead of copying files to new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.31 19531

-o, --old-options=OPTIONS old cluster options to pass to the server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.32 19532

-O, --new-options=OPTIONS new cluster options to pass to the server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.33 19533

-p, --old-port=PORT old cluster port number (default @1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.34 19534

-P, --new-port=PORT new cluster port number (default @1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.35 19535

-r, --retain retain SQL and log files after success

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.36 19536

-U, --username=NAME cluster superuser (default "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.37 19537

-v, --verbose enable verbose internal logging

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.38 19538

-V, --version display version information, then exit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.39 19539

-?, --help show this help, then exit

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.40 19540

Report bugs to <pgsql-bugs@postgresql.org>.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.41 19541

Finding the real data directory for the source cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.42 19542

Finding the real data directory for the target cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.43 19543

could not get data directory using @1@: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.44 19544

could not read line @1@ from file "@2@": @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.45 19545

user-supplied old port number @1@ corrected to @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.46 19546

could not create worker process: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.47 19547

could not create worker thread: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.48 19548

child worker exited abnormally: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.49 19549

Setting next OID for new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.50 19550

Sync data directory to disk

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.51 19551

@1@: could not find own program executable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.52 19552

Analyzing all rows in the new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.53 19553

Freezing all rows in the new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.54 19554

Restoring global objects in the new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.55 19555

Restoring database schemas in the new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.56 19556

Deleting files from new @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.57 19557

could not delete directory "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.58 19558

Copying old @1@ to new server

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.59 19559

Setting next transaction ID and epoch for new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.60 19560

Setting next multixact ID and offset for new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.61 19561

Setting oldest multixact ID in new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.62 19562

Resetting WAL archives

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.63 19563

Setting frozenxid and minmxid counters in new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.64 19564

Setting minmxid counter in new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.65 19565

error while checking for existence of keystore file @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.66 19566

Linking user relation files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.67 19567

Copying user relation files

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.68 19568

copying "@1@" to "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.69 19569

linking "@1@" to "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.70 19570

old database "@1@" not found in the new cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.71 19571

error while checking for file existence "@1@.@2@" ("@3@" to "@4@"): @5@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.72 19572

rewriting "@1@" to "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.73 19573

connection to database failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.74 19574

Failure, exiting

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.75 19575

executing: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.76 19576

SQL command failed@1@@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.77 19577

could not open version file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.78 19578

could not parse version file "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.79 19579

connection to database failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.80 19580

pg_ctl failed to start the source server, or connection failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.81 19581

pg_ctl failed to start the target server, or connection failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.82 19582

out of memory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.83 19583

libpq environment variable @1@ has a non-local server value: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.84 19584

tablespace directory "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.85 19585

could not stat tablespace directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.86 19586

tablespace path "@1@" is not a directory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.87 19587

%-*s

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.88 19588

ok

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.89 19589

Checking for large objects

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.90 19590

warning

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.91 19591

Checking for incompatible "line" data type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.92 19592

Checking for invalid "unknown" user columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.93 19593

Checking for hash indexes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.94 19594

@1@: unexpected empty file "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.95 19595

@1@: pg_control exists but is broken or wrong version; ignoring it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.96 19596

could not find file "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.92.97 19599

no arguments specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93 Message Numbers Beginning with 19600

2.93.1 19600

could not parse end WAL location "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.2 19601

could not parse limit "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.3 19602

resource manager "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.4 19603

could not parse start WAL location "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.5 19604

could not parse timeline "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.6 19605

could not parse "@1@" as a transaction ID

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.7 19606

unrecognized argument to --stats: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.8 19607

too many command-line arguments (first is "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.9 19608

could not open directory "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.10 19610

could not open file "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.11 19611

start WAL location @1@/@2@ is not inside file "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.12 19612

ENDSEG @1@ is before STARTSEG @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.13 19613

end WAL location @1@/@2@ is not inside file "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.14 19614

no start WAL location given

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.15 19615

out of memory

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.16 19616

could not find a valid record after @1@/@2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.17 19617

error in WAL record at @1@/@2@: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.18 19618

cannot set system attribute "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.19 19619

function "@1@" is in the wrong language

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.20 19620

function "@1@" must not be SECURITY DEFINER

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.21 19621

set-valued function called in context that cannot accept a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.22 19622

column name/value list must have even number of elements

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.23 19623

column name/value list contains nonexistent column name "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.24 19624

cannot set system attribute "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.25 19625

malformed record literal: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.26 19626

number of array dimensions exceeds the maximum allowed (@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.27 19627

could not determine sequence length for function return value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.28 19628

array size exceeds the maximum allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.29 19629

wrong length of inner sequence: has length @1@, but @2@ was expected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.30 19630

malformed SCRAM message (empty message)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.31 19631

malformed SCRAM message (length mismatch)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.32 19632

incorrect server signature

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.33 19633

invalid SCRAM exchange state

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.34 19634

malformed SCRAM message (attribute "@1@" expected)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.35 19635

malformed SCRAM message (expected character "=" for attribute "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.36 19636

could not generate nonce

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.37 19637

invalid SCRAM response (nonce mismatch)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.38 19638

malformed SCRAM message (invalid iteration count)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.39 19639

malformed SCRAM message (garbage at end of server-first-message)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.40 19640

error received from server in SCRAM exchange: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.41 19641

malformed SCRAM message (garbage at end of server-final-message)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.42 19642

malformed SCRAM message (invalid server signature)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.43 19643

out of memory allocating SSPI buffer (@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.44 19644

duplicate SSPI authentication request

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.45 19645

duplicate SASL authentication request

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.46 19646

none of the server's SASL authentication mechanisms are supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.47 19647

out of memory allocating SASL buffer (@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.48 19648

AuthenticationSASLFinal received from server, but SASL authentication was not completed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.49 19649

unexpected shape of result set returned for SHOW

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.50 19650

password_encryption value too long

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.51 19651

unrecognized password encryption algorithm "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.52 19652

could not match @1@ host names to @2@ hostaddrs

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.53 19653

could not match @1@ port numbers to @2@ hosts

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.54 19654

invalid target_session_attrs value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.55 19655

invalid target_server value: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.56 19656

could not parse network address "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.57 19657

PGresult cannot support more than INT_MAX tuples

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.58 19658

size_t overflow

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.59 19659

cannot pass more than @1@ arguments to a function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.60 19660

set-valued function called in context that cannot accept a set

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.61 19661

More details may be available in the server log.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.62 19662

Kill all remaining database processes and restart the database.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.63 19663

deadlock detected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.64 19664

VCI parallel execution is blocked by other operation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.65 19665

not enough maximum share memory for parallel query (@1@ bytes requested)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.66 19666

You possibly need to raise the configuration parameter "vci.shared_work_mem" value to be at least @1@kB.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.67 19667

You may need to increase max_worker_processes.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.68 19669

Failed on request of size @1@.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.93.69 19670

failed to shm_open()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.70 19671

could not open file "@1@": @2@

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.93.71 19672

could not get handle of the kernel module : error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.72 19673

the relation is not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.73 19674

access method "@1@" does not work with partitioned tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.74 19675

The "vci_column_ids" option cannot be used without "ctid" column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.75 19676

VCI failed to catch up with dropped columns in table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.76 19677

Automatically recreated "CREATE INDEX" is corrupt. Please recreate VCI by "vci_create()" function.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.77 19688

compress method must be defined when leaf type is different from input type

[Description]

compress method is not defined.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.78 19689

WAL segment size must be a power of two between 1 MB and 1 GB, but the control file specifies @1@ byte

[Description]

Control file specifies WAL segment size is wrong, may be the control file is corrupted?

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.79 19690

"min_wal_size" must be at least twice "wal_segment_size"

[Description]

The GUC parameter of min_wal_size must be at least twice the size of the wal_segment_size

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.80 19691

"max_wal_size" must be at least twice "wal_segment_size"

[Description]

The GUC parameter of max_wal_size must be at least twice the size of the wal_segment_size

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.81 19692

-X requires a power of two value between 1 MB and 1 GB

[Description]

Specified WAL segment size must be power of two and it should be between 1MB and 1GB

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.82 19693

parameter "@1@" must be READ_ONLY, SHAREABLE, or READ_WRITE

[Description]

The value of aggregate function aggfinalmodify or aggmfinalmodify values must not be other than the above listed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.83 19694

including column does not support an operator class

[Description]

Create index with including column doesn't support operator class.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.84 19695

column "@1@" cannot be used in statistics because its type @2@ has no default btree operator class

[Description]

When creating statistics, the column's type must have default btree operator class.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.85 19696

could not connect to publisher when attempting to drop the replication slot "@1@"

[Description]

When dropping a subscription that is associated with a replication slot on the remote host (the normal state), DROP SUBSCRIPTION will connect to the remote host and try to drop the replication slot as part of its operation. This is necessary so that the resources allocated for the subscription on the remote host are released. If this fails, either because the remote host is not reachable or because the remote replication slot cannot be dropped or does not exist or never existed, the DROP SUBSCRIPTION command will fail.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.86 19697

cannot refer to non-index column by number

[Description]

We allow referencing columns by numbers only for indexes, since table column numbers could contain gaps if columns are later dropped.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.93.87 19698

cannot use ONLY for foreign key on partitioned table "@1@" referencing relation "@2@"

[Description]

Using ONLY to add or drop a constraint on partitioned table is supported only when there are no partitions. Once partitions exist, using ONLY will result in an error as adding or dropping constraints only on the partitioned table, when partitions exist, is not supported.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94 Message Numbers Beginning with 19700

2.94.1 19701

unsupported SCRAM channel-binding type "@1@"

[Description]

The only channel binding type supported is tls-server-end-point.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.2 19702

SCRAM channel binding check failed

[Description]

Compare the value sent by the client with the value expected by the server, if they are different, then SCRAM channel binding check fails.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.3 19703

User "@1@" has a password that cannot be used with MD5 authentication.

[Description]

Incompatible password hash format.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.4 19704

RANGE with offset PRECEDING/FOLLOWING requires exactly one ORDER BY column

[Description]

The number of order by clause is not one.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.5 19705

RANGE with offset PRECEDING/FOLLOWING is not supported for column type @1@

[Description]

The comlumn type can't be used in RANGE with offset PRECEDING/FOLLOWING.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.6 19706

a hash-partitioned table may not have a default partition

[Description]

Partition table may not be a default partition if the partitioned table have hash type partition.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.7 19707

every hash partition modulus must be a factor of the next larger modulus

[Description]

Check the rule that every modulus must be a factor of the next larger modulus. For example, if you have a bunch of partitions that all have modulus 5, you can add a new partition with modulus 10 or a new partition with modulus 15, but you cannot add both a partition with modulus 10 and a partition with modulus 15, because 10 is not a factor of 15.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.8 19708

remainder for hash partition must be a non-negative integer

[Description]

Sanity check remainder.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.9 19709

column @1@ of the partition key has type "@2@", but supplied value is of type "@3@"

[Description]

Partition key column type and given value type should match

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.10 19710

%lld total checksum verification failure

[Description]

By default, checksums are verified and checksum failures are reported for any possible page corruptions

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.94.11 19711

checksum verification failure during base backup

[Description]

By default, checksums are verified and checksum failures are reported for any possible page corruptions

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.94.12 19712

could not verify checksum in file "@1@", block @2@: read buffer size @3@ and page size @4@ differ

[Description]

The checksums are verified at block level, so we iterate over the buffer in chunks of BLCKSZ, after making sure that TAR_SEND_SIZE/buf is divisible by BLCKSZ.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the event indicated in supplementary information reported by the system is a planned event.

2.94.13 19713

logical replication worker slot @1@ is already used by another worker, cannot attach

[Description]

Another worker occupied the logical replication worker slot.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.14 19714

logical replication target relation "@1@.@2@" is missing some replicated columns

[Description]

Local relation does not have some of the columns that are logically replicated from remote relation

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.15 19715

logical replication target relation "@1@.@2@" uses system columns in REPLICA IDENTITY index

[Description]

Logical replication target relation uses some of the system columns to identify rows which are updated or deleted.

[System Processing]

Processing will be aborted.

[Action]

Usage of system columns for REPLICA IDENTITY should be avoided as these data vary across databases.

2.94.16 19716

publisher did not send replica identity column expected by the logical replication target relation "@1@.@2@"

[Description]

The logical replication relation is not updatable. Replica identity index and primary key are not defined.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.17 19717

logical replication target relation "@1@.@2@" has neither REPLICA IDENTITY index nor PRIMARY KEY and published relation does not have REPLICA IDENTITY FULL

[Description]

The logical replication relation is not updatable.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.18 19718

logical replication apply worker for subscription @1@ will not start because the subscription was removed during startup

[Description]

Subscription to which the logical replication apply worker is been assigned is already removed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.19 19719

replication slot "@1@" cannot be advanced

[Description]

A slot whose restart_lsn has never been reserved cannot be advanced.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.20 19720

cannot advance replication slot to @1@/@2@, minimum is @3@/@4@

[Description]

Data older than minimum is not available anymore. Check if the slot is not moving backwards.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.21 19721

@1@ must not be called inside a transaction

[Description]

When creating a new replication slot, it is not allowed to put CREATE_REPLICATION_SLOT and EXPORT_SNAPSHOT in a transAction.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.22 19722

@1@ must be called inside a transaction

[Description]

When creating a new replication slot, we must put CREATE_REPLICATION_SLOT and USE_SNAPSHOT in a transAction.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.23 19723

@1@ must be called in REPEATABLE READ isolation mode transaction

[Description]

When creating a new replication slot, we must put CREATE_REPLICATION_SLOT and USE_SNAPSHOT in REPEATABLE READ isolation mode transAction.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.24 19724

CREATE_REPLICATION_SLOT ... USE_SNAPSHOT must be called before any query

[Description]

When creating a new replication slot, we must call CREATE_REPLICATION_SLOT ... USE_SNAPSHOT before any query.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.25 19725

@1@ must not be called in a subtransaction

[Description]

When creating a new replication slot, we must not put CREATE_REPLICATION_SLOT and USE_SNAPSHOT in a subtransAction.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.26 19726

wrong flag type, only arrays and scalars are allowed

[Description]

Jasbonb flag type support arrays and scalars only.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.27 19728

cannot perform transaction commands inside a cursor loop that is not read-only

[Description]

Doing transAction control, especially abort, inside a cursor loop that is not read-only, for example using UPDATE RETURNING, has weird semantics issues.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.28 19729

@1@: argument of --wal-segsize must be a power of 2 between 1 and 1024

[Description]

The input parameter WAL segment size is wrong.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.29 19730

@1@: checksum error occurred

[Description]

When basebackup, checksum error occurred.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.30 19731

--create-slot and --no-slot are incompatible options

[Description]

The input parameter in invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.31 19732

WAL segment size must be a power of two between 1 MB and 1 GB, but the remote server reported a value of @1@ byte

[Description]

The WAL segment size is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.32 19733

@1@: could not open process token: error code @2@

[Description]

Most Windows targets make DWORD a 32-bit unsigned long, but in case it doesn't cast DWORD before printing.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.33 19734

@1@: could not allocate SIDs: error code @2@

[Description]

Calling AllocateAndInitializeSid failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.34 19735

@1@: could not create restricted token: error code @2@

[Description]

Calling _CreateRestrictedToken failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.35 19736

@1@: could not start process for command "@2@": error code @3@

[Description]

Calling CreateProcessAsUser failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.36 19737

@1@: could not re-execute with restricted token: error code @2@

[Description]

Calling CreateRestrictedProcess failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.37 19738

@1@: could not get exit code from subprocess: error code @2@

[Description]

Calling GetExitCodeProcess failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.38 19739

@1@: invalid argument for option @2@

[Description]

The input argument for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.39 19740

@1@: transaction ID epoch (-e) must not be -1

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.40 19741

@1@: transaction ID (-x) must not be 0

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.41 19742

@1@: transaction ID (-c) must be either 0 or greater than or equal to 2

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.42 19743

@1@: OID (-o) must not be 0

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.43 19744

@1@: multitransaction ID (-m) must not be 0

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.44 19745

@1@: oldest multitransaction ID (-m) must not be 0

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.45 19746

@1@: multitransaction offset (-O) must not be -1

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.46 19747

@1@: argument of --wal-segsize must be a power of 2 between 1 and 1024

[Description]

The input parameter for option is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.47 19748

@1@: too many command-line arguments (first is "@2@")

[Description]

The input parameters are too many.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.48 19749

@1@: no data directory specified

[Description]

Data directory must be specified.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.49 19750

@1@: cannot be executed by "root"

[Description]

Don't allow to be run by root, to avoid overwriting the ownership of files in the data directory. Check is made only for root as any other user won't have sufficient permissions to modify files in the data directory.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.50 19751

You must run @1@ as the PostgreSQL superuser.

[Description]

Don't allow to be run by root, to avoid overwriting the ownership of files in the data directory. We need only check for root any other user won't have sufficient permissions to modify files in the data directory.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.51 19752

@1@: could not change directory to "@2@": @3@

[Description]

Change directory failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.52 19753

@1@: could not open file "@2@" for reading: @3@

[Description]

Open file for reading failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.53 19754

@1@: lock file "@2@" existsIs a server running? If not, delete the lock file and try again.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.54 19755

@1@: could not read file "@2@": @3@

[Description]

Reading file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.55 19756

@1@: data directory is of wrong versionFile "@2@" contains "@3@", which is not compatible with this program's version "@4@".

[Description]

The version of the data directory must be same with the program's version.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.56 19757

If you are sure the data directory path is correct, execute touch @1@and try again.

[Description]

If pg_control is not there at all, or can't be read, the odds are that wrong DataDir path is been handed. User can do "touch pg_control" to force us to proceed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.57 19758

@1@: pg_control exists but has invalid CRC; proceed with caution

[Description]

We will use the data but treat it as guessed.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.58 19759

@1@: pg_control specifies invalid WAL segment size (@2@ byte); proceed with caution

[Description]

if WAL segment size is not valid. WAL segment size must be a power of two between 1 MB and 1 GB.

[System Processing]

Processing will proceed.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.59 19760

@1@: could not create pg_control file: @2@

[Description]

Create pg_control file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.60 19761

@1@: could not write pg_control file: @2@

[Description]

There can be not enough disk space.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.61 19762

@1@: fsync error: @2@

[Description]

The return value of fsync is not zero.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.62 19763

could not open directory "@1@": @2@

[Description]

Open directory failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.63 19764

@1@: could not read directory "@2@": @3@

[Description]

read directory failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.64 19765

@1@: could not close directory "@2@": @3@

[Description]

Close directory failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.65 19766

@1@: could not delete file "@2@": @3@

[Description]

Delete file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.66 19767

@1@: could not open file "@2@": @3@

[Description]

Open file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.67 19768

@1@: could not write file "@2@": @3@

[Description]

There can be not enough disk space.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.68 19769

WAL segment size must be a power of two between 1 MB and 1 GB, but the control file specifies @1@ byte

[Description]

WAL segment size is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.69 19770

Could not create thread for alarm

[Description]

Create thread for alarm failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.70 19771

could not open output file

[Description]

open output file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.71 19772

write failed

[Description]

The return value is not same with expected value.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.72 19773

fsync failed

[Description]

The return value of fsync is not zero.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.73 19774

seek failed

[Description]

the return value of lseek is -1.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.74 19775

Detected clock going backwards in time.

[Description]

Current time is smaller than previous time.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.75 19776

Time warp: @1@ ms

[Description]

Current time is smaller than previous time, showing the difference.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.76 19777

template0 must not allow connections, i.e. its pg_database.datallowconn must be false

[Description]

avoid restore failure when pg_dumpall tries to create template0

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.77 19778

All non-template0 databases must allow connections, i.e. their pg_database.datallowconn must be true

[Description]

avoid datallowconn == false databases from being skipped on restore

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.78 19779

The source cluster was shut down while in recovery mode. To upgrade, use "rsync" as documented or shut it down as a primary.

[Description]

we check here that the server was shut down cleanly from the controldata perspective.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.79 19780

The target cluster was shut down while in recovery mode. To upgrade, use "rsync" as documented or shut it down as a primary.

[Description]

Clean server shut down is checked from the controldata perspective.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.80 19781

Consult the last few lines of "@1@" or "@2@" forthe probable cause of the failure.

[Description]

check the last few lines.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.81 19782

Consult the last few lines of "@1@" forthe probable cause of the failure.

[Description]

check the last few lines.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.82 19783

could not create hard link between old and new data directories: @1@In link mode the old and new data directories must be on the same file system.

[Description]

link file failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.83 19784

Your installation references loadable libraries that are missing from thenew installation. You can add these libraries to the new installation,or remove the functions using them from the old installation. A list ofproblem libraries is in the file: @1@

[Description]

Some of the libraries required by the new installation is missing. Check that the new cluster contains all required libraries.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.84 19785

You must identify the directory where the @1@.Please use the @2@ command-line option or the @3@ environment variable.

[Description]

getenv failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.85 19786

There seems to be a postmaster servicing the old cluster.Please shutdown that postmaster and try again.

[Description]

If we have a postmaster.pid file in old cluster, try to start the server. If it doesn't start, assume the server is running.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.86 19787

There seems to be a postmaster servicing the new cluster.Please shutdown that postmaster and try again.

[Description]

If we have a postmaster.pid file in new cluster, try to start the server. If it doesn't start, assume the server is running.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.87 19788

could not connect to source postmaster started with the command:@1@

[Description]

pg_ctl failed, If connection reason is found then connection will be re-attempted.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.88 19789

could not connect to target postmaster started with the command:@1@

[Description]

pg_ctl failed, If connection reason is found then connection will be re-attempted.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.89 19790

Cannot upgrade to/from the same system catalog version whenusing tablespaces.

[Description]

The directories of old cluster and new cluster should be different.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.90 19791

@1@: could not read block @2@ in file "@3@": read @4@ of @5@

[Description]

The return value of read is not BLCKSZ.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.91 19792

checksum verification failed in file "@1@", block @2@: calculated checksum @3@ but block contains @4@

[Description]

The calculated checksum is different from the checksum that was saved in the block.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.92 19793

checksums verified in file "@1@"

[Description]

List of files verified for checksum is listed.

[System Processing]

Continues processing.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.93 19794

invalid segment number @1@ in file name "@2@"

[Description]

The segment number is zero.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.94 19795

invalid filenode specification, must be numeric: @1@

[Description]

relfilenode is zero.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.95 19796

pg_control CRC value is incorrect

[Description]

CRC check failed.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.96 19797

cluster must be shut down

[Description]

The state of the cluster must be DB_SHUTDOWNED or DB_SHUTDOWNED_IN_RECOVERY.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.97 19798

data checksums are not enabled in cluster

[Description]

data checksum version is zero.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.94.98 19799

WAL segment size must be a power of two between 1 MB and 1 GB, but the WAL file "@1@" header specifies @2@ byte

[Description]

Specified WAL segment size is must be power of two and it should be between 1MB and 1GB

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95 Message Numbers Beginning with 19800

2.95.1 19800

invalid value "@1@" for "@2@": integer expected

[Description]

string is not recognized.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.2 19801

pointers to uvarchar are not implemented

[Description]

The length of the uvachar is not positive.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.3 19802

server offered SCRAM-SHA-256-PLUS authentication over a non-SSL connection

[Description]

The server offered SCRAM-SHA-256-PLUS, but the connection is not SSL-encrypted. That's not sane.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.4 19803

procedure parameter "@1@" is an output parameter but corresponding argument is not writable

[Description]

The output parameter should be writable.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.5 19804

procedure parameter @1@ is an output parameter but corresponding argument is not writable

[Description]

The output parameter shoube be writable.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.6 19805

function returning record called in context that cannot accept type record

[Description]

The result type is not TYPEFUNC_COMPOSITE.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.7 19806

@1@: could not send replication command "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.8 19807

could not fetch WAL segment size: got @1@ rows and @2@ fields, expected @3@ rows and @4@ or more fields

[Description]

The result number of show wal_segment_size is not one.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.9 19808

WAL segment size could not be parsed

[Description]

The wal segment size is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.10 19809

WAL segment size must be a power of two between 1 MB and 1 GB, but the remote server reported a value of @1@ byte

[Description]

The wal segment size is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.11 19810

@1@: WAL segment size must be a power of two between 1 MB and 1 GB, but the remote server reported a value of @2@ bytes

[Description]

The wal segment size is invalid.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.12 19811

Whether to continue running after a failure to sync data files.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.13 19815

level number 77 could not be used in TYPEDEF statement

[Description]

77 level variable is used in the TYPEDEF statement.

[System Processing]

Precompling will be aborted.

[Action]

Change the level number.

2.95.14 19816

level number 77 could not be used for group item

[Description]

A group data item contains the 77 level variable.

[System Processing]

Precompling will be aborted.

[Action]

Remove the variable from the group data item.

2.95.15 19817

"VARYING" cannot have a level number greater than 48

[Description]

Variables that have greather than 48 level have VARYING clause.

[System Processing]

Precompling will be aborted.

[Action]

Remove "VARYNING" clause or change the level number.

2.95.16 19818

cannot alter inherited column "@1@" of relation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.17 19819

empty configuration file name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.18 19820

configuration file recursion in "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.19 19821

empty configuration directory name: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.20 19822

no slot available for new worker process

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.21 19823

could not read from file "@1@"

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.22 19824

while setting parameter "@1@" to "@2@"

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.95.23 19825

@1@: too many jobs for this platform -- try @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.24 19826

cannot PREPARE a transaction that has operated on temporary objects

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.25 19827

cannot perform FREEZE on a partitioned table

[Description]

(Nothing)

[System Processing]

(Nothing)

[Action]

(Nothing)

2.95.26 19836

waitpid() failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.27 19837

child process exited abnormally: status @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.28 19838

XMLTABLE cannot cast a namespace node to a non-XML result type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.29 19839

cannot create foreign partition of partitioned table "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.30 19840

cannot attach foreign table "@1@" as partition of partitioned table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.31 19841

could not determine row type for result of @1@

[Description]

The result row type cannot be determined.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.32 19842

selecting default time zone ...

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.95.33 19843

malformed SCRAM message (invalid salt)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.34 19844

cluster is not compatible with this version of pg_checksums

[Description]

The version of the cluster and the version of pg_verify_checksums must be the same.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.35 19845

database cluster is not compatible

[Description]

pg_verify_checksums is not compatible with the database cluster.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.36 19846

The database cluster was initialized with block size @1@, but pg_checksums was compiled with block size @2@.

[Description]

The initial BLCKSZ of the database cluster must be the same as pg_verify_checksums

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.37 19847

type @1@ is not composite

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.38 19848

tables declared WITH OIDS are not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.39 19850

could not read from log segment @1@, offset @2@: read @3@ of @4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.40 19852

index row size @1@ exceeds btree version @2@ maximum @3@ for index "@4@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.41 19853

tid (@1@, @2@) is not valid for relation "@3@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.42 19854

table access method "@1@" does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.43 19855

incorrect size of file "@1@": @2@ byte

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.44 19856

incorrect alignment of CRC offset for file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.45 19857

invalid magic number stored in file "@1@"

[Description]

An error occurred reading the file.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.46 19858

invalid size stored in file "@1@"

[Description]

An error occurred reading the file.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.47 19859

calculated CRC checksum does not match value stored in file "@1@"

[Description]

An error occurred reading the file.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.48 19860

using recovery command file "@1@" is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.49 19861

could not fsync write-through file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.50 19862

could not read from log segment @1@, offset @2@: read @3@ of @4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.51 19863

"wait_seconds" must not be negative or zero

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.52 19864

server did not promote within @1@ seconds

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.53 19865

must be superuser to call pg_nextoid()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.54 19866

pg_nextoid() can only be used on system catalogs

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.55 19867

column "@1@" is not of type oid

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.56 19868

index "@1@" is not the index for column "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.57 19869

cannot use generated column "@1@" in column generation expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.58 19870

primary key column "@1@" is not marked NOT NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.59 19871

nondeterministic collations are not supported for operator class "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.60 19872

concurrent index creation for exclusion constraints is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.61 19873

cannot change routine kind

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.62 19874

cannot change number of direct arguments of an aggregate function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.63 19875

nondeterministic collations not supported with this provider

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.64 19876

invalid COPY file header (WITH OIDS)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.65 19877

column "@1@" is a generated column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.66 19878

support function @1@ must return type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.67 19879

must be superuser to specify a support function

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.68 19880

cannot specify default tablespace for partitioned relations

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.69 19881

table "@1@" has no indexes that can be reindexed concurrently

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.70 19882

table "@1@" has no indexes to reindex

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.71 19883

cannot reindex system catalogs concurrently

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.72 19884

cannot reindex system catalogs concurrently, skipping all

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.73 19885

cannot reindex invalid index "@1@.@2@" concurrently, skipping

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.74 19886

cannot reindex exclusion constraint index "@1@.@2@" concurrently, skipping

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.75 19887

cannot reindex this type of relation concurrently

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.95.76 19888

index "@1@.@2@" was reindexed

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.95.77 19889

@1@ and @2@ are mutually exclusive options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.78 19890

subscription with @1@ must also set @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.79 19891

specifying a table access method is not supported on a partitioned table

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.80 19892

inherited column "@1@" has a generation conflict

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.81 19893

column "@1@" of relation "@2@" is a generated column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.82 19894

invalid @1@ action for foreign key constraint containing generated column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.83 19895

generation expression for column "@1@" cannot be cast automatically to type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.84 19896

cannot alter type of a column used by a generated column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.85 19897

cannot use generated column in partition key

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.86 19898

BEFORE trigger's WHEN condition cannot reference NEW generated columns

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.95.87 19899

could not serialize access due to concurrent delete

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96 Message Numbers Beginning with 19900

2.96.1 19900

unrecognized ANALYZE option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.2 19901

skipping vacuum of "@1@" --- relation no longer exists

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.96.3 19902

tuple to be deleted was already modified by an operation triggered by the current command

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.4 19903

WHERE clause not allowed with COPY TO

[Description]

WHERE clause not allowed with COPY TO in copy command.

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.96.5 19904

for a generated column, GENERATED ALWAYS must be specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.6 19905

XQuery "x" flag (expanded regular expressions) is not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.7 19906

@1@ at end of jsonpath input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.8 19907

@1@ at or near "@2@" of jsonpath input

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.9 19908

GSSAPI encryption can only be used with gss, trust, or reject authentication methods

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.10 19909

could not extract domain name from ldapbasedn

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.11 19910

LDAP authentication could not find DNS SRV records for "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.12 19911

LDAP server not specified, and no ldapbasedn

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.13 19912

outgoing GSSAPI message would not use confidentiality

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.14 19913

server tried to send oversize GSSAPI packet (@1@ > @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.15 19914

oversize GSSAPI packet sent by the client (@1@ > @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.16 19915

incoming GSSAPI message did not use confidentiality

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.17 19916

oversize GSSAPI packet sent by the client (@1@ > @2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.18 19917

could not set minimum SSL protocol version

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.96.19 19918

could not set maximum SSL protocol version

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.96.20 19919

hostgssenc record cannot match because GSSAPI is not supported by this build

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.96.21 19920

GSSAPI encryption only supports gss, trust, or reject authentication

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.22 19921

invalid value for clientcert: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.23 19922

aggregate functions are not allowed in partition bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.24 19923

grouping operations are not allowed in partition bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.25 19924

aggregate functions are not allowed in column generation expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.26 19925

grouping operations are not allowed in column generation expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.27 19926

aggregate functions are not allowed in COPY FROM WHERE conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.28 19927

grouping operations are not allowed in COPY FROM WHERE conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.29 19928

window functions are not allowed in partition bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.30 19929

window functions are not allowed in COPY FROM WHERE conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.31 19930

window functions are not allowed in column generation expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.32 19931

cannot use column reference in DEFAULT expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.33 19932

cannot use column reference in partition bound expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.34 19933

cannot use subquery in partition bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.35 19934

cannot use subquery in COPY FROM WHERE condition

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.36 19935

cannot use subquery in column generation expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.37 19936

procedures cannot have more than @1@ argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.96.38 19937

routine name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.39 19938

aggregate name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.40 19939

procedure name "@1@" is not unique

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.41 19940

set-returning functions are not allowed in partition bound

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.42 19941

set-returning functions are not allowed in COPY FROM WHERE conditions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.43 19942

set-returning functions are not allowed in column generation expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.44 19943

cannot use system column "@1@" in column generation expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.45 19944

generated columns are not supported on typed tables

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.46 19945

generated columns are not supported on partitions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.47 19946

multiple generation clauses specified for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.48 19947

both default and generation expression specified for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.49 19948

both identity and generation expression specified for column "@1@" of table "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.50 19949

collation of partition bound value for column "@1@" does not match partition key collation "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.51 19950

removed orphan archive status file "@1@"

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.96.52 19951

removal of orphan archive status file "@1@" failed too many times, will try again later

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.96.53 19952

nondeterministic collations are not supported for regular expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.54 19953

replication origin name "@1@" is reserved

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.55 19954

cannot copy physical replication slot "@1@" as a logical replication slot

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.56 19955

cannot copy logical replication slot "@1@" as a physical replication slot

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.57 19956

cannot copy a replication slot that doesn't reserve WAL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.58 19957

could not copy replication slot "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.59 19958

could not read from log segment @1@, offset @2@: read @3@ of @4@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.60 19959

could not close shared memory segment "@1@": @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.61 19960

must be superuser to rotate log files with adminpack 1.0

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.62 19961

unsafe use of new value "@1@" of enum type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.63 19962

@ is not allowed in root expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.64 19963

LAST is allowed only in array subscripts

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.65 19964

single boolean result is expected

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.66 19965

"vars" argument is not an object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.67 19966

JSON object does not contain key "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.68 19967

jsonpath member accessor can only be applied to an object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.69 19968

jsonpath wildcard array accessor can only be applied to an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.70 19969

jsonpath array subscript is out of bounds

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.71 19970

jsonpath array accessor can only be applied to an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.72 19971

jsonpath wildcard member accessor can only be applied to an object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.73 19972

jsonpath item method .@1@() can only be applied to an array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.74 19973

jsonpath item method .@1@() can only be applied to a numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.75 19974

jsonpath item method .@1@() can only be applied to a string or numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.76 19975

left operand of jsonpath operator @1@ is not a single numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.77 19976

right operand of jsonpath operator @1@ is not a single numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.78 19977

operand of unary jsonpath operator @1@ is not a numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.79 19978

jsonpath item method .@1@() can only be applied to an object

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.80 19979

could not find jsonpath variable "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.81 19980

jsonpath array subscript is not a single numeric value

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.82 19981

jsonpath array subscript is out of integer range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.83 19982

nondeterministic collations are not supported for LIKE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.84 19983

nondeterministic collations are not supported for ILIKE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.85 19984

SQL regular expression may not contain more than two escape-double-quote

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.86 19985

removing partition "@1@" violates foreign key constraint "@2@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.87 19986

nondeterministic collations are not supported for substring searches

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.96.88 19987

Sets the shell command that will be called to retrieve an archived WAL file.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.89 19988

Sets the shell command that will be executed at every restart point.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.90 19989

Sets the shell command that will be executed once at the end of recovery.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.91 19990

Specifies the timeline to recover into.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.92 19991

Set to "immediate" to end recovery as soon as a consistent state is reached.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.93 19992

Sets the transaction ID up to which recovery will proceed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.94 19993

Sets the time stamp up to which recovery will proceed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.95 19994

Sets the named restore point up to which recovery will proceed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.96 19995

Sets the LSN of the write-ahead log location up to which recovery will proceed.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.97 19996

Specifies a file name whose presence ends recovery in the standby.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.98 19997

Sets the connection string to be used to connect to the sending server.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.99 19998

Sets the name of the replication slot to use on the sending server.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.96.100 19999

Sets the default table access method for new tables.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.97 Message Numbers Beginning with 20000

2.97.1 20000

listagg_transfn called in non-aggregate context

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.2 20002

median4_transfn called in non-aggregate context

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.3 20003

lock request error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.4 20004

event registeration error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.5 20005

event name is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.6 20006

feature not supported

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.7 20007

not called by trigger manager

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.8 20008

not called on valid event

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.9 20009

SPI_connect failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.10 20010

not called with valid relation

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.11 20011

attribute event not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.12 20012

attribute message not found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.13 20013

SPI_prepare failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.14 20014

can't execute sql

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.15 20015

SPI execute error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.16 20016

invalid value for @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.17 20017

date out of range

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.18 20018

timestamp out of range

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.19 20019

invalid cursor number

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.20 20020

failed to execute SQL statement

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.21 20021

SQL is empty string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.22 20022

host variable name "@1@" is too long

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.23 20023

host variable name is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.24 20024

no statement parsed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.25 20025

host variable does not exist

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.26 20026

invalid length for host variable name

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.27 20027

invalid length for variable character string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.28 20028

not all variables bound

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.29 20029

no statement execute

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.30 20030

not supported data type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.31 20031

mismatch column_value data type and define_column data type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.32 20032

mismatch select data type and define_column data type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.33 20033

@1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.34 20034

invalid parameter

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.35 20035

null value not allowed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.36 20036

invalid encoding name "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.37 20037

program limit exceeded

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.38 20038

no data found

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.39 20039

SPI_prepare_failed

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.40 20040

start_line must be positive (@1@ passed)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.41 20041

end_line must be positive (@1@ passed)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.42 20042

return type must be a row type

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.43 20043

failed to retrieve the default LC_COLLATE value

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.44 20044

failed to set the requested LC_COLLATE value [@1@]

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.45 20045

failed to set back the default LC_COLLATE value [@1@]

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.46 20046

unknown format

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.47 20047

function is called from invalid context

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.48 20048

argument is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.49 20049

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.97.50 20050

insufficient privilege

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.51 20051

datatype mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.52 20052

unexpected type: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.53 20053

pipe name is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.54 20054

pipe creation error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.55 20055

message is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.56 20056

could not determine data type of input

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.57 20057

unknown equal operand for datatype

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.58 20058

cannot set range to negative number

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.59 20059

date is out of range

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.60 20060

nonbizday registeration error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.61 20061

nonbizday unregisteration error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.62 20062

plvlex.tokens is not available in the built

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.63 20063

too few parameters specified for template string

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.64 20064

substition is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.65 20065

buffer overflow

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.66 20066

internal error

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.67 20067

Limit decreased to @1@ bytes.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.68 20068

Limit increased to @1@ bytes.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.69 20069

unknown option '@1@'

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.70 20070

too much large memory block request

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.71 20071

corrupted pointer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.72 20082

SQL is NULL

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.73 20083

input value length is @1@; too long for type nvarchar2(@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.74 20084

input value too long for type nvarchar2(@1@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.75 20085

input value length is @1@; too long for type varchar2(@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.76 20086

input value length is @1@; too long for type varchar2(@2@)

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.77 20087

String constants with Unicode escapes cannot be used when standard_conforming_strings is off.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.78 20088

Unicode escapes must be \\uXXXX or \\UXXXXXXXX.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.79 20089

Use '' to write quotes in strings. \\' is insecure in client-only encodings.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.80 20090

Use '' to write quotes in strings, or use the escape string syntax (E'...').

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.81 20091

Use the escape string syntax for backslashes, e.g., E'\\\\'.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.82 20092

Use the escape string syntax for escapes, e.g., E'\\r\'.

[Description]

Supplementary information was output.

[System Processing]

None.

[Action]

Refer to this message together with the message that was output immediately beforehand.

2.97.83 20093

cannot to parse timezone "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.97.84 20094

utl_file package is not supported on Microsoft Windows

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.85 20095

an argument is NULL

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.97.86 20098

cannot match partition key to an index using access method "@1@"

[Description]

Cannot match partition key to an index using the access method.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.97.87 20099

could not seek to block @1@ of temporary file

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98 Message Numbers Beginning with 20100

2.98.1 20100

type input function @1@ has multiple matches

[Description]

Type input function has multiple matches.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.2 20101

type receive function @1@ has multiple matches

[Description]

Type receive function has multiple matches.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.3 20102

join estimator function @1@ has multiple matches

[Description]

Join estimator function has multiple matches.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.4 20103

could not clear search path: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.5 20104

file length too large

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.6 20105

BYTEA type cannot have a level number greater than 48

[Description]

Level number 49, 77 cannot be used for declaring bytea variable.

[System Processing]

Preprocessing will be aborted.

[Action]

Change the level number to 48 or lower.

2.98.7 20106

rejected a connection from application due to max_connections

[Description]

Rejected a connection from application due to max_connections.

[System Processing]

Processing will be aborted.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.98.8 20107

could not reduce CatCacheMemoryContext size to @1@ kilobytes, reduced to @2@ kilobytes

[Description]

CatCacheMemoryContext could not be reduced to pgx_catalog_cache_max_size kilobytes. The amount of memory actually used is %zu kilobytes.

[System Processing]

After CatCacheMemoryContext is temporarily expanded to% zu kB, all catalog caches will be released and CatCacheMemoryContext will be reduced to 8kB at the end of the transaction.

[Action]

Increase the configuration parameter pgx_catalog_cache_max_size

2.98.9 20108

consider increasing the configuration parameter "pgx_catalog_cache_max_size"

[Description]

Consider increasing the configuration parameter pgx_catalog_cache_max_size.

[System Processing]

After CatCacheMemoryContext is temporarily expanded to% zu kB, all catalog caches will be released and CatCacheMemoryContext will be reduced to 8kB at the end of the transaction.

[Action]

Increase the configuration parameter pgx_catalog_cache_max_size

2.98.10 20109

catalog cache hit stats: search @1@, hits @2@

[Description]

Catalog cache hit stats: hash table search count %lu, hash table hit count %lu

[System Processing]

Processing will countinue.

[Action]

Catalog cache hit rate can be checked.

2.98.11 20110

could not reduce RelCacheMemoryContext size to @1@ kilobytes, reduced to @2@ kilobytes

[Description]

RelCacheMemoryContext could not reduced to pgx_relation_cache_max_size kilobytes. The amount of memory actually used is %zu kilobytes.

[System Processing]

After RelCacheMemoryContext is temporarily expanded to% zu kB, all relation caches will be released and RelCacheMemoryContext will be reduced to 8kB at the end of the transaction.

[Action]

Increase the configuration parameterpgx_relation_cache_max_size

2.98.12 20111

consider increasing the configuration parameter "pgx_relation_cache_max_size"

[Description]

Consider increasing the configuration parameter pgx_relation_cache_max_size.

[System Processing]

After RelCacheMemoryContext is temporarily expanded to% zu kB, all relation caches will be released and RelCacheMemoryContext will be reduced to 8kB at the end of the transaction.

[Action]

Increase the configuration parameter pgx_relation_cache_max_size

2.98.13 20112

relation cache hit stats: search @1@, hits @2@

[Description]

Relation cache hit stats: hash table search count %lu, hash table hit count %lu

[System Processing]

Processing will countinue.

[Action]

Relation cache hit rate can be checked.

2.98.14 20113

pgx_catalog_cache_max_size must be set to at least 8kB when enabled.

[Description]

pgx_catalog_cache_max_size must be set to at least 8kB when enabled.

[System Processing]

pgx_catalog_cache_max_size will not be changed.

[Action]

Set pgx_catalog_cache_max_size to at least 8kB.

2.98.15 20114

pgx_relation_cache_max_size must be set to at least 8kB when enabled.

[Description]

pgx_relation_cache_max_size must be set to at least 8kB when enabled.

[System Processing]

pgx_relation_cache_max_size will not be changed.

[Action]

Set pgx_relation_cache_max_size to at least 8kB.

2.98.16 20115

cannot create a cursor WITH HOLD within security-restricted operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.17 20116

cannot fire deferred trigger within security-restricted operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.18 20117

cannot send a message of size @1@ via shared memory queue

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.19 20118

invalid message size @1@ in shared memory queue

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.20 20121

new cluster tablespace directory already exists: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.21 20122

cannot drop partitioned index "@1@" concurrently

[Description]

An abnormality occurred.

[System Processing]

Processing will be aborted.

[Action]

Please investigate the cause of the abnormality from the message body and remove the cause.

2.98.22 20130

too many command-line arguments (first is "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.23 20131

In database: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.24 20132

could not load library "@1@": error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.25 20133

invalid hex string literal

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.26 20134

unhandled previous state in xqs

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.27 20135

could not load library "@1@": error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.28 20136

options -s/--schema-only and --include-foreign-data cannot be used together

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.29 20137

option --include-foreign-data is not supported with parallel backup

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.30 20138

no matching foreign servers were found for pattern "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.31 20139

could not open output file: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.32 20140

could not duplicate stdout: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.33 20141

--progress and --no-estimate-size are incompatible options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.34 20142

--no-manifest and --manifest-checksums are incompatible options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.35 20143

--no-manifest and --manifest-force-encode are incompatible options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.36 20144

could not read from file @1@, offset @2@: @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.37 20145

could not read from file @1@, offset @2@: read @3@ of @4@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.38 20146

cannot use multiple jobs to reindex indexes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.39 20147

cannot use multiple jobs to reindex system catalogs

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.40 20148

cannot reindex system catalogs concurrently, skipping all

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.98.41 20149

parallel vacuum degree must be a non-negative integer

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.42 20150

processing of database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.43 20151

restore_command failed: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.44 20152

could not load library "@1@": error code @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.45 20153

could not write to file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.46 20154

cannot use restore_command with @1@r placeholder

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.47 20155

restore_command is not set in the target cluster

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.48 20156

cannot create restricted tokens on this platform: error code @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.49 20157

could not create file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.50 20158

unexpected file size for "@1@": @2@ instead of @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.51 20159

could not open file "@1@" restored from archive: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.52 20160

error running query (@1@) on source server: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.53 20161

could not restore file "@1@" from archive

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.54 20162

The program "@1@" is needed by @2@ but was not found in thesame directory as "@3@".Check your installation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.55 20163

The program "@1@" was found by "@2@"but was not the same version as @3@.Check your installation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.56 20164

could not print result table: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.57 20165

Could not send cancel request:

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.58 20166

Cancel request sent

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.59 20167

invalid value "@1@" for minimum SSL protocol version

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.60 20168

could not encode nonce

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.61 20169

channel binding is required, but client does not support it

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.62 20170

channel binding required, but server authenticated client without channel binding

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.63 20171

This may indicate that the server does not support any SSL protocol version between @1@ and @2@.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.64 20172

could not encode client proof

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.65 20173

invalid ssl_max_protocol_version value: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.66 20174

channel binding required, but SSL not in use

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.67 20175

invalid channel_binding value: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.68 20176

channel binding is required, but server did not offer an authentication method that supports channel binding

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.69 20177

could not set maximum SSL protocol version: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.70 20178

channel binding required but not supported by server's authentication request

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.71 20179

invalid SSL protocol version range

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.72 20180

invalid ssl_min_protocol_version value: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.73 20181

could not set minimum SSL protocol version: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.74 20182

WARNING: sslpassword truncated

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.98.75 20183

invalid value "@1@" for maximum SSL protocol version

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.76 20184

invalid Unicode code point

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.77 20185

cannot determine element type of "anyarray" argument

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.78 20186

invalid value for enum option "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.79 20187

could not read from temporary file: @1@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.80 20188

missing time zone in input string for type timestamptz

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.81 20189

cannot specify a canonical function without a pre-created shell type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.82 20190

unmatched format separator "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.83 20191

moving row to another partition during a BEFORE trigger is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.84 20192

result of encoding conversion is too large

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.98.85 20193

unrecognized checksum algorithm: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.86 20194

operator class @1@ has no options

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.87 20195

arguments declared "anycompatiblerange" are not all alike

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.88 20196

cannot change type's storage to PLAIN

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.89 20197

missing time zone in input string for type timetz

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.98.90 20198

wal_level is insufficient to publish logical changes

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.98.91 20199

WITH TIES cannot be specified without ORDER BY clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99 Message Numbers Beginning with 20200

2.99.1 20200

invalid datetime format separator: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.2 20201

multiple limit options not allowed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.3 20202

row count cannot be null in FETCH FIRST ... WITH TIES clause

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.4 20203

datetime format is zoned but not timed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.5 20204

unrecognized DROP DATABASE option "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.6 20205

type attribute "@1@" cannot be changed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.7 20206

could not generate random values

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.8 20207

must be superuser to alter a type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.9 20208

datetime format is not dated and not timed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.10 20209

result of decoding conversion is too large

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.11 20210

index %lld out of valid range, 0..%lld

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.12 20211

manifest checksums require a backup manifest

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.13 20212

JSON value must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.14 20213

"@1@" setting "@2@" not supported by this build

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.15 20214

CREATE EXTENSION ... FROM is no longer supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.16 20215

unexpected EOF for tape @1@: requested @2@ bytes, read @3@ bytes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.17 20216

parallel option requires a value between 0 and @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.18 20217

could not get collation version for locale "@1@": error code @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.19 20218

cannot drop generation expression from inherited column

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.20 20219

moving row to another partition during a BEFORE FOR EACH ROW trigger is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.21 20220

statistics object "@1@.@2@" does not exist, skipping

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.99.22 20221

expected start timeline @1@ but found timeline @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.23 20222

timetz out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.24 20223

unrecognized manifest option: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.25 20224

parallel vacuum degree must be between 0 and @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.26 20225

could not rewind temporary file

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.27 20226

ALTER TABLE / DROP EXPRESSION must be applied to child tables too

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.28 20227

argument types @1@ and @2@ cannot be matched

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.29 20228

recovery ended before configured recovery target was reached

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.30 20229

datetime format is not recognized: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.31 20230

@1@ is not a base type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.32 20231

unmatched format character "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.33 20232

jsonpath item method .@1@() can only be applied to a string

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.34 20233

cannot read from logical replication slot "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.35 20234

start timeline @1@ not found in history of timeline @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.36 20235

standby promotion is ongoing

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.37 20236

cannot reindex invalid index on TOAST table

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.38 20237

type matched to anycompatiblenonarray is an array type: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.39 20238

timestamptz out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.40 20239

UESCAPE must be followed by a simple string literal

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.41 20240

encoding conversion to or from "SQL_ASCII" is not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.42 20241

column "@1@" of relation "@2@" is not a stored generated column

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.43 20242

input string is too short for datetime format

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.44 20243

could not set SSL protocol version range

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.45 20244

can no longer get changes from replication slot "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.46 20245

unhandled previous state in xqs

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.47 20246

cannot convert value from @1@ to @2@ without time zone usage

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.48 20247

operator class options info is absent in function call context

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.49 20248

expected end timeline @1@ but found timeline @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.50 20249

database "@1@" is being used by prepared transactions

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.51 20250

could not encode random nonce

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.52 20251

control file contains invalid database cluster state

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.53 20252

anycompatiblerange type @1@ does not match anycompatible type @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.54 20253

out of memoryCannot enlarge string buffer containing @1@ bytes by @2@ more bytes.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.55 20254

invalid value for --connection-limit: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.56 20255

attempt to \\gset into specially treated variable "@1@" ignored

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.99.57 20256

reconnection to database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.58 20257

data block @1@ has wrong seek position

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.99.59 20258

could not determine which collation to use for partition bound expression

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.60 20259

column "@1@" inherits from generated column but specifies default

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.61 20260

child column "@1@" specifies generation expression

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.62 20261

no collation was derived for partition key column @1@ with collatable type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.63 20262

numeric argument of jsonpath item method .@1@() is out of range for type double precision

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.64 20263

string argument of jsonpath item method .@1@() is not a valid representation of a double precision number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.65 20264

column "@1@" inherits from generated column but specifies identity

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.66 20265

could not read block @1@ of temporary file: read only @2@ of @3@ bytes

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.67 20266

cannot reindex invalid index on TOAST table concurrently

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.68 20267

cannot copy unfinished logical replication slot "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.69 20268

partition key column @1@ has pseudo-type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.70 20269

column "@1@" inherits conflicting generation expressions

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.71 20270

@1@: could not open log file "@2@": @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.72 20271

reconnection to database "@1@" failed: @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.73 20272

Checking for new cluster tablespace directories

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.99.74 20273

invalid value for --connection-limit: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.75 20274

cannot reindex invalid index "@1@.@2@" on TOAST table, skipping

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.99.76 20275

Omit the generation expression in the definition of the child table column to inherit the generation expression from the parent table.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.77 20276

Retry when the source replication slot's confirmed_flush_lsn is valid.

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.78 20277

unique constraint on partitioned table must include all partitioning columns

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.79 20278

could not read from shared tuplestore temporary file: read only @1@ of @2@ bytes

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.80 20279

could not get server address from Connection Manager

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.99.81 20280

could not receive server address from Connection Manager

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.99.82 20281

no target server address from Connection Manager

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.99.83 20282

out of memory

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.99.84 20283

cannot duplicate null pointer (internal error)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.99.85 20284

Escape sequence "\\@1@" is invalid.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.86 20285

Character with value 0x@1@ must be escaped.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.87 20286

Expected end of input, but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.88 20287

Expected array element or "]", but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.89 20288

Expected "," or "]", but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.90 20289

Expected ":", but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.91 20290

Expected JSON value, but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.92 20291

The input string ended unexpectedly.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.93 20292

Expected string or "}", but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.94 20293

Expected "," or "}", but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.95 20294

Expected string, but found "@1@".

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.96 20295

Token "@1@" is invalid.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.97 20296

\\u0000 cannot be converted to text.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.98 20297

"\\u" must be followed by four hexadecimal digits.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.99 20298

Unicode escape values cannot be used for code point values above 007F when the encoding is not UTF8.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.99.100 20299

Unicode high surrogate must not follow a high surrogate.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100 Message Numbers Beginning with 20300

2.100.1 20300

Unicode low surrogate must follow a high surrogate.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.2 20301

could not parse backup manifest: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.3 20302

unrecognized checksum algorithm: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.4 20303

invalid checksum for file "@1@": "@2@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.5 20304

manifest has no checksum

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.6 20305

invalid manifest checksum: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.7 20306

manifest checksum mismatch

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.8 20307

Try "@1@ --help" for more information.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.9 20308

no backup directory specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.10 20309

too many command-line arguments (first is "@1@")

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.11 20310

The program "@1@" is needed by @2@ but was not found in thesame directory as "@3@".Check your installation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.12 20311

The program "@1@" was found by "@2@"but was not the same version as @3@.Check your installation.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.100.13 20312

---

backup successfully verified

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.100.14 20313

---

could not open file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.15 20314

---

could not stat file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.16 20315

---

could not read file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.17 20316

---

could not read file "@1@": read @2@ of @3@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.18 20317

---

duplicate path name in backup manifest: "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.19 20318

---

could not open directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.20 20319

could not close directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.21 20320

could not stat file or directory "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.22 20321

"@1@" is not a file or directory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.23 20322

"@1@" is present on disk but not in the manifest

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.24 20323

"@1@" has size @2@ on disk but size @3@ in the manifest

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.25 20324

"@1@" is present in the manifest but not on disk

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.26 20325

---

could not close file "@1@": @2@

[Description]

An error occurred during I/O processing in the database server.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.27 20326

---

file "@1@" should contain @2@ bytes, but read @3@ bytes

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.28 20327

---

file "@1@" has checksum of length @2@, but expected @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.29 20328

---

checksum mismatch for file "@1@"

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.100.30 20329

WAL parsing failed for timeline @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101 Message Numbers Beginning with 25000

2.101.1 25000

Name of the SSL library.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.2 25001

Sets the action to perform upon reaching the recovery target.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.3 25002

Selects the shared memory implementation used for the main shared memory region.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.4 25003

Sets the minimum SSL/TLS protocol version to use.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.5 25004

Sets the maximum SSL/TLS protocol version to use.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.6 25005

multiple recovery targets specified

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.7 25006

could not determine which collation to use for string hashing

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.8 25007

WITH OIDS is no longer supported; this can only be false.

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.9 25008

could not read compressed file "@1@": read @2@ of @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.10 25009

---

could not close file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.11 25010

---

checksums enabled in file "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.12 25011

---

seek failed for block @1@ in file "@2@": @3@

[Description]

the return value of lseek is -1.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.13 25012

---

could not write block @1@ in file "@2@": @3@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.101.14 25013

---

could not write block @1@ in file "@2@": wrote @3@ of @4@

[Description]

There was insufficient free space in the disk of the database server during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Delete user data stored in the database server to free up space on the disk.

2.101.15 25014

---

data checksums are already disabled in cluster

[Description]

data checksums are already disabled in cluster.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.101.16 25015

---

data checksums are already enabled in cluster

[Description]

data checksums are already enabled in cluster.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly

2.101.17 25016

Checksums enabled in cluster

[Description]

Checksums enabled in cluster.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.18 25017

Checksums disabled in cluster

[Description]

Checksums disabled in cluster.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.19 25018

out of memory

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.20 25019

could not close file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.21 25020

---

could not open file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.22 25021

---

could not write file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.23 25022

---

could not fsync file "@1@": @2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.24 25023

@1@: could not start server due to setsid() failure: @2@

[Description]

could not start server

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.25 25024

@1@: cannot rotate log file; single-user server is running (PID: @2@)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.26 25025

@1@: could not create log rotation signal file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.27 25026

@1@: could not write log rotation signal file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.28 25027

@1@: could not send log rotation signal (PID: @2@): @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.29 25028

@1@: could not remove log rotation signal file "@2@": @3@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.30 25029

---

out of memory

[Description]

out of memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.31 25030

---

out of memory

[Description]

out of memory

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.32 25031

restoring tables WITH OIDS is not supported anymore

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.33 25032

could not set default_table_access_method: @1@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.34 25033

extra_float_digits must be in range -15..3

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.35 25034

rows-per-insert must be in range @1@..@2@

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.36 25035

---

option --on-conflict-do-nothing requires option --inserts, --rows-per-insert, or --column-inserts

[Description]

option --on-conflict-do-nothing requires option --inserts, --rows-per-insert, or --column-inserts

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.37 25036

WITH OIDS is not supported anymore (table "@1@")

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.101.38 25037

---

no referencing object @1@ @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.101.39 25038

---

no referenced object @1@ @2@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.101.40 25039

---

option --exclude-database cannot be used together with -g/--globals-only, -r/--roles-only, or -t/--tablespaces-only

[Description]

option --exclude-database cannot be used together with -g/--globals-only, -r/--roles-only, or -t/--tablespaces-only

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.41 25040

---

excluding database "@1@"

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.101.42 25041

---

one of -d/--dbname and -f/--file must be specified

[Description]

one of -d/--dbname and -f/--file must be specified

[System Processing]

Processing will be aborted.

[Action]

Check the command-line, and re-execute the command with correct options.

2.101.43 25042

---

options -C/--create and -1/--single-transaction cannot be used together

[Description]

options -C/--create and -1/--single-transaction cannot be used together

[System Processing]

Processing aborts

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.44 25043

---

could not find referenced extension @1@

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.101.45 25044

---

number of source and target fields in assignment does not match

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.46 25045

---

cannot set generated column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.47 25046

cannot set generated column "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.101.48 25047

Views with conditional DO INSTEAD rules are not automatically updatable.

[Description]

Write operation Views with conditional DO INSTEAD rules are not automatically updatable.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.101.49 25049

unrecognized value "@1@" for option '-i'

[Description]

Unrecognized value specified for option '-i'.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.50 25050

unrecognized stop mode "@1@"

[Description]

Unrecognized stop mode was specified.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.51 25051

---

invalid timeout "@1@"

[Description]

Invalid timeout specified.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.52 25052

---

too many command-line arguments (first is "@1@")

[Description]

Too many command-line arguments.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.53 25053

---

unrecognized operation mode "@1@"

[Description]

Unrecognized operation mode was specified.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.54 25054

---

no operation mode is specified

[Description]

No operation mode is specified.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.55 25055

---

no connection manager directory is specified and environment variable CMDATA is unset

[Description]

No connection manager directory is specified and environment variable CMDATA is unset.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.56 25056

---

could not create conmgr process: @1@

[Description]

Could not create conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.57 25057

---

could not start conmgr process due to setsid() failure: @1@

[Description]

Could not start conmgr process due to setsid() failure.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.58 25058

---

could not start conmgr process: @1@

[Description]

Could not start conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.59 25059

---

could not get a result from conmgr process: @1@

[Description]

Could not get a result from conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.60 25060

---

unexpected response from conmgr process: result_status=@1@ @2@

[Description]

Unexpected response from conmgr process.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.61 25061

---

unexpected response from conmgr process: attr is null

[Description]

Unexpected response from conmgr process.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.62 25062

invalid conmgr process status "@1@"

[Description]

Invalid conmgr process status.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.63 25063

invalid conmgr process status "@1@"

[Description]

Invalid conmgr process status.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.64 25064

could not open pid file "@1@": @2@

[Description]

Could not open pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.65 25065

could not read from pid file "@1@": @2@

[Description]

Could not read from pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.66 25066

---

invalid data in pid file "@1@"

[Description]

Invalid data in pid file.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.67 25067

---

invalid pid file "@1@"

[Description]

Invalid pid file.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.68 25068

---

could not send signal to conmgr process: @1@

[Description]

Could not send signal to conmgr process

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.69 25069

---

could not connect to conmgr process: @1@

[Description]

Could not connect to conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.70 25070

---

waiting conmgr process to connect to watchdog

[Description]

Waiting conmgr process to connect to watchdog.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.71 25071

---

could not start conmgr process in time

[Description]

Could not start conmgr process in time.

[System Processing]

Processing aborts.

[Action]

Check log of conmgr process.

2.101.72 25072

---

could not start conmgr process

[Description]

Could not start conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of conmgr process.

2.101.73 25073

---

another conmgr process is starting up

[Description]

Another conmgr process is starting up.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.74 25074

---

another conmgr process is running

[Description]

Another conmgr process is running.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.75 25075

---

another conmgr process is shutting down

[Description]

Another conmgr process is shutting down.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.76 25076

---

starting conmgr process

[Description]

Starting conmgr process.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.77 25077

conmgr process is ready

[Description]

Conmgr process is ready.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.78 25078

started conmgr process successfully

[Description]

Started conmgr process successfully.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.79 25079

could not send signal(@1@) to conmgr process(PID: @2@): @3@

[Description]

Could not send signal to conmgr process.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.80 25080

could not stop conmgr process in time

[Description]

Could not stop conmgr process in time.

[System Processing]

Processing aborts.

[Action]

Check log of conmgr process.

2.101.81 25081

---

pid file "@1@/conmgr.pid" does not exist

[Description]

Pid file does not exist.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.82 25082

---

conmgr process shutting down

[Description]

Conmgr process shutting down.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.83 25083

---

stopped conmgr process successfully

[Description]

Stopped conmgr process successfully.

[System Processing]

Continues processing.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.84 25084

---

connection manager directory "@1@" does not exist

[Description]

Connection manager directory does not exist.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.85 25085

---

could not access to connection manager directory "@1@": @2@

[Description]

Could not access to connection manager directory.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.86 25086

"@1@" is not a directory

[Description]

Not a directory.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.87 25087

---

cannot be run as rootPlease log in (using

[Description]

Cannot be run as root. Please login as the (unprivileged) user that will own the conmgr process.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.88 25088

---

out of memory

[Description]

Out of memory.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.89 25089

---

too long literal in configuration file "@1@" line @2@

[Description]

Too long literal in configuration file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.90 25090

---

syntax error near '@1@' in configuration file "@2@" line @3@

[Description]

Syntax error in configuration file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.91 25091

---

invalid default value for parameter '@1@' of instance #@2@

[Description]

Invalid default value for parameter of instance.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.92 25092

invalid default value for parameter '@1@'

[Description]

Invalid default value for parameter.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.101.93 25093

either backend_host or backend_hostaddr is needed for instance #@1@

[Description]

Either backend_host or backend_hostaddr is needed for instance.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.94 25094

invalid value for parameter '@1@' of instance #@2@

[Description]

Invalid value for parameter of instance.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.95 25095

invalid value for parameter '@1@'

[Description]

Invalid value for parameter.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.96 25096

---

could not open file "@1@": @2@

[Description]

Could not open file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.101.97 25097

---

invalid parameter '@1@' in configuration file "@2@" line @3@

[Description]

Invalid parameter in configuration file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.98 25098

---

invalid value for parameter '@1@' in configuration file "@2@" line @3@

[Description]

Invalid value for parameter in configuration file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.101.99 25099

---

could not notify application: @1@

[Description]

Could not notify application.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102 Message Numbers Beginning with 25100

2.102.1 25100

unexpected heartbeat event is reported: host="@1@"

[Description]

Unexpected heartbeat event is reported.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.2 25101

could not reply all application info: @1@

[Description]

Could not reply all application info.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.3 25102

could not reply all node info: @1@

[Description]

Could not reply all node info.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.4 25103

could not reply target node info: @1@

[Description]

Could not reply target node info.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.5 25104

invalid query "@1@" is received

[Description]

Invalid query is received.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.6 25105

received invalid startup packet

[Description]

Received invalid startup packet.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.7 25106

could not complete command: @1@

[Description]

Could not complete command.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.8 25107

could not be ready for next command: @1@

[Description]

Could not be ready for next command.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.9 25108

invalid status(@1@) for connection of application internal event(@2@)

[Description]

Invalid status for connection of application internal event.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.10 25109

rejected a connection from application due to going shutdown

[Description]

Rejected a connection from application due to going shutdown.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.11 25110

could not reply for startup: @1@

[Description]

Could not reply for startup.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.12 25111

unexpected packet(@1@) is received

[Description]

Unexpected packet is received.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.13 25112

@1@ causes an error at application connection: @2@

[Description]

Causes an error at application connection.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.14 25113

---

application connection is closed by remote in @1@

[Description]

Application connection is closed by remote.

[System Processing]

Processing continues.

[Action]

Check log of remote system.

2.102.15 25114

---

unexpected heartbeat event(@1@) is received

[Description]

Unexpected heartbeat event is received.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.16 25115

---

could not listen for socket: @1@

[Description]

Could not listen for socket.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.17 25116

---

could not accept application connection: @1@

[Description]

Could not accept application connection.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.18 25117

---

could not get string format address: @1@

[Description]

Could not get string format address.

[System Processing]

Processing continues.

[Action]

Check log of Operating System.

2.102.19 25118

---

could not open pid file "@1@": @2@

[Description]

Could not open pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.20 25119

could not read from pid file "@1@": @2@

[Description]

Could not read from pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.21 25120

"@1@" is not pid file: number of line is not enough(expect 4 but @2@)

[Description]

Not pid file: number of line is not enough.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.22 25121

could not write to pid file "@1@": @2@

[Description]

Could not write to pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.23 25122

could not seek pid file "@1@": @2@

[Description]

Could not seek pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.24 25123

---

could not sync to pid file "@1@": @2@

[Description]

Could not sync to pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.25 25124

---

closing all application connections

[Description]

Closing all application connections.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.26 25125

---

received smart shutdown request

[Description]

Received smart shutdown request.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.27 25126

---

received fast shutdown request

[Description]

Received fast shutdown request.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.28 25127

---

received immediate shutdown request

[Description]

Received immediate shutdown request.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.29 25128

---

invalid packet is received: msgtype='0x@1@'

[Description]

Invalid packet is received.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.30 25129

---

could not change directory to "@1@": @2@

[Description]

Could not change directory.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.31 25130

---

could not create pid file "@1@": @2@

[Description]

Could not create pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.32 25131

---

invalid pid file "@1@"

[Description]

Invalid pid file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.33 25132

---

another conmgr process(PID @1@) is running

[Description]

Another conmgr process is running.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.34 25133

---

could not write pid file "@1@": @2@

[Description]

Could not write pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.35 25134

could not remove pid file "@1@": @2@

[Description]

Could not remove pid file.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.36 25135

real and effective user IDs must match

[Description]

Real and effective user IDs must match.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.37 25136

no cmdata directory specified and environment variable CMDATA unset

[Description]

No cmdata directory specified and environment variable CMDATA unset.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.38 25137

cmdata directory "@1@" does not exist

[Description]

Cmdata directory does not exist.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.39 25138

---

could not access to cmdata directory "@1@": @2@

[Description]

Could not access to cmdata directory.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.40 25139

"@1@" is not a directory

[Description]

Not a directory.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.41 25140

---

conmgr process is starting

[Description]

Conmgr process is starting.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.42 25141

---

conmgr process stopped

[Description]

Conmgr process stopped.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.43 25142

---

could not prepare for heartbeat: @1@

[Description]

Could not prepare for heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.44 25143

---

could not connect due to the following errors

[Description]

Could not connect due to the following errors.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.45 25144

---

could not receive a heartbeat packet: @1@

[Description]

Could not receive a heartbeat packet.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.46 25145

---

error is occured for completion of asynchronous connect for heartbeat: @1@

[Description]

Error is occured for completion of asynchronous connect for heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.47 25146

@1@ cause an error in heartbeat: @2@

[Description]

Cause an error in heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.48 25147

---

could not accept heartbeat connection: @1@

[Description]

Could not accept heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.49 25148

---

could not add node: host=@1@ hostaddr=@2@ port=@3@

[Description]

Could not add node.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.50 25149

listening on @1@ port @2@

[Description]

Listening on port.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.51 25150

could not bind port @1@

[Description]

Could not bind port.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.52 25151

could not bind port @1@ with following causes

[Description]

Could not bind port with following causes.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.53 25152

could not send @1@: @2@

[Description]

Could not send.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.54 25153

---

could not create an additional interval event: @1@

[Description]

Could not create an additional interval event.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.55 25154

---

could not create bufferevent: @1@

[Description]

Could not create bufferevent.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.56 25155

---

could not resolve address: @1@

[Description]

Could not resolve address.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.57 25156

---

invalid status(@1@) for heartbeat internal event(@2@)

[Description]

Invalid status for heartbeat internal event.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.58 25157

---

heartbeat connection is established

[Description]

Heartbeat connection is established.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.59 25158

---

heartbeat connect is refused: @1@

[Description]

Heartbeat connect is refused.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.60 25159

---

remote node closes heartbeat connection

[Description]

Remote node closes heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.61 25160

---

remote node shuts down heartbeat connection

[Description]

Remote node shuts down heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.62 25161

---

heartbeat connect is timed out

[Description]

Heartbeat connect is timed out.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.63 25162

---

heartbeat is timed out

[Description]

Heartbeat is timed out.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.64 25163

---

could not establish heartbeat connection

[Description]

Could not establish heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.65 25164

out of memory

[Description]

Out of memory.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.66 25165

unexpected packet(@1@) is received

[Description]

Unexpected packet is received.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.67 25166

could not listen for socket: @1@

[Description]

Could not listen for socket.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.68 25167

could not get string format address: @1@

[Description]

Could not get string format address.

[System Processing]

Processing continues.

[Action]

Check log of Operating System.

2.102.69 25168

---

could not prepare for heartbeat: @1@

[Description]

Could not prepare for heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.70 25169

---

could not connect due to the following errors

[Description]

Could not connect due to the following errors.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.71 25170

---

could not receive a heartbeat packet: @1@

[Description]

Could not receive a heartbeat packet.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.72 25171

---

error is occured for completion of asynchronous connect for heartbeat: @1@

[Description]

Error is occured for completion of asynchronous connect for heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.73 25172

@1@ cause an error in heartbeat: @2@

[Description]

Cause an error in heartbeat.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.74 25173

---

could not accept heartbeat connection: @1@

[Description]

Could not accept heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.75 25174

---

could not add node: host=@1@ hostaddr=@2@ port=@3@

[Description]

Could not add node.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.76 25175

---

listening on @1@ port @2@

[Description]

Listening on port.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.77 25176

---

could not bind port @1@

[Description]

Could not bind port.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.78 25177

---

could not bind port @1@ with following causes

[Description]

Could not bind port with following causes.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.79 25178

---

could not send @1@: @2@

[Description]

Could not send.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.80 25179

could not create an additional interval event: @1@

[Description]

Could not create an additional interval event.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.81 25180

could not create bufferevent: @1@

[Description]

Could not create bufferevent.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.82 25181

could not resolve address: @1@

[Description]

Could not resolve address.

[System Processing]

Processing aborts.

[Action]

Check log of Operating System.

2.102.83 25182

invalid status(@1@) for heartbeat internal event(@2@)

[Description]

Invalid status for heartbeat internal event.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.84 25183

---

heartbeat connection is established

[Description]

Heartbeat connection is established.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.85 25184

---

heartbeat connect is refused: @1@

[Description]

Heartbeat connect is refused.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.86 25185

---

remote node closes heartbeat connection

[Description]

Remote node closes heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.87 25186

---

remote node shuts down heartbeat connection

[Description]

Remote node shuts down heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.88 25187

---

heartbeat connect is timed out

[Description]

Heartbeat connect is timed out.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.89 25188

---

heartbeat is timed out

[Description]

Heartbeat is timed out.

[System Processing]

Processing aborts.

[Action]

Check log of remote system.

2.102.90 25189

---

could not establish heartbeat connection

[Description]

Could not establish heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.91 25190

---

terminator: could not attach to server: unexpected result(@1@)

[Description]

Could not attach to server.

[System Processing]

Processing aborts.

[Action]

Contact Fujitsu technical support.

2.102.92 25191

---

terminator: terminated connections: ipaddress="@1@"

[Description]

Terminated connections.

[System Processing]

Processing continues.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.93 25192

---

watchdog: could not send attribute

[Description]

Could not send attribute.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.94 25193

---

watchdog: could not accept heartbeat connection

[Description]

Could not accept heartbeat connection.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.95 25194

Increase watchdog.max_hb_connections.

[Description]

Increase watchdog.max_hb_connections.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.96 25195

terminator: could not prepare statement for "@1@"

[Description]

Could not prepare statement.

[System Processing]

Processing aborts.

[Action]

Check messages near this message.

2.102.97 25196

set-valued function called in context that cannot accept a set

[Description]

Set-valued function called in context that cannot accept a set.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.98 25197

materialize mode required, but it is not allowed in this context

[Description]

Materialize mode required, but it is not allowed in this context.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.99 25198

"root" execution of the conmgr is not permitted.The conmgr must be started under an unprivileged user ID to preventpossible system security compromise. See the documentation formore information on how to properly start the conmgr.

[Description]

"root" execution of the conmgr is not permitted. The conmgr must be started under an unprivileged user ID to prevent possible system security compromise. See the documentation for more information on how to properly start the conmgr.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.102.10025199

Execution of conmgr by a user with administrative permissions is notpermitted.The conmgr must be started under an unprivileged user ID to preventpossible system security compromises. See the documentation formore information on how to properly start the conmgr.

[Description]

Execution of conmgr by a user with administrative permissions is not permitted. The conmgr must be started under an unprivileged user ID to prevent possible system security compromises. See the documentation for more information on how to properly start the conmgr.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.103 Message Numbers Beginning with 25200

2.103.1 25200

The program "@1@" is needed by @2@ but was not found in thesame directory as "@3@".Check your installation.

[Description]

A required program was not found. Check your installation.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.103.2 25201

The program "@1@" was found by "@2@"but was not the same version as @3@.Check your installation.

[Description]

The program was not the same version.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.103.3 25202

invalid value for integer parameter in configuration file "@1@" line @2@

[Description]

Invalid value for integer parameter in configuration file.

[System Processing]

Processing aborts.

[Action]

Recheck command line, configuration file, or logic of your application. Hint message may follow with this message.

2.103.4 25203

attribute of the instance(host='@1@', port=@2@) is changed from '@3@' to '@4@'

[Description]

Attribute of the instance is changed.

[System Processing]

Processing continues.

[Action]

No action required.

2.103.5 25204

Sleep until another process releases global meta cache because global meta cache cannot be swept away yet. Please increase pgx_global_metacache.

[Description]

Sleep until another process releases global meta cache because global meta cache cannot be swept away yet. Please increase pgx_global_metacache.

[System Processing]

Processing continues.

[Action]

If this message occurs frequently, increase the pgx_global_metacache parameter setting and restart the database.

2.103.6 25205

GMC is swept away

[Description]

GMC is swept away.

[System Processing]

Processing continues.

[Action]

No action required.

2.103.7 25206

pgx_global_metacache must be set to at least 10MB when enabled.

[Description]

pgx_global_metacache must be set to at least 10MB when enabled.

[System Processing]

Processing will be aborted.

[Action]

Set the pgx_global_metacache parameter to at least 10MB and restart the database.

2.104 Message Numbers Beginning with 70000

2.104.1 70001

Error loading default settings from driverconfig.properties

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.104.2 70002

Your security policy has prevented the connection from being attempted. You probably need to grant the connect java.net.SocketPermission to the database server host and port that you wish to connect to.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.3 70003

Something unusual has occurred to cause the driver to fail. Please report this exception.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.104.4 70004

Connection attempt timed out.

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.104.5 70005

Interrupted while attempting to connect.

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.6 70006

Method @1@ is not yet implemented.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.7 70007

Requested CopyIn but got @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.8 70008

Requested CopyOut but got @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.9 70009

Copying from database failed: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.104.10 70010

This copy stream is closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.11 70011

Read from copy failed.

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.12 70012

Cannot write to copy a byte of value @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.13 70013

A connection could not be made using the requested protocol @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.14 70014

Premature end of input stream, expected @1@ bytes, but only read @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.15 70015

Expected an EOF from server, got: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.16 70016

An unexpected result was returned by a query.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.17 70017

Illegal UTF-8 sequence: byte @1@ of @2@ byte sequence is not 10xxxxxx: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.18 70018

Illegal UTF-8 sequence: @1@ bytes used to encode a @2@ byte value: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.19 70019

Illegal UTF-8 sequence: initial byte is @1@: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.20 70020

Illegal UTF-8 sequence: final value is out of range: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.21 70021

Illegal UTF-8 sequence: final value is a surrogate value: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.22 70022

Zero bytes may not occur in string parameters.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.23 70023

Zero bytes may not occur in identifiers.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.24 70024

Cannot convert an instance of @1@ to type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.25 70025

Connection to @1@ refused. Check that the hostname and port are correct and that the postmaster is accepting TCP/IP connections.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.26 70026

The connection attempt failed.

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.27 70027

The server does not support SSL.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.28 70028

An error occurred while setting up the SSL connection.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.29 70030

The server requested password-based authentication, but no password was provided.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.30 70031

The authentication type @1@ is not supported. Check that you have configured the pg_hba.conf file to include the client''s IP address or subnet, and that it is using an authentication scheme supported by the driver.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.31 70032

Protocol error. Session setup failed.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.32 70034

The column index is out of range: @1@, number of columns: @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.33 70035

No value specified for parameter @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.34 70036

Expected command status BEGIN, got @1@.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.35 70037

Unexpected command status: @1@.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.36 70038

An I/O error occurred while sending to the backend.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.37 70039

Unknown Response Type @1@.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.38 70040

Ran out of memory retrieving query results.

[Description]

There was insufficient free space in the server's memory during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Estimate memory usage and take the following action:

- If the number of simultaneous connections from client applications is high, reduce it.

- If the number of simultaneous SQL executions is high, reduce it.

2.104.39 70044

CommandComplete expected COPY but got:

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.40 70045

Tried to obtain lock while already holding it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.41 70046

Tried to break lock on database connection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.42 70047

Interrupted while waiting to obtain lock on database connection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.43 70048

Unable to bind parameter values for statement.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.44 70049

Database connection failed when starting copy

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.45 70050

Tried to cancel an inactive copy operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.46 70051

Database connection failed when canceling copy operation

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.47 70052

Missing expected error response to copy cancel request

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.48 70053

Got @1@ error responses to single copy cancel request

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.49 70054

Tried to end inactive copy

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.50 70055

Database connection failed when ending copy

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.51 70056

Tried to write to an inactive copy operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.52 70057

Database connection failed when writing to copy

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.53 70058

Tried to read from inactive copy

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.54 70059

Database connection failed when reading from copy

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.55 70060

Received CommandComplete "@1@" without an active copy operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.56 70061

Got CopyInResponse from server during an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.57 70062

Got CopyOutResponse from server during an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.58 70063

Got CopyData without an active copy operation

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.59 70064

Unexpected copydata from server for @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.60 70065

Unexpected packet type during copy: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.61 70066

Bind message length @1@ too long. This can be caused by very large or incorrect length specifications on InputStream parameters.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.62 70067

The server''s client_encoding parameter was changed to @1@. The JDBC driver requires client_encoding to be UTF8 for correct operation.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.63 70068

The server''s DateStyle parameter was changed to @1@. The JDBC driver requires DateStyle to begin with ISO for correct operation.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.64 70069

The server"s standard_conforming_strings parameter was reported as @1@. The JDBC driver expected on or off.

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.104.65 70070

The driver currently does not support COPY operations.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.66 70071

This PooledConnection has already been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.67 70072

Connection has been closed automatically because a new connection was opened for the same PooledConnection or the PooledConnection has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.68 70073

Connection has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.69 70074

Statement has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.70 70075

Failed to setup DataSource.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.104.71 70076

DataSource has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.72 70077

Fastpath call @1@ - No result was returned and we expected an integer.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.73 70078

The fastpath function @1@ is unknown.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.74 70079

Conversion to type @1@ failed: @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.75 70080

Cannot tell if path is open or closed: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.76 70081

GSS Authentication failed

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.104.77 70082

The array index is out of range: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.78 70083

The array index is out of range: @1@, number of elements: @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.79 70084

Truncation of large objects is only implemented in 8.3 and later servers.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.80 70085

Cannot truncate LOB to a negative length.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.81 70086

PostgreSQL LOBs can only index to: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.82 70087

LOB positioning offsets start at 1.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.83 70088

---

free() was called on this LOB previously

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.84 70089

Unsupported value for stringtype parameter: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.85 70091

No results were returned by the query.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.86 70092

A result was returned when none was expected.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.104.87 70093

Custom type maps are not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.88 70094

Failed to create object for: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.89 70095

Unable to load the class @1@ responsible for the datatype @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.90 70096

Cannot change transaction read-only property in the middle of a transaction.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.91 70097

Cannot commit when autoCommit is enabled.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.92 70098

This connection has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.104.93 70099

Cannot rollback when autoCommit is enabled.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105 Message Numbers Beginning with 70100

2.105.1 70100

Cannot change transaction isolation level in the middle of a transaction.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.2 70101

Transaction isolation level @1@ not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.3 70102

Unable to translate data into the desired encoding.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.4 70103

Unable to determine a value for MaxIndexKeys due to missing system catalog data.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.5 70104

Unable to find name datatype in the system catalogs.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.6 70105

Operation requires a scrollable ResultSet, but this ResultSet is FORWARD_ONLY.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.7 70107

Can"t use relative move methods while on the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.8 70108

Invalid fetch direction constant: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.9 70109

Cannot call cancelRowUpdates() when on the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.10 70110

Cannot call deleteRow() when on the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.11 70111

Currently positioned before the start of the ResultSet. You cannot call deleteRow() here.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.12 70112

Currently positioned after the end of the ResultSet. You cannot call deleteRow() here.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.13 70113

There are no rows in this ResultSet.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.14 70114

Not on the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.15 70115

You must specify at least one column value to insert a row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.16 70116

The JVM claims not to support the encoding: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.17 70117

Provided InputStream failed.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.18 70118

Provided Reader failed.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.19 70119

Can"t refresh the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.20 70120

Cannot call updateRow() when on the insert row.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.21 70121

Cannot update the ResultSet because it is either before the start or after the end of the results.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.22 70122

ResultSets with concurrency CONCUR_READ_ONLY cannot be updated.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.23 70123

No primary key found for table @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.24 70124

Fetch size must be a value greater to or equal to 0.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.25 70125

Invalid character data was found. This is most likely caused by stored data containing characters that are invalid for the character set the database was created in. The most common example of this is storing 8bit data in a SQL_ASCII database.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.26 70126

Bad value for type @1@ : @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.27 70127

The column name @1@ was not found in this ResultSet.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.28 70128

ResultSet is not updateable. The query that generated this result set must select only one table, and must select all primary keys from that table. See the JDBC 2.1 API Specification, section 5.6 for more details.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.29 70129

This ResultSet is closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.30 70130

ResultSet not positioned properly, perhaps you need to call next.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.31 70131

Can"t use query methods that take a query string on a PreparedStatement.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.32 70132

Multiple ResultSets were returned by the query.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.33 70133

A CallableStatement was executed with nothing returned.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.34 70134

A CallableStatement was executed with an invalid number of parameters

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.35 70135

A CallableStatement function was executed and the out parameter @1@ was of type @2@ however type @3@ was registered.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.36 70136

Maximum number of rows must be a value grater than or equal to 0.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.37 70137

Query timeout must be a value greater than or equals to 0.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.38 70138

The maximum field size must be a value greater than or equal to 0.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.39 70139

Unknown Types value.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.40 70140

Invalid stream length @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.41 70141

The JVM claims not to support the @1@ encoding.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.42 70142

Unknown type @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.43 70143

Cannot cast an instance of @1@ to type @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.44 70144

Unsupported Types value: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.45 70145

Can''t infer the SQL type to use for an instance of @1@. Use setObject() with an explicit Types value to specify the type to use.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.46 70146

This statement does not declare an OUT parameter. Use '{' ?= call ... '}' to declare one.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.47 70147

wasNull cannot be call before fetching a result.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.48 70148

Malformed function or procedure escape syntax at offset @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.49 70149

Parameter of type @1@ was registered, but call to get@2@ (sqltype=@3@) was made.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.50 70150

A CallableStatement was declared, but no call to registerOutParameter(1, <some type>) was made.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.51 70151

No function outputs were registered.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.52 70152

Results cannot be retrieved from a CallableStatement before it is executed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.53 70153

This statement has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.54 70154

Too many update results were returned.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.55 70155

Batch entry @1@ @2@ was aborted: @3@ Call getNextException to see other errors in the batch.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.56 70156

Unexpected error writing large object to database.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.57 70157

@1@ function takes one and only one argument.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.58 70158

@1@ function takes two and only two arguments.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.59 70159

@1@ function takes four and only four argument.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.60 70160

@1@ function takes two or three arguments.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.61 70161

@1@ function doesn''t take any argument.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.62 70162

@1@ function takes three and only three arguments.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.63 70163

Interval @1@ not yet implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.64 70166

Unknown ResultSet holdability setting: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.65 70168

Cannot establish a savepoint in auto-commit mode.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.66 70169

Returning autogenerated keys is not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.67 70170

The parameter index is out of range: @1@, number of parameters: @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.68 70172

Returning autogenerated keys by column index is not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.69 70173

Cannot reference a savepoint after it has been released.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.70 70174

Cannot retrieve the id of a named savepoint.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.71 70175

Cannot retrieve the name of an unnamed savepoint.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.72 70176

Invalid UUID data.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.73 70177

Unable to find server array type for provided name @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.74 70178

Failed to set ClientInfo property: @1@

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.75 70179

ClientInfo property not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.76 70180

Unable to decode xml data.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.77 70181

Unknown XML Source class: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.78 70182

Unable to create SAXResult for SQLXML.

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.79 70183

Unable to create StAXResult for SQLXML

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.105.80 70184

Unknown XML Result class: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.81 70185

This SQLXML object has already been freed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.82 70186

This SQLXML object has not been initialized, so you cannot retrieve data from it.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.83 70187

Failed to convert binary xml data to encoding: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.84 70188

Unable to convert DOMResult SQLXML data to a string.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.85 70189

This SQLXML object has already been initialized, so you cannot manipulate it further.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.86 70191

Large Objects may not be used in auto-commit mode.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.87 70192

The SSLSocketFactory class provided @1@ could not be instantiated.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.88 70193

Conversion of interval failed

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.89 70194

Conversion of money failed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.90 70195

Transaction control methods setAutoCommit(true), commit, rollback and setSavePoint not allowed while an XA transaction is active.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.91 70196

Invalid flags

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.92 70197

---

xid must not be null

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.93 70198

Connection is busy with another transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.105.94 70199

---

suspend/resume not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106 Message Numbers Beginning with 70200

2.106.1 70200

Transaction interleaving not implemented

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.2 70201

Error disabling autocommit

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.3 70202

tried to call end without corresponding start call

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.4 70203

Not implemented: Prepare must be issued using the same connection that started the transaction

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.5 70204

Prepare called before end

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.6 70206

Error preparing transaction

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.7 70207

Invalid flag

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.8 70208

Error during recover

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.9 70209

Error rolling back prepared transaction

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.10 70210

Not implemented: one-phase commit must be issued using the same connection that was used to start it

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.11 70211

commit called before end

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.12 70212

Error during one-phase commit

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.13 70213

Not implemented: 2nd phase commit must be issued using an idle connection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.14 70214

Error committing prepared transaction

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.106.15 70215

Heuristic commit/rollback not supported

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.16 70221

Could not find a server with specified targetServerType: @1@

[Description]

Could not find a suitable target server.

[System Processing]

Processing is aborted.

[Action]

Check following settings (host, IP address, port number,or targetServer):

- Connection string
- Connection service file
- Data source of JDBC or ODBC
- Environment variables for default connection parameter values(ex. PGHOST)
- Arguments of functions of libpq
- Options of command

2.106.17 70222

Invalid timeout (@1@<0).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.18 70225

Invalid targetServerType value: @1@

[Description]

value of targetserver is invalid.

[System Processing]

Processing is aborted.

[Action]

Set one of the following:

- primary

- standby

- prefer_standby

- any(can be specified only JDBC)

2.106.19 70226

The sslservercertcn @1@ could not be verified.

[Description]

value of sslservercertcn is different from common name in the server certificate.

[System Processing]

Processing is aborted.

[Action]

Set SSL certificate's common name to sslservercertcn.

2.106.20 70227

The sslservercertcn @1@ could not be verified by hostnameverifier @2@.

[Description]

value of sslservercertcn is different from common name in the server certificate.

[System Processing]

Processing is aborted.

[Action]

- Set SSL certificate's common name to sslservercertcn.

- Check the program of class specified by hostnameverifier.

2.106.21 70228

Properties for the driver contains a non-string value for the key

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.106.22 70229

(pgjdbc: autodetected server-encoding to be @1@, if the message is not readable, please check database logs and/or host, port, dbname, user, password, pg_hba.conf)

[Description]

An error occurred.

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

2.106.23 70230

Object is too large to send over the protocol.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.24 70231

No IOException expected from StringBuffer or StringBuilder

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.25 70232

---

oid type @1@ not known and not a number

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.26 70233

The SocketFactory class provided @1@ could not be instantiated.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.27 70234

Added parameters index out of range: @1@, number of columns: @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.28 70235

Invalid sslmode value: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.29 70237

Unsupported property name: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.30 70238

Fastpath call @1@ - No result was returned and we expected a numeric.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.31 70239

Fastpath call @1@ - No result was returned or wrong size while expecting an integer.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.32 70240

Fastpath call @1@ - No result was returned and we expected a long.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.33 70241

Fastpath call @1@ - No result was returned or wrong size while expecting a long.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.34 70242

@1@ parameter value must be an integer but was: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.35 70243

The sslfactoryarg property may not be empty.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.36 70244

The environment variable containing the server's SSL certificate must not be empty.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.37 70245

The system property containing the server's SSL certificate must not be empty.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.38 70246

The sslfactoryarg property must start with the prefix file:, classpath:, env:, sys:, or -----BEGIN CERTIFICATE-----.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.39 70247

An error occurred reading the certificate

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.40 70248

No X509TrustManager found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.41 70249

Could not find a java cryptographic algorithm: X.509 CertificateFactory not available.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.42 70250

Could not open SSL certificate file @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.43 70251

Loading the SSL certificate @1@ into a KeyManager failed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.44 70252

Could not read password for SSL key file, console is not available.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.45 70253

Could not read password for SSL key file by callbackhandler @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.46 70254

Could not decrypt SSL key file @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.47 70255

Could not read SSL key file @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.48 70256

Could not find a java cryptographic algorithm: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.49 70257

The password callback class provided @1@ could not be instantiated.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.50 70258

Could not open SSL root certificate file @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.51 70259

Could not read SSL root certificate file @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.52 70260

Loading the SSL root certificate @1@ into a TrustManager failed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.53 70261

Could not initialize SSL context.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.54 70262

SSL error: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.55 70263

The HostnameVerifier class provided @1@ could not be instantiated.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.56 70264

The hostname @1@ could not be verified by hostnameverifier @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.57 70266

One ore more ClientInfo failed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.58 70267

Can"t use executeWithFlags(int) on a Statement.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.59 70268

Bad value for type timestamp/date/time: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.60 70269

Unsupported binary encoding of @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.61 70270

Cannot convert the column of type @1@ to requested type @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.62 70271

No hstore extension installed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.63 70272

Unsupported properties: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.64 70293

SCRAM authentication is not supported by this driver. You need JDK >= 8 and pgjdbc >= 42.2.0 (not ".jre" versions).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.65 70294

Finalizing a Connection that was never closed:

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.106.66 70295

Validating connection.

[Description]

The application or command terminated normally, but a warning was output.

[System Processing]

Processing will continue.

[Action]

Check the message text and confirm that the issue does not affect the expected outcome.

2.106.67 70296

Invalid elements @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.68 70297

Network timeout must be a value greater than or equal to 0.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.69 70298

Unable to set network timeout.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.106.70 70299

Unable to get network timeout.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107 Message Numbers Beginning with 70300

2.107.1 70300

No SCRAM mechanism(s) advertised by the server.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.2 70301

Invalid or unsupported by client SCRAM mechanisms

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.3 70302

Invalid server-first-message: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.4 70303

Invalid server-final-message: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.5 70304

SCRAM authentication failed, server returned error: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.6 70305

Invalid server SCRAM signature.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.7 70306

Enter SSL password:

[Description]

Terminated normally.

[System Processing]

Continues processing.

[Action]

No action required.

2.107.8 70307

Detail: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.9 70308

Hint: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.10 70309

Position: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.11 70310

Where: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.12 70311

Internal Query: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.13 70312

Location: File: @1@, Routine: @2@, Line: @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.14 70313

Server SQLState: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.15 70314

---

conversion to @1@ from @2@ not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.16 70315

Requested CopyDual but got @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.17 70316

CopyIn copy direction can't receive data

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.18 70317

An error occurred while trying to get the socket timeout.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.19 70318

An error occurred while trying to reset the socket timeout.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.20 70319

Got CopyBothResponse from server during an active @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.21 70320

Unable to parse the count in command completion tag: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.22 70321

Unexpected packet type during replication: @1@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.23 70322

This replication stream has been closed.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.24 70323

Cannot cast to boolean: "@1@"

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.25 70324

Unsupported type conversion to @2@.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.26 70325

Error releasing savepoint

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.107.27 70327

Invalid Inet data.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.28 70328

Server does not support temporary replication slots

[Description]

(Nothing)

[System Processing]

(Nothing)

[Action]

(Nothing)

2.107.29 70331

Hostname @1@ is invalid

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.30 70336

Server name validation failed: hostname @1@ does not match common name @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.31 70341

Server name validation pass for @1@, subjectAltName @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.32 70342

Result set exceeded maxResultBuffer limit. Received: @1@; Current limit: @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.33 70343

COPY commands are only supported using the CopyManager API.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.34 70344

Could not instantiate xmlFactoryFactory: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.35 70345

Connection property xmlFactoryFactory must implement PGXmlFactoryFactory: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.36 70346

SCRAM session does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.37 70347

SCRAM client final processor does not exist

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.38 70348

Unable to find resource @1@ via Thread contextClassLoader @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.107.39 70349

Unable to find resource @1@ via class @2@ ClassLoader @3@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108 Message Numbers Beginning with 80000

2.108.1 80001

The connection configuration file cannot be opened. detail: '@1@'

[Description]

The process to open the connection configuration file failed.

[System Processing]

Processing is aborted.

[Action]

This messages is output in the case of HA Database Ready.

Check the state of the connection configuration file, remove the cause of the error, and restart the application.

2.108.2 80002

Invalid definition statement format in connection configuration file. line number: @1@

[Description]

The format of a parameter definition statement in the connection configuration file is invalid.

[System Processing]

Processing is aborted.

[Action]

This messages is output in the case of HA Database Ready.

Correct the connection configuration file and restart the application.

2.108.3 80003

The same server name is specified by two or more SERVER parameters in the connection configuration file.

[Description]

The same server name is specified in multiple SERVER parameters in the connection configuration file.

[System Processing]

Processing is aborted.

[Action]

This messages is output in the case of HA Database Ready.

Correct the server name specified in the SERVER parameter of the connection configuration file, and restart the application.

2.108.4 80004

I/O error occurred during the reading of connection configuration file. file name: '@1@' detail: '@2@'

[Description]

An I/O error occurred during loading of the connection configuration file.

[System Processing]

Processing is aborted.

[Action]

This messages is output in the case of HA Database Ready.

Check the state of the connection configuration file, remove the cause of the error, and restart the application.

2.108.5 80005

CommandTimeout can't be less than zero.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.6 80006

The Connection is broken.

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.108.7 80007

The Connection is not open.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.8 80008

Parameter @1@ not found in query.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.9 80009

The Connection property can't be changed with an uncommited transaction.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.10 80010

There is already an open DataReader associated with this Command which must be closed first.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.11 80011

@1@ does not exist in pg_proc

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.12 80012

Invalid parameter type: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.13 80013

Connection is not open

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.14 80014

Connection already open

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.15 80015

Invalid database name: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.16 80016

Connection string argument missing!

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.17 80017

Nested/Concurrent transactions aren't supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.18 80018

---

numeric value @1@ in ConnectionString exceeds maximum value @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.19 80019

---

numeric value @1@ in ConnectionString is below minimum value @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.20 80020

---

expecting @1@=[True/False] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.21 80021

expecting @1@=[Numeric] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.22 80022

expecting @1@=[Protocol Version] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.23 80023

key=value argument incorrect in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.24 80024

Attempt to set compatibility with version @1@ when using version @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.25 80025

There is already an open DataReader associated with this Command which must be closed first.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.26 80026

ApplicationName not supported.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.27 80027

Timeout while getting a connection from pool.

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.108.28 80028

Connection pool exceeds maximum size.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.29 80029

Not a COPY IN query: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.30 80030

Copy can only start in Ready state, not in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.31 80031

Tried to set Position of network stream @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.32 80032

Tried to read non-readable @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.33 80033

Tried to seek non-seekable @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.34 80034

Tried to set length of network stream @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.35 80035

Not a COPY OUT query, not in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.36 80036

Copy can only start in Ready state, not in @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.37 80037

Tried to set Position of network stream @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.38 80038

Tried to write non-writable @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.39 80039

Tried to flush read-only @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.40 80040

Tried to seek non-seekable @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.41 80041

Tried to set length of network stream @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.42 80042

Do not change stream of an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.43 80043

Do not change delimiter of an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.44 80044

Do not change separator of an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.45 80045

Do not change escape symbol of an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.46 80046

Do not change null symbol of an active @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.47 80047

Tried to add too many fields to a copy record with @1@ fields

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.48 80048

Invalid attempt to read when no data is present.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.49 80049

Column index out of range

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.50 80050

---

could not find a suitable target server

[Description]

Could not find a suitable target server.

[System Processing]

Processing is aborted.

[Action]

Check following settings (host, IP address, port number,or targetServer):

- Connection string
- Connection service file
- Data source of JDBC or ODBC
- Environment variables for default connection parameter values(ex. PGHOST)
- Arguments of functions of libpq
- Options of command

2.108.51 80051

---

server does not support auto connection switching

[Description]

The server does not support auto connection switching.

[System Processing]

Processing is aborted.

[Action]

Specify servers that support auto connection switching.

2.108.52 80052

Only AuthenticationClearTextPassword and AuthenticationMD5Password supported for now. Received: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.53 80053

A timeout has occured. If you were establishing a connection, increase Timeout value in ConnectionString. If you were executing a command, increase the CommandTimeout value in ConnectionString or in your NpgsqlCommand object.

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.108.54 80054

Connection establishment timeout. Increase Timeout value in ConnectionString.

[Description]

Timeout occurred during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Check the following:

- If executing SQL that outputs a large volume of search results, add a conditional expression to filter the results further.

- If numerous SQLs are being simultaneously executed, reduce the number of simultaneously executed SQLs.

- If a large volume of data is to be updated in a single transaction, modify the SQL to reduce the volume of data to be updated in a single transaction.

- If executing a complex SQL, modify it to a simple SQL.

- Check if there are any problems in the network.

- Before conducting maintenance that involves the processing of a large volume of data, use the SET statement to temporarily increase the value of maintenance_work_mem.

2.108.55 80055

Failed to establish a connection to '@1@'.

[Description]

The database server was disconnected during execution of the application.

[System Processing]

Processing will be aborted.

[Action]

Communication may have been disconnected for the following reasons:

- An error occurred in the communication line (TCP/IP etc.)

- The database server terminated abnormally.

Take the following actions:

- Eliminate the cause of the communication disconnection.

Examine the application and check whether the transaction for implementing update is a long transaction. Judge whether it is a long transaction from the following viewpoints and modify the application.

a) If the COMMIT process is not executed after update, add the COMMIT process.

b) If the total number of update records in a single transaction is high, split it into short transactions.

c) If search was conducted for a long period of time after update, execute COMMIT after update or review the search SQL statement.

- If none of the above situations applies, perform the following:

a) Confirm that the database server has not stopped.

b) If the database server is starting or stopping, re-execute the command after the database server starts.

2.108.56 80056

Ssl connection requested. No Ssl enabled connection from this host is configured.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.57 80057

Backend sent unrecognized response type: @1@

[Description]

An error occurred during communication between the application and the database server.

[System Processing]

Processing will be aborted.

[Action]

Check if there are any problems in the network, eliminate the cause of any error and re-execute the command.

2.108.58 80058

Store does not support specified edm type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.59 80059

Can't cast @1@ into any valid DbType.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.60 80060

Cannot set NpgsqlDbType to just Array, Binary-Or with the element type (e.g. Array of Box is NpgsqlDbType.Array | NpgsqlDbType.Box).

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.61 80061

Can't cast @1@ into NpgsqlParameter

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.62 80062

Invalid attempt to read from column ordinal '@1@'. With CommandBehavior.SequentialAccess, you may only read from column ordinal '@2@' or greater.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.63 80063

this[] index value

[Description]

An unexpected error occurred.

[System Processing]

Processing will be aborted.

[Action]

Contact Fujitsu technical support.

2.108.64 80064

Field not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.65 80065

No transaction in progress.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.66 80066

Savepoint is not supported by backend.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.67 80067

Savepoint name cannot have semicolon.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.68 80068

The collection is read-only

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.69 80069

NotSupported @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.70 80070

Require primitive EdmType

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.71 80071

NotSupported: @1@ @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.72 80072

The authData parameter con only be null at the first call to continue!

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.73 80073

SSPI returned invalid number of output buffers

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.74 80074

Dns hostname lookup timeout. Increase Timeout value in ConnectionString.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.75 80075

Could not load Npgsql.EntityFrameworkLegacy assembly, is it installed?

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.76 80076

Npgsql.EntityFrameworkLegacy assembly does not seem to contain the correct type!

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.77 80077

Invalid parameter name: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.78 80078

Parameter not found

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.79 80079

The parameter already belongs to a collection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.80 80080

No parameter with the specified name exists in the collection

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.81 80081

Only AuthenticationClearTextPassword and AuthenticationMD5Password supported for now. Received: @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.82 80082

---

key=value argument incorrect in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.83 80083

---

expecting @1@=[True/False] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.84 80084

---

expecting @1@=[Numeric] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.85 80085

---

numeric value @1@ in ConnectionString exceeds maximum value @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.86 80086

---

numeric value @1@ in ConnectionString is below minimum value @2@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.87 80087

---

expecting @1@=[Protocol Version] value in ConnectionString

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.88 80088

The Transaction property can't be changed with an uncommited transaction.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.89 80089

Only Text and StoredProcedure types supported!

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.90 80090

There have been errors reported by the backend.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.91 80091

There have been errors on @1@():

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.92 80092

There have been errors on @1@(@2@):

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.93 80093

The Connection is not set.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.94 80094

Multiple queries not supported for this command type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.95 80095

Cannot derive function parameter of type VARIADIC

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.96 80096

Cannot derive function parameter of type TABLE

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.97 80097

ConnectionString cannot be empty.

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.98 80098

A SocketException occured

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.108.99 80099

There have been errors on Open()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109 Message Numbers Beginning with 80100

2.109.1 80100

Error in Close()

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.2 80101

Insuffient backend data to describe dimension count in binary array header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.3 80102

Invalid array dimension count encountered in binary array header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.4 80103

Insuffient backend data to describe all expected dimensions in binary array header

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.5 80104

Out of backend data while reading binary array

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.6 80105

Expected a hex character, got

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.7 80106

Expected a hex character, got @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.8 80107

Expected an octal character, got @1@

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.9 80108

Object is immutable

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.10 80109

Unexpected integer binary field length

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.11 80110

Unexpected float binary field length

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.12 80111

Unable to cast data to NpgsqlPoint type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.13 80112

Unable to cast data to Rectangle type

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.14 80113

Type already mapped

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.15 80114

NpgsqlDbType already aliased

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.16 80115

DbType already aliased

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

2.109.17 80116

Type already aliased

[Description]

An error occurred during execution of the application or command.

[System Processing]

Processing will be aborted.

[Action]

Check the message text and confirm that the application is written correctly and the command is being used correctly.

Chapter 3 Mirroring Controller Messages

This chapter explains messages output by Mirroring Controller.

3.1 Message Numbers Beginning with MCA00000

3.1.1 MCA00001

could not read file "{0}": exception={1}: {2}

[Description]

Could not read the file.

[Parameters]

{0}: file name

{1}: exception type

{2}: exception detail

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the message, and then remove it.

3.1.2 MCA00002

{0}: wrong number of server ID in definition file "{1}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.3 MCA00003

{0}: server ID not found in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.4 MCA00004

{0}: server ID specified in definition file "{1}" too long (max {2} bytes) line {3}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: max length of server ID

{3}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.5 MCA00005

invalid host name or IP address "{1}" in definition file "{0}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: file name

{1}: host name or IP address

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.6 MCA00006

{0}: invalid port number in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.7 MCA00007

{0}: invalid format specified in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.8 MCA00008

{0}: invalid value for parameter "{2}" in definition file "{1}"

[Description]

Invalid parameter was found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.9 MCA00009

{0}: no value for parameter "{2}" specified in definition file "{1}"

[Description]

Invalid parameter was found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.10 MCA00010

{0}: unrecognized parameter "{2}" in definition file "{1}"

[Description]

Unrecognized parameter was found in definition file.

[Parameters]

{0}: file name

{1}: command name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.1.11 MCA00011

%s: no operation mode specified

[Description]

No operation mode was specified.

[Parameters]

%s: command name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying operation modes.

3.1.12 MCA00012

%s: unrecognized operation mode "%s"

[Description]

Unrecognized operation mode was specified.

[Parameters]

%s: command name

%s: operation mode

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying operation modes.

3.1.13 MCA00013

%s: option "%s" duplicated

[Description]

Certain option is duplicated.

[Parameters]

%s: command

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.14 MCA00014

%s: "%s" option conflicts with "%s" option

[Description]

Options are conflicting.

[Parameters]

%s: command

%s: option

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.15 MCA00015

%s: option requires an argument -- %s

[Description]

No argument specified for the option.

[Parameters]

%s: command

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.16 MCA00016

%s: neither "%s" option nor environment variable "%s" specified

[Description]

Both of required option and equivalent environment variable were not specified.

[Parameters]

%s: command

%s: option

%s: environment variable

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying required option or equivalent environment variable.

3.1.17 MCA00017

%s: out of memory

[Description]

Out of memory error occurred.

[Parameters]

%s: command

[System Processing]

Processing will be aborted.

[Action]

Obtain free memory space by stopping unnecessary processes or changing system settings.

3.1.18 MCA00018

out of memory

[Description]

Out of memory error occurred.

[System Processing]

Processing will be aborted.

[Action]

Obtain free memory space by stopping unnecessary processes or changing system settings.

3.1.19 MCA00019

detected an error on the monitored object "{0}({1})": {2}

[Description]

An error was detected on the monitored object.

[Parameters]

{0}: monitored object (server, database process, data storage destination directory, transaction log storage destination directory, tablespace directory)

{1}: object name (host name, database process name, directory path)

{2}: error detail ("no response:", "read/write error:" and detailed information)

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.1.20 MCA00020

unexpected error occurred in the monitoring process: {0}

[Description]

Monitoring process cannot continue because an unexpected error was occurred during its processing.

[Parameters]

{0}: error detail

[System Processing]

Continues processing.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.1.21 MCA00021

starting to {2} from {0} to {1}.

[Description]

Switching standby server to primary server.

[Parameters]

{0}: server ID of primary server

{1}: server ID of standby server

{2}: "fail over"or"switch over"

[Action]

If Mirroring Controller executed switching automatically, find the message output before this message from system log or event log to identify the cause of switching, and then work around according to the Action of the message.

3.1.22 MCA00022

{2} completed.switched from {0} to {1}

[Description]

Switching standby server to primary server was completed.

[Parameters]

{0}: server ID of primary server

{1}: server ID of standby server

{2}: "fail over"or"switch over"

3.1.23 MCA00023

failed to {2} from {0} to {1}

[Description]

Failed to switch to primary server because of unexpected failure.

[Parameters]

{0}: server ID of primary server

{1}: server ID of standby server

{2}: "fail over"or"switch over"

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.1.24 MCA00024

starting to detach standby server "{0}" {1}

[Description]

Detaching standby server because of failure detected on standby server.

[Parameters]

{0}: server ID

{1}: "automatically" or none

[Action]

If Mirroring Controller executed detaching automatically, find the message output before this message from system log or event log to identify the cause of detaching, and then work around according to the Action of the message.

3.1.25 MCA00025

detach standby server "{0}" completed {1}

[Description]

Detached standby server.

[Parameters]

{0}: server ID

{1}: "automatically" or none

3.1.26 MCA00026

failed to {2} standby server "{0}" {1}

[Description]

Failed to detach standby server.

[Parameters]

{0}: server ID

{1}: "automatically" or none

{2}: "detach"

[System Processing]

Processing of detaching will be aborted.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.1.27 MCA00027

another "{0}" command is running

[Description]

Cannot execute command with this operation mode because another command is running on the same or another server.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

There is a case executing another command. Wait for completion of another command on the same or another server, and then re-execute.

In addition, there are the following cases when using mc_ctl command.

There is a case under processing of a failover and an automatic detach by Mirroring Controller. Wait for completion of the processing under operation, and re-execute.

If any of the following cases occurs, there is a possibility that the processing of Mirroring Controller interrupts. Re-execute the mc_ctl command after restarting Mirroring Controller.

- When abnormality occurs in the network

- When another server is downed

- When Mirroring Controller is stopped forcibly

3.1.28 MCA00028

communication timeout of Mirroring Controller occurred server:"{0}"

[Description]

Either of the followings has occurred.

- communication timeout between mc_ctl command and Mirroring Controller process has occurred.

- communication timeout between Mirroring Controller processes have occurred.

- Terminating database instance was not completed in the specified time.

[Parameters]

{0}: server ("localhost"or server ID)

[System Processing]

Processing will be aborted.

[Action]

Completion synchronization for terminating database instance might have timed out, because connections remained. Disconnect all connections, and re-execute it.

Reduce CPU or network load caused by the other processes. If could not reduce it, extend remote_call_timeout in "server identifier".conf.

3.1.29 MCA00029

could not create PID file "{0}" of Mirroring Controller detail of cause:"{1}"

[Description]

Could not create PID file of Mirroring Controller.

[Parameters]

{0}: file name

{1}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the message, and then remove it.

3.1.30 MCA00030

could not remove PID file "%s" of Mirroring Controller detail of cause:"%s"

[Description]

Could not remove PID file of Mirroring Controller.

[Parameters]

%s: file name

%s: detail of cause

[Action]

Identify the cause according to the message, and then remove it.

3.1.31 MCA00031

could not read PID file "%s" of Mirroring Controller detail of cause:"%s"

[Description]

Could not read PID file of Mirroring Controller.

[Parameters]

%s: file name

%s: detail of cause

[Action]

Identify the cause according to the message, and then remove it.

3.1.32 MCA00032

invalid contents of PID file "%s" of Mirroring Controller

[Description]

The contents of PID file of Mirroring Controller is invalid.

[Parameters]

%s: file name

[System Processing]

Processing will be aborted.

[Action]

The following causes could be considered.

- The file was stored or replaced by mistake

- The file was corrupted

When starting Mirroring Controller, move or remove the file shown in the message.

When stopping Mirroring Controller, terminate forcibly mc_keeper process and terminate forcibly mc_agent process with using OS command.

3.1.33 MCA00033

Mirroring Controller is already running

[Description]

Mirroring Controller is already running.

[System Processing]

Processing will be aborted.

[Action]

If needed, stop Mirroring Controller, and re-execute.

3.1.34 MCA00034

cannot execute %s command because Mirroring Controller is not running

[Description]

Cannot execute Mirroring Controller command because Mirroring Controller process is not running.

[Parameters]

%s: command name

[System Processing]

Processing will be aborted.

[Action]

Start Mirroring Controller, and re-execute.

3.1.35 MCA00035

failed to start database instance

[Description]

Failed to start database instance.

[System Processing]

Processing will be aborted.

[Action]

Find the database message output in the log files of database output before this message, and then work around according to the Action of the message.

3.1.36 MCA00036

failed to stop database instance target server:"{0}"

[Description]

Failed to stop database instance.

[Parameters]

{0}: target server ("localhost" or server ID)

[System Processing]

Processing will be aborted.

[Action]

Find the database message output in the log files of database on the target server

output before this message, and then work around according to the Action of the message.

3.1.37 MCA00037

Mirroring Controller option is not installed

[Description]

This functionality is enabled by installing Mirroring Controller option.

[System Processing]

Processing will be aborted.

[Action]

To use this functionality, install Mirroring Controller option,and then re-execute.

3.1.38 MCA00038

starting Mirroring Controller

[Description]

Starting Mirroring Controller.

3.1.39 MCA00039

Mirroring Controller started

[Description]

Mirroring Controller started.

3.1.40 MCA00040

failed to start Mirroring Controller

[Description]

Failed to start Mirroring Controller.

[System Processing]

Processing will be aborted.

[Action]

Work around according to the Action of the message output before this message.

On Windows, if there is no message outputted before this message, please refer to the message outputted to an event log.

3.1.41 MCA00041

stopping Mirroring Controller

[Description]

Stopping Mirroring Controller.

3.1.42 MCA00042

Mirroring Controller stopped target server:"{0}"

[Description]

Mirroring Controller stopped.

[Parameters]

{0}: target server ("localhost" or server ID)

3.1.43 MCA00043

failed to stop Mirroring Controller target server:"{0}"

[Description]

Failed to stop Mirroring Controller.

[Parameters]

{0}: target server ("localhost" or server ID)

[System Processing]

Processing will be aborted.

[Action]

Identify the cause from system log or event log on the target server, and work around.

3.1.44 MCA00044

stopping Mirroring Controller forcibly

[Description]

Stopping Mirroring Controller forcibly.

3.1.45 MCA00045

stopped Mirroring Controller forcibly

[Description]

Mirroring Controller stopped forcibly.

3.1.46 MCA00046

enabled failover target server:"{0}"

[Description]

Enabled failover and automatic detach.

[Parameters]

{0}: target server ("localhost" or server ID)

3.1.47 MCA00047

failed to enable failover target server:"{0}"

[Description]

Failed to enable failover and automatic detach.

[Parameters]

{0}: target server ("localhost" or server ID)

[System Processing]

Processing will be aborted.

[Action]

Identify the cause from messages on system log or event log, and work around.

3.1.48 MCA00048

disabled failover target server:"{0}"

[Description]

Disabled failover and automatic detach.

[Parameters]

{0}: target server ("localhost" or server ID)

3.1.49 MCA00049

failed to disable failover target server:"{0}"

[Description]

Failed to disable failover and automatic detach.

[Parameters]

{0}: target server ("localhost" or server ID)

[System Processing]

Processing will be aborted.

[Action]

Identify the cause from messages on system log or event log, and work around.

3.1.50 MCA00050

{0}: server ID "{2}" specified with option "{1}" does not exist in definition file "{3}"

[Description]

server ID specified with the option does not exist in definition file.

[Parameters]

{0}: command name

{1}: option

{2}: server ID

{3}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options or definition file.

3.1.51 MCA00051

{0}: The IP address or host name of the server where the command was executed in is not found on the definition file "{1}"

[Description]

Either of the followings has occurred.

- The IP address or host name that does not exist is specified.

- The network interface is stopped.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.1.52 MCA00052

{0}: wrong server ID "{2}" in definition file "{1}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: server ID

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.1.53 MCA00053

failed to detach standby server

[Description]

Failed to detach standby server

because processing of detaching cannot be continued by something failure.

[System Processing]

Processing of detaching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.1.54 MCA00054

could not write to file "{0}": exception={1}: {2}

[Description]

Failed to detach or synchronize standby server because could not write to the file.

[Parameters]

{0}: file name

{1}: exception type

{2}: exception detail

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes, and detach or synchronize standby server according to "Actions when an Error Occurs" of "Cluster Operation Guide (Database Multiplexing)".

3.1.55 MCA00055

unexpected error occurred in the monitoring process: {0}

[Description]

Monitoring process could not continue because the unexpected error occured.

[Parameters]

{0}: detail of cause

[System Processing]

Continues monitoring.

[Action]

Check the error detail and eliminate causes.

If you cannot clear the problem, contact Fujitsu technical support.

3.1.56 MCA00056

unexpected error occurred: {0}

[Description]

An unexpected error occurred.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate cause.

If you cannot clear the problem, contact Fujitsu technical support.

3.1.57 MCA00057

failed to stop Mirroring Controller forcibly

[Description]

Failed to stop Mirroring Controller forcibly.

[System Processing]

Processing will be aborted.

[Action]

Check [Action] of the message output before this message,and re-execute.

If re-execution fails, terminate forcibly mc_keeper process and terminate forcibly mc_agent process with using OS command.

3.1.58 MCA00058

could not access path "%s" specified as a directory for Mirroring Controller detail of cause:"%s"

[Description]

could not access path specified as a directory for Mirroring Controller.

[Parameters]

%s: path name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.1.59 MCA00059

system call error occurred:"%s" detail of cause:"%s"

[Description]

System call error occurred.

[Parameters]

%s: system call name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.1.60 MCA00060

could not get installation path

[Description]

Enterprise Postgres may not be installed.

[System Processing]

Processing will be aborted.

[Action]

Re-install Enterprise Postgres.

3.1.61 MCA00061

could not access path "%1$s" for parameter "%2$s" in definition file "%3$s" detail of cause:"%4$s"

[Description]

could not access path for parameter in definition file.

[Parameters]

%3$s: file name

%2$s: parameter name

%1$s: path name

%4$s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.1.62 MCA00062

promotion processing completed

[Description]

Promotion processing completed.

3.1.63 MCA00063

promotion processing failed

[Description]

Promotion processing failed.

[System Processing]

Processing will be aborted.

[Action]

Clear the problem according to [Action] of the message which was output before this message in system log or in database server log.

3.1.64 MCA00064

stopped database instance forcibly

[Description]

Database instance stopped forcibly.

3.1.65 MCA00065

failed to stop database instance forcibly

[Description]

Failed to stop database instance forcibly.

[System Processing]

Processing will be aborted.

[Action]

Clear the problem according to [Action] of the message which was output before this message in system log or in database server log.

3.1.66 MCA00067

did not switch during a degeneration use

[Description]

Did not switch during a degeneration use.

[System Processing]

Processing will be aborted.

[Action]

If Mirroring Controller executed switching automatically, find the message output before this message from system log or event log to identify the cause of degeneration, and then eliminate causes according to [Action] of the message and try to switch with command.

3.1.67 MCA00068

{0}: users other than an instance administrator have the access privileges for definition file "{1}"

[Description]

users other than an instance administrator have the access privileges for definition file.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Revoke all the access privileges for users other than an instance administrator.

MCA00069

could not execute because Mirroring Controller of the server "{0}" is not running

[Description]

Could not execute because Mirroring Controller is not running.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Start Mirroring Controller, and try to switch with command.

3.1.68 MCA00070

Try "%s --help" for more information.\n

[Description]

--help option can show more additional information.

[Parameters]

%s: command name

[System Processing]

None.

[Action]

Check the message output before this message, and refer to descriptions shown by '--help' option.

3.1.69 MCA00071

starting to {0}

[Description]

Switching standby server to primary server.

[Parameters]

{0}: "switch over"

3.1.70 MCA00072

failed to {0}

[Description]

Failed to switch to primary server because of an unexpected failure.

[Parameters]

{0}: "switch over"

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then eliminate causes according to [Action] of the message.

3.1.71 MCA00073

error detected in handling of the database instance detail of cause:"{0}"

[Description]

Error detected in handling of the database instance for the following purposes.

- Obtain the port number of database instance

- Access to the data storage destination directory

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.1.72 MCA00074

could not read PID file "{0}" of Mirroring Controller detail of cause:"{1}"

[Description]

Could not read PID file of Mirroring Controller.

[Parameters]

{0}: file name

{1}: detail of cause

[Action]

Identify the cause according to the message, and then remove it.

3.1.73 MCA00075

invalid contents of PID file "{0}" of Mirroring Controller

[Description]

The contents of PID file of Mirroring Controller is invalid.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

The following causes could be considered.

- The file was stored or replaced by mistake

- The file was corrupted

When starting Mirroring Controller, move or remove the file shown in the message.

When stopping Mirroring Controller, terminate forcibly mc_keeper process and terminate forcibly mc_agent process with using OS command.

3.1.74 MCA00076

cannot execute "{0}" command because Mirroring Controller is not running

[Description]

Cannot execute Mirroring Controller command because Mirroring Controller process is not running.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Start Mirroring Controller, and re-execute.

3.1.75 MCA00077

%s: argument of option "%s" is too long

[Description]

Argument of option is too long.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.76 MCA00078

%s: invalid option -- %s

[Description]

Invalid option.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.77 MCA00079

%s: unnecessary operand "%s"

[Description]

Unnecessary operand.

[Parameters]

%s: command name

%s: operand

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting operand.

3.1.78 MCA00080

%s: unrecognized operation mode or no operation mode specified

[Description]

Unrecognized operation mode or no operation mode specified.

[Parameters]

%s: command name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting or specifying operation mode.

3.1.79 MCA00081

start to enable the parameter "{1}" required to build in the standby server "{0}"

[Description]

Start to enable the parameter required to build in the standby server.

[Parameters]

{0}: server ID

{1}: parameter name

3.1.80 MCA00082

enableing the parameter "{1}" required to build in the standby server "{0}" completed

[Description]

Enableing the parameter required to build in the standby server completed.

[Parameters]

{0}: server ID

{1}: parameter name

3.1.81 MCA00083

failed to enable the parameter "{1}" required to build in the standby server "{0}"

[Description]

Failed to enable the parameter required to build in the standby server.

The following causes could be considered.

- another command is running

- can not access definition file

- parameter does not exist

[Parameters]

{0}: server ID

{1}: parameter name

[System Processing]

Processing will be aborted.

[Action]

- If the parameter is not set

On the primary server, set the parameter of postgresql.conf file according to "parameter" description of "Cluster Operation Guide (Database Multiplexing)" and execute pg_ctl command with reload mode.

- Otherwise

Find the message output before this message from display, system log or event log, and then eliminate causes according to [Action] of the message. Then, on the primary server, set the parameter of postgresql.conf file according to "parameter" description of "Cluster Operation Guide (Database Multiplexing)" and execute pg_ctl command with reload mode.

3.1.82 MCA00084

primary server is already running

[Description]

Primary server is already running.

[System Processing]

Processing will be aborted.

[Action]

The standby server might be running without creating standby.signal. Create standby.signal, and re-execute.

3.1.83 MCA00085

cannot start Mirroring Controller because database instance is not running

[Description]

Cannot start Mirroring Controller because database instance is not running.

[System Processing]

Processing will be aborted.

[Action]

Start database instance, and re-execute.

3.1.84 MCA00086

could not get state of database instance detail of cause:"{0}"

[Description]

Could not get state of database instance.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.1.85 MCA00087

unusable character is included in path "%s" specified as a directory for Mirroring Controller

[Description]

Unusable character is included in path specified as a directory for Mirroring Controller.

[Parameters]

%s: path name

[System Processing]

Processing will be aborted.

[Action]

Correct the path specified as a directory for Mirroring Controller according to the message and mc_ctl command descriptions of "Reference".

3.1.86 MCA00088

%1$s: unusable character is included in server ID "%3$s" specified with option "%2$s"

[Description]

Unusable character is included in server ID specified with option.

[Parameters]

%1$s: command name

%2$s: option

%3$s: server ID

[System Processing]

Processing will be aborted.

[Action]

Correct the server ID specified with option according to the message and mc_ctl command descriptions of "Reference".

3.1.87 MCA00089

only instance administrator can execute this command

[Description]

Only instance administrator who created the directory for Mirroring Controller can execute this command.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command by the instance administrator who created the directory for Mirroring Controller.

3.1.88 MCA00090

could not read file "{0}": Permission denied

[Description]

No read permissions for the file.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command, after granting the read permissions to the file.

3.1.89 MCA00091

host name or IP address "{1}" of the primary server and the standby server in definition file "{0}" are same, but the --local-server option was not specified

[Description]

Host name or IP address of the primary server and the standby server in definition file are same, but the --local-server option was not specified.

[Parameters]

{0}: file name

{1}: host name or IP address

[System Processing]

Processing will be aborted.

[Action]

If the primary server and the standby server are built in the same server, execute the mc_ctl command with the --local-server option.

If the primary server and the standby server are built in the different server, correct host name or IP address in the definition file.

3.1.90 MCA00092

this feature is not available in this edition

[Description]

This feature is not available in this edition.

[System Processing]

Processing will be aborted

[Action]

Please install the right edition for this feature.

3.1.91 MCA00093

installation environment is destroyed

[Description]

Enterprise Postgres may not be installed correctly or may be destroyed.

[System Processing]

Processing will be aborted.

[Action]

Re-install Enterprise Postgres.

3.1.92 MCA00094

%s: invalid argument for option %s

[Description]

Invalid argument for option.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.1.93 MCA00095

could not remove file or directory "{0}"

[Description]

Could not remove the file or the directory.

[Parameters]

{0}: file name or directory name

[System Processing]

Processing will be aborted.

[Action]

Check the status of the file or the directory and eliminate causes, and then remove it.

3.1.94 MCA00096

could not write file "{0}": exception={1}: {2}

[Description]

Could not write the file.

[Parameters]

{0}: file name

{1}: exception type

{2}: exception detail

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the message, and then remove it.

3.1.95 MCA00097

setup of standby server completed

[Description]

Setup of standby server completed.

3.1.96 MCA00098

setup of standby server failed

[Description]

Setup of standby server failed.

[System Processing]

Processing will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then eliminate causes according to [Action] of the message.

3.1.97 MCA00099

{0}: server""{1}"" is running as a standby server

[Description]

Could not continue processing because database instance to be duplicated is not running as a primary server.

[Parameters]

{0}: command name

{1}: server ID

[System Processing]

Processing will be aborted.

[Action]

Re-execute this command on the standby server to be set up.

3.2 Message Numbers Beginning with MCA00100

3.2.1 MCA00100

cannot execute {0} command because Mirroring Controller is running

[Description]

Cannot execute this command because Mirroring Controller is running on the server to be set up.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Execute this command on server where primary server is not running. If execute it on the right server, stop Mirroring Controller and then re-execute it.

3.2.2 MCA00101

cannot execute {0} command because database instance is running

[Description]

Cannot execute this command because database instance is running on the server to be set up.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Execute this command on server where primary server is not running. If execute it on the right server, stop database instance and then re-execute it.

3.2.3 MCA00102

{0}: invalid argument value {2} for option {1}

[Description]

Invalid argument for option.

[Parameters]

{0}: command name

{1}: option

{2}: argument value

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting argument value for the option.

3.2.4 MCA00103

could not move file or directory from {0} to {1}

[Description]

Could not move the file or the directory.

[Parameters]

{0}: source file or directory

{1}: target file or directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the file or the directory and eliminate causes, and then remove it.

3.2.5 MCA00104

could not create directory {0}

[Description]

Could not create the directory.

[Parameters]

{0}: target directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the directory and eliminate causes, and then remove it.

3.2.6 MCA00105

could not read the access privileges of {0}

[Description]

Could not read the access privileges.

[Parameters]

{0}: target directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the directory and eliminate causes, and then remove it.

3.2.7 MCA00106

failed to set the access privileges of {0}

[Description]

Failed to set the access privileges.

[Parameters]

{0}: target directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the directory and eliminate causes, and then remove it.

3.2.8 MCA00107

service "{0}" is not registered

[Description]

Service is not registered.

[Parameters]

{0}: Service name

[System Processing]

Processing will be aborted.

[Action]

Register service, and re-execute.

3.2.9 MCA00108

could not start service "{0}" detail of cause:"{1}"

[Description]

Could not start service.

[Parameters]

{0}: Service name

{1}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.2.10 MCA00109

could not start service "%s" detail of cause:"%s"

[Description]

Could not start service.

[Parameters]

%s: Service name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.2.11 MCA00110

service "%s" is not registered

[Description]

Service is not registered.

[Parameters]

%s: Service name

[System Processing]

Processing will be aborted.

[Action]

Register service, and re-execute.

3.2.12 MCA00111

Mirroring Controller service "%s" has been registered

[Description]

Mirroring Controller service has been registered with Windows Service.

[Parameters]

%s: Service name

3.2.13 MCA00112

Mirroring Controller service "%s" has been unregistered

[Description]

Mirroring Controller service has been unregistered from Windows Service.

[Parameters]

%s: Service name

3.2.14 MCA00113

service name "%s" is already in use

[Description]

Service name is already in use.

[Parameters]

%s: Service name

[System Processing]

Processing will be aborted.

[Action]

Check the service name, and re-execute.

3.2.15 MCA00114

could not register service "%s" detail of cause: "%s"

[Description]

An error occurred during registration of service.

[Parameters]

%s: Service name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.2.16 MCA00115

could not unregister service "%s" detail of cause: "%s"

[Description]

An error occurred during deregistration of service.

[Parameters]

%s: Service name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.2.17 MCA00116

%s: option "%s" is required

[Description]

A required option is not specified.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Specify the required option, and re-execute.

3.2.18 MCA00117

no authority to execute this command

[Description]

Only the administrative user can run this command.

[System Processing]

Processing will be aborted.

[Action]

Invoke the administrator's prompt, and re-execute this command.

3.2.19 MCA00119

could not receive respons from {0} server({1})

[Description]

An error was detected on the server.

[Parameters]

{0}: monitored object (server)

{1}: server type (primary, candidate primary, standby)

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.2.20 MCA00120

detected streaming replication error in {0} server({1})

[Description]

A streaming replication error was detected.

[Parameters]

{0}: monitored object (database process)

{1}: server type (primary, candidate primary, standby)

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.2.21 MCA00121

disk drives are available

[Description]

Database where data storage, transaction log storage and tablespaces are saved is working correctly.

3.2.22 MCA00122

a {0} server({1}) is running normally

[Description]

A server is running normally.

[Parameters]

{0}: server type (primary, candidate primary, standby)

{1}: monitored object (server)

3.2.23 MCA00123

Streaming Replication has started

[Description]

Streaming Replication has started

3.2.24 MCA00124

postmaster is running in {0} server({1})

[Description]

postmaster is running

[Parameters]

{0}: server type (primary, candidate primary, standby)

{1}: monitored object (server)

3.2.25 MCA00125

failed to get the standby server information

[Description]

Failed to get the standby server information

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.2.26 MCA00126

{0} server({1}) was downed

[Description]

database server was downed

[Parameters]

{0}: server type (primary, candidate primary, standby)

{1}: monitored object (server)

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.2.27 MCA00127

You can promote the standby server

[Description]

You can promote the standby server

3.2.28 MCA00128

You cannot promote the standby server

[Description]

You cannot promote the standby server

3.2.29 MCA00129

detected a disk I/O error in {0} server({1})

[Description]

A disk I/O error was detected.

[Parameters]

{0}: server type (primary, candidate primary, standby)

{1}: monitored object (server)

[System Processing]

Perform failover or detaching.

If failover or detaching is already performed, these functions would be disabled.

[Action]

Refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.2.30 MCA00130

starting to switch over forcibly

[Description]

Starting to switch over forcibly.

3.2.31 MCA00131

succeeded in switching over to {0} forcibly

[Description]

Switching standby server to primary server succeeded.

[Parameters]

{0}: server ID of standby server

3.2.32 MCA00132

failed to switch over to {0} forcibly

[Description]

Failed in processing of switching because of unexpected failure.

[Parameters]

{0}: server ID of standby server

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.2.33 MCA00133

starting to detach standby server forcibly

[Description]

Starting to detach standby server forcibly.

3.2.34 MCA00134

succeeded in detaching standby server "{0}" completed forcibly

[Description]

Detached standby server succeeded.

[Parameters]

{0}: server ID

3.2.35 MCA00135

failed to detach standby server "{0}" forcibly

[Description]

Failed to detach standby server.

[Parameters]

{0}: server ID

[System Processing]

Processing of detaching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.2.36 MCA00136

{0}: the specified option is invalid: "{1}"

[Description]

the specified option is invalid.

[Parameters]

{0}: command name

{1}: option name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.2.37 MCA00137

disabled standby server "{0}" to automatically switch because of canceling the synchronous replication for standby server

[Description]

Disabled the standby server to automatically switch because of canceling the synchronous replication for standby server.

[Parameters]

{0}: server ID

3.2.38 MCA00138

disabled standby server "{0}" to automatically switch

[Description]

Disabled the standby server to automatically switch.

[Parameters]

{0}: server ID

3.2.39 MCA00139

failed to disable standby server "{0}" to automatically switch

[Description]

Failed to disable the standby server to automatically switch.

[Parameters]

{0}: server ID

[System processing]

Processing will be aborted.

[Action]

The following causes could be considered.

- An error was detected in database server

- Timeout waiting for between Mirroring Controller processes of database server

Identify the cause from messages on system log or event log, and work around.

3.2.40 MCA00140

{0}: invalid server kind specified in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.41 MCA00141

{0}: server kind 'arbiter' do not specified in definition file "{2}" despite value 'arbitration' is specified parameter heartbeat_error_action in definition file "{1}"

[Description]

Server kind 'arbiter' do not been specified in network.conf despite value 'arbitration' is specified parameter heartbeat_error_action in "server identifer".conf

[Parameters]

{0}: command name

{1}: file name

{2}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.42 MCA00142

{0}: could not specify server kind 'arbiter' in definition file "{3}" because value '{2}' is specified parameter heartbeat_error_action in definition file "{1}"

[Description]

Could not specify server kind 'arbiter' in network.conf because value 'arbitration' is not specified parameter heartbeat_error_action in "server identifer".conf.

[Parameters]

{0}: command name

{1}: file name

{2}: message, arbitration, command, fallback

{3}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.43 MCA00143

{0}: second port number to use for the arbitration network is not specified in definition file "{1}"

[Description]

Second port number to use for the arbitration network is not specified in network.conf.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.44 MCA00144

{0}: could not specify second port number to use for the arbitration network in definition file "{3}" because value '{2}' is specified parameter heartbeat_error_action in definition file "{1}"

[Description]

Could not specify second port number to use for the arbitration network in network.conf.

[Parameters]

{0}: command name

{1}: file name

{2}: message, command, fallback

{3}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.45 MCA00145

{0}: second IP address to use for the arbitration network is not specified in definition file "{1}"

[Description]

Second IP address to use for the arbitration network is not specified in network.conf.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.46 MCA00146

{0}: cannot specify second IP Address on server kind 'arbiter' in definition file "{1}"

[Description]

Cannot specify second IP Address on server kind 'arbiter' in network.conf.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.47 MCA00147

{0}: could not use parameter '{3}' because value '{2}' is specified parameter heartbeat_error_action in definition file "{1}"
[Discription]
Could not use parameter in "server identifier".conf.

[Parameters]

{0}: command name

{1}: file name

{2}: message, arbitration, command, fallback

{3}: parameter

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.48 MCA00148

{0}: could not use option "{3}" because value '{2}' is specified parameter heartbeat_error_action in definition file "{1}"

[Description]

Could not use this option.

[Parameters]

{0}: command

{1}: file name

{2}: message, arbitration, command, fallback

{3}: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options according to the message and mc_ctl command descriptions of "Reference".

3.2.49 MCA00149

requesting arbitration server "{0}" to connect

[Description]

Requesting arbitration server to connect.

[Parameters]

{0}: server ID

[System processing]

Requesting arbitration server to connect.

3.2.50 MCA00150

trying to connect to arbitration server "{0}"

[Description]

Trying to connect to arbitration server.

[Parameters]

{0}: server ID

[System processing]

Trying to connect to arbitration server until success.

3.2.51 MCA00151

succeeded in connection with arbitration server "{0}"

[Description]

Succeeded in connection with arbitration server.

[Parameters]

{0}: server ID

3.2.52 MCA00152

failed to connect to arbitration server "{0}" event:"{1}"

[Description]

Either of the followings has occurred.

- incorrect specification in network.conf

- error occurs in the network between database server and arbitration server

- Mirroring Controller Arbitration process is not running or in the stop processing

- Mirroring Controller Arbitration process or arbitration server detects an error

[Parameters]

{0}: server ID

{1}: "timeout" or "communication error"

[System Processing]

Processing will be aborted.

[Action]

Check the following and identify the cause, and eliminate cause.

- specification about server kind 'arbiter' in network.conf

- the value of arbiter_connect_timeout parameter in "server identifier".conf

- communication status between database server and arbitration server

- Mirroring Controller Arbitration process staring status

- the message in arbitration server

3.2.53 MCA00153

disconnected from arbitration server "{0}"

[Description]

Disconnected from arbitration server.

[Parameters]

{0}: sever ID

3.2.54 MCA00154

timeout waiting for communication with Mirroring Controller Arbitration process server:"{0}"

[Description]

Timeout waiting for communication between Mirroring Controller process and Mirroring Controller Arbitration process.

[Parameters]

{0}: server ID

[System Processing]

Try to connect to arbitration server.

[Action]

Check whether a network error between arbitration server and database server or an error of arbtration server was detected.

If an error was not detected, the value of arbiter_alive_timeout parameter in "server identifier".conf is too short.

Review and extend the value of arbiter_alive_timeout in "server identifier".conf.

3.2.55 MCA00155

failed to open communication environment detail of cause:"{0}"

[Description]

Failed to open communication environment.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

3.2.56 MCA00156

invalid port number for server "{0}" in definition file "{1}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: server ID

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.2.57 MCA00157

communication error with the arbitration server "{0}" occurred

[Description]

Communication error with the arbitration server occurred.

[Parameters]

{0}: server ID

[System Processing]

Trying to connect.

[Action]

Either of the followings has occurred.

- When Mirroring Controller Arbitration process of a arbitration server is not running

- When abnormality occurs in the network between a database server and arbitration server

Identify the cause from messages on system log or event log in arbitration server or database server, and work around.

3.2.58 MCA00158

failed to start Mirroring Controller because of could not connect to arbitration server "{0}"

[Description]

Failed to start Mirroring Controller because of could not connect to arbitration server.

[Parameters]

{0}: server ID

[System processing]

Processing will be aborted.

[Action]

Work around according to the Action of the message output before this message.

On Windows, if there is no message outputted before this message, please refer to the message outputted to an event log.

MCA00159

requesting arbitration server "{1}" to arbitrate for database server "{0}"

[Description]

Requesting arbitration server to arbitrate for the target server.

[Parameters]

{0}: server ID

{1}: server ID

[System processing]

Requesting arbitration server to arbitrate for the target server.

3.2.59 MCA00160

the arbitration server "{0}" arbitrated status of database server "{1}" as sanity

[Description]

The arbitration server arbitrated status of database server as sanity.

[Parameters]

{0}: server ID

{1}: server ID

3.2.60 MCA00161

the request for arbitration was omitted because fencing command for a database server "{0}" was finished already

[Description]

The request for arbitration was omitted because fencing command for a database server was finished already.

[Parameters]

{0}: server ID

3.2.61 MCA00162

arbitration processing cannot request because the "{0}" command is carrying out

[Description]

Cannot request arbitration processing because command is running on the same or another server.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

3.2.62 MCA00163

timeout waiting for requesting arbitration server "{0}" to arbitrate

[Description]

Timeout waiting for requesting arbitration server to arbitrate.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Switch or detach server in yourself according to descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.2.63 MCA00164

requesting arbitration server "{0}" to fence database server "{1}"

[Description]

Requesting arbitration server to fence database server.

[Parameters]

{0}: server ID

{1}: server ID

[System Processing]

Requesting arbitration server to fence.

3.2.64 MCA00165

arbitration server "{0}" succeeded in fencing for database server "{1}"

[Description]

Arbtration server succeeded in executing fencing command for the target server.

[Parameters]

{0}: server ID

{1}: server ID

3.2.65 MCA00166

arbitration server "{0}" failed to fence for database server "{1}". detail of cause: check log file in arbitration server

[Description]

Arbitration process failed to execute fencing command for the target server.

[Parameters]

{0}: server ID

{1}: server ID

[System Processing]

Processing will be aborted.

[Action]

Check error message in arbitration server.

If needed, perform switch or detach the database server with manually operation according to descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.2.66 MCA00167

timeout waiting for a request to fence to arbitration server "{0}"

[Description]

Timeout waiting for a request to fence to arbitration server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Switch or detach server in yourself according to descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.2.67 MCA00168

arbitration server "{0}" rejected the request to fence database server "{1}"

[Description]

Either of the followings is esteemed.

- The arbtration server is executing arbitration process

- Fencing command was executed just before

[Parameters]

{0}: server ID

{1}: server ID

3.2.68 MCA00169

could not request "{1}" because of disconnecting from arbitration server "{0}"

[Description]

Could not request arbitration server to arbitrate, fence or disable automatically switch because of disconnecting.

[Parameters]

{0}: server ID

{1}: "arbitration" or "fencing" or "disable automatically switch"

[System Processing]

Processing will be aborted.

[Action]

Either of the followings has occurred.

- Mirroring Controller Arbitration process is not running in arbitration server

- Abnormality occurs in the network between database server and arbitration server

Identify the cause from messages on system log or event log in arbitration server or database server, and work around.

3.2.69 MCA00170

rejeceted a request arbitration server "{1}" because database server "{0}" was beening fencing

[Description]

The following requirements shouldn't be executed if it is requested from the database server which is a fencing target.

- request to arbitrate

- request to fence

[Parameters]

{0}: server ID

{1}: server ID

[Action]

Processing will be aborted.

3.2.70 MCA00171

requested arbitration server "{0}" to disable standby server "{1}" to automatically switch

[Description]

Requested arbitraion server to disable the standby server to automatically switch.

[Parameters]

{0}: server ID

{1}: server ID

3.2.71 MCA00172

arbitration server "{0}" fenced standby server "{1}" because of failed to disable the standby server to automatically switch

[Description]

Arbitration server fenced the standby server because of failed to disable the standby server to automatically switch.

[Parameters]

{0}: server ID

{1}: server ID

3.2.72 MCA00173

arbitration server "{0}" tried to fence standby server "{1}" because of failed to disable the standby server to automatically switch, however fencing was failed

[Description]

Arbitration server tried to fence the standby server because of failed to disable the standby server to automatically switch, however fencing was failed.

[Parameters]

{0}: server ID

{1}: server ID

[System Processing]

Processing will be aborted.

[Action]

Switch or detach database server which error has been detected in yourself.

After, identify the cause from messages on system log or event log in arbitration server and work around.

3.2.73 MCA00174

requested standby server "{0}" to disable automatically switching

[Description]

Requested the standby server to disable automatically switching.

[Parameters]

{0}: server ID

3.2.74 MCA00175

{0}: cannot execute switching over forcibly other than on standby server

[Description]

Switching over forcibly needs to be executed only on standby server.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Check whether the server where the command was executed is correct.

Either, check that Mirroring Controller has been degenerate state yet.

3.2.75 MCA00176

{0}: cannot execute detaching forcibly other than on primary server

[Description]

Detaching forcibly needs to be executed only on pimary server.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Check whether the server where the command was executed is correct.

Either, check that Mirroring Controller has been degenerate state yet.

3.2.76 MCA00177

forcible switch over to standby server "{0}" was requested although the data may be not synchronous with primary server

[Description]

Forcible switch over to standby server was requested although the data may be not synchronous with primary server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be continued.

[Action]

Check the data of database server and recovery as necessary, after forcible switch over will be completed.

3.2.77 MCA00178

database server which is able to be switched over is not found

[Description]

Database server which is able to be switched over is not found.

[System Processing]

Processing will be aborted.

3.2.78 MCA00179

starting to detach standby server

[Description]

Starting to detach standby server.

3.2.79 MCA00180

database server which needs to be detached is not found

[Description]

Database server which needs to be detached is not found.

[System Processing]

Processing will be aborted.

3.2.80 MCA00181

database server already has been detached

[Description]

Database server already has been detached.

[System Processing]

Processing will be aborted.

3.2.81 MCA00182

failed to switch over forcibly

[Description]

Failed in processing of switching because of unexpected failure.

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.2.82 MCA00183

failed to detach standby server forcibly

[Description]

Failed to detach standby server.

[System Processing]

Processing of detaching will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.2.83 MCA00184

could not {1} because {0} server is abnormal

[Description]

Could not switch over or detach because server is abnormal

[Parameters]

{0}: "primary" or "candidate primary" or "standby"

{1}: "switch over" or "detach"

[System Processing]

Processing will be aborted.

[Action]

Find the message output before this message in the log files on the target server, and work around according to the Action of the message.

3.2.84 MCA00185

value of heartbeat_error_action is different from the value of other server "{0}"

[Description]

Value of heartbeat_error_action is different from the value of other server "{0}".

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting value of heartbeat_error_action to the same value as another server.

3.2.85 MCA00186

restarting Mirroring Controller process because an its error was detected: %s

[Description]

Restarting Mirroring Controller process because an its error was detected.

[Parameters]

%s: error detail ("no response", "down")

[System Processing]

Restarting Mirroring Controller process.

3.2.86 MCA00187

Mirroring Controller process was restarted

[Description]

Mirroring Controller process was restarted.

3.2.87 MCA00188

failed to restart Mirroring Controller

[Description]

Failed to restart Mirooring Controller.

[System Processing]

Processing will be aborted.

[Action]

Work around according to the Action of the message output before this message.

On Windows, if there is no message outputted before this message, please refer to the message outputted to an event log.

After, execute the mc_ctl command to restart Mirroring Controller.

3.2.88 MCA00189

could not access "{0}" file detail of cause:"{1}"

[Description]

Could not access the process information file of OS.

[Parameters]

{0}: file name

{1}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.2.89 MCA00190

invalid contents of "{0}" file

[Description]

Invalid contents of /proc/[pid]/status file.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Check whether mc_keeper process or mc_agent process exists with using OS command.

3.2.90 MCA00191

executing arbitration command and inquiring the result of arbitration

[Description]

Executing arbitration command that execute arbitration.

[System processing]

Degenerate depending on result of arbitration command.

3.2.91 MCA00192

executing fencing command

[Description]

Executing fencing command.

[System processing]

Processing will be continued depending on result of fencing command.

3.2.92 MCA00193

starting degenerate because of result of arbitration command for database server "{0}" result:"{1}"

[Description]

Starting degenerate because of result of arbitration command for target server.

[parameters]

{0}: server ID

{1}: return code of command

3.2.93 MCA00194

degeneracy is not executed because of result of arbitration command to database server "{0}" result:"{1}"

[Description]

Degeneracy is not executed because of result of arbitration command to target server.

[parameters]

{0}: server ID

{1}: return code of command

3.2.94 MCA00195

timeout has occurred during arbitration command has been executing to database server "{0}"

[Description]

Timeout has occurred during arbitration command has been executing to target server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Check the state of database server and switch or detach the server with manually operation according to descriptions of "Cluster Operation Guide (Database Multiplexing)" as necessary.

When find process ID of arbitration command, terminate forcibly by using OS command.

3.2.95 MCA00196

{0}: two or more standby server names are specified in the parameter "synchronous_standby_names" in PostgreSQL

[Description]

multiple synchronous standby servers can not be monitored by Mirroring Controller.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying single standby server to synchronous_standby_names.

3.2.96 MCA00197

the arbitration server "{0}" didn't arbitrate status of database server "{1}" as sanity

[Description]

Status of the target server was not arbitrated as sanity by arbitration server.

[Parameters]

{0}: server ID

{1}: server ID

[System processing]

Start degenerate processing.

3.2.97 MCA00198

fencing command for database server "{0}" succeeded: result:"{1}"

[Description]

Fencing command for database server succeeded.

[parameters]

{0}: server ID

{1}: return code of command

[System processing]

Processing will be continued.

3.2.98 MCA00199

fencing command for database server "{0}" failed: result:"{1}"

[Description]

Fencing command for database server failed.

[parameters]

{0}: server ID

{1}: return code of command

[System processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

Switch or detach the server with manually operation according to descriptions of "Cluster Operation Guide (Database Multiplexing)" as necessary.

MCA00200

timeout waiting for the fencing command

[Description]

Timeout waiting for the fencing command.

[System processing]

Processing will be aborted.

[Action]

The value of fencing_command_timeout parameter in server identifer.conf is too short.

Review and extend the value of fencing_command_timeout parameter in arbitration.conf.

When find process ID of fencing command, terminate forcibly by using OS command.

3.3 Message Numbers Beginning with MCA00200

3.3.1 MCA00201

executing state-transition-command kind of command:{0}

[Description]

Executing state-transition-command.

[parameters]

{0}: kind of state-transition-command(post-switch, pre-detach, post-attach)

3.3.2 MCA00202

state-transition-command has done kind of command:{0}

[Description]

State-transition-command has done.

[parameters]

{0}: kind of state-transition-command(post-promote, pre-detach, post-attach)

[System processing]

Processing will be continued.

3.3.3 MCA00203

timeout has occurred to state-transition-command kind of command:{0}

[Description]

Timeout has occurred to state-transition-command.

[parameters]

{0}: kind of state-transition-command(post-promote, pre-detach, post-attach)

[System Processing]

Processing of state-transition-command will be aborted.

[Action]

If the process of state-transition-command remained, terminate the process forcibly by using OS command. After checking processing status of state-transition-command, exec the processing of the command manually.

3.3.4 MCA00204

detected recovery from an error on monitoring of table space({0})

[Description]

detected recovery from an error on monitoring of table space

[Parameters]

{0}: directory path of table space

3.3.5 MCA00205

detected no responce on monitoring of database process

[Description]

Detected no responce on monitoring of database process.

[System Processing]

Continues processing.

[Action]

Check the error detail and eliminate causes.

3.3.6 MCA00206

detected recovery from no responce on monitoring of database process

[Description]

Detected recovery from no responce on monitoring of database process.

3.3.7 MCA00207

{0}: the user name specified in parameter db_instance_username of definition file "{1}" is not database superuser

[Description]

The user name specified in parameter db_instance_username is not database superuser.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying a database superuser.

3.3.8 MCA00208

{0}: the user name specified in parameter db_instance_username of definition file "{1}" does not exist

[Description]

The user name specified in parameter db_instance_username does not exist.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying a database superuser.

3.3.9 MCA00209

{0}: could not specify second IP address to use for the arbitration network in definition file "{3}" because value '{2}' is specified parameter heartbeat_error_action in definition file "{1}"

[Description]

Could not specify second IP address to use for the arbitration network in network.conf.

[Parameters]

{0}: command name

{1}: file name

{2}: message, command, fallback

{3}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.10 MCA00210

{0}: cannot specify second port number on server kind 'arbiter' in definition file "{1}"

[Description]

Cannot specify second port number on server kind 'arbiter' in network.conf.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.11 MCA00211

{0}: could not use parameter "{2}" because parameter "{3}" is not specified in definition file "{1}"

[Description]

This parameter cannot be specified because the parameter with dependency is not specified in the definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

{3}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.12 MCA00212

{0}: primary_conninfo parameter is not specified in postgresql.auto.conf

[Description]

Primary_conninfo parameter is not specified in postgresql.auto.conf file.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Specify primary_conninfo parameter in postgresql.auto.conf file according to the description of "Setting Up the Standby Center" for disaster recovery of "Cluster Operation Guide (Database Multiplexing)".

3.3.13 MCA00213

values of parameters for abnormality monitoring of operating system or server in server definition file "{1}" are too small for value of heartbeat_interval in arbitration definition file of arbitration server "{0}"

[Description]

Because the values of parameters for abnormality monitoring of the operating system or server in the server definition file are too small compared with the value of heartbeat_interval in the arbitration definition file of the arbitration server, the arbtration for the target database server might be delayed.

[Parameters]

{0}: server ID

{1}: file name

[System Processing]

Depending on the start mode of the mc_ctl command, either of the following processes will be performed.

- When --async-connect-arbiter option is not specified

Processing will be aborted.

- When --async-connect-arbiter option is specified

Continues processing.

[Action]

Take either of the following actions.

- When --async-connect-arbiter option is not specified

Correct the value of parameters for abnormality monitoring of the operating system or server according to the message and "Tuning for Optimization of Degradation Using Abnormality Monitoring With the Arbitration Server" of "Cluster Operation Guide (Database Multiplexing)".

After that, re-execute the mc_ctl command.

- When --async-connect-arbiter option is specified

Correct the parameters for abnormality monitoring of the operating system or server according to the message and "Tuning for Optimization of Degradation Using Abnormality Monitoring With the Arbitration Server" of "Cluster Operation Guide (Database Multiplexing)".

After that, execute the mc_ctl command to restart Mirroring Controller.

3.3.14 MCA00214

{0}: keyword "{1}" is not specified for primary_conninfo parameter in postgresql.auto.conf

[Description]

The required keyword is not specified for primary_conninfo parameter in postgresql.auto.conf file.

[Parameters]

{0}: command name

{1}: keyword name

[System Processing]

Processing will be aborted.

[Action]

Specify the required keyword for primary_conninfo parameter in postgresql.auto.conf file according to the description of "Setting Up the Standby Center" for disaster recovery of "Cluster Operation Guide (Database Multiplexing)".

3.3.15 MCA00215

{0}: keyword "{3}" is not specified for parameter "{2}" in definition file "{1}"

[Description]

The keyword is not specified for the parameter in the definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

{3}: keyword name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.16 MCA00216

{0}: value that cannot be specified for keyword "{3}" of parameter "{2}" in definition file "{1}" is set

[Description]

The value that cannot be specified for keyword of the parameter in the definition file is set.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

{3}: keyword name

[System Processing]

Processing will be aborted.

[Action]

Take either of the following actions.

- When the keyword is application_name

Correct the definition file or postgresql.auto.conf file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

- Otherwise

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.17 MCA00217

{0}: could not use parameter "{3}" because parameter "{2}" is specified in definition file "{1}"

[Description]

This parameter cannot be specified because the parameter with exclusive relationship is specified in the definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

{3}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.18 MCA00218

{0}: value 'fallback' could not be specified for parameter heartbeat_error_action because parameter "{2}" is specified in definition file "{1}"

[Description]

The parameter with exclusive relationship is specified although 'fallback' is specified for heartbeat_error_action.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.19 MCA00219

you can switch the connection destination of streaming replication of server "{0}"

[Description]

You can switch the connection destination of streaming replication.

[Parameters]

{0}: server ID

3.3.20 MCA00220

you cannot switch the connection destination of streaming replication of server "{0}"

[Description]

You cannot switch the connection destination of streaming replication.

[Parameters]

{0}: server ID

3.3.21 MCA00221

start to build in standby server "{0}"

[Description]

Start to build in standby server.

[Parameters]

{0}: server ID

3.3.22 MCA00222

failed to build in standby server "{0}"

[Description]

Failed to build in standby server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Find the message output before this message from display of own and other server, system log or event log, and then work around according to the Action of the message.

3.3.23 MCA00223

build in standby server "{0}" completed

[Description]

Build in standby server "{0}" completed.

[Parameters]

{0}: server ID

3.3.24 MCA00224

start to switch the connection destination of streaming replication

[Description]

Start to switch the connection destination of streaming replication.

3.3.25 MCA00225

failed to switch the connection destination of streaming replication

[Description]

Failed to switch the connection destination of streaming replication.

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display of own and other server, system log or event log, and then work around according to the Action of the message.

3.3.26 MCA00226

start to switch the connection destination of streaming replication of server "{0}"

[Description]

Start to switch the connection destination of streaming replication.

[Parameters]

{0}: server ID

[Action]

If Mirroring Controller executed switching automatically, find the message output before this message from system log or event log to identify the cause of switching, and then work around according to the Action of the message.

3.3.27 MCA00227

failed to switch the connection destination of streaming replication of server "{0}"

[Description]

Failed to switch the connection destination of streaming replication.

[Parameters]

{0}: server ID

[System Processing]

Processing of switching will be aborted.

[Action]

Find the message output before this message from display own and other server, system log or event log, and then work around according to the Action of the message.

3.3.28 MCA00228

switch the connection destination of streaming replication of server "{0}" completed

[Description]

Switch the connection destination of streaming replication completed.

[Parameters]

{0}: server ID

3.3.29 MCA00229

switch forcibly the connection destination of streaming replication of server "{0}" completed

[Description]

Switch forcibly the connection destination of streaming replication completed.

[Parameters]

{0}: server ID

3.3.30 MCA00230

value of primary_conninfo parameter which is specified in postgresql.auto.conf file of server "{0}" has been updated to the value of parameter "{2}" which is specified in definition file "{1}"

[Description]

Value of primary_conninfo parameter which is specified in postgresql.auto.conf file has been updated.

[Parameters]

{0}: server ID

{1}: file name

{2}: parameter name

3.3.31 MCA00231

failed to update value of primary_conninfo parameter which is specified in postgresql.auto.conf file of server "{0}" detail of cause:"{1}"

[Description]

Failed to update value of primary_conninfo parameter which is specified in postgresql.auto.conf file.

[Parameters]

{0}: server ID

{1}: detail of cause

[Action]

Check the error detail and eliminate causes.

3.3.32 MCA00232

update value of parameter "{2}" to "{3}" which is specified in definition file "{1}" of server "{0}" has completed

[Description]

Update value of parameter which is specified in definition file has completed.

[Parameters]

{0}: server ID

{1}: file name

{2}: parameter name

{3}: primary, standby

3.3.33 MCA00233

failed to update value of parameter "{2}" which is specified in definition file "{1}" of server "{0}"

[Description]

Failed to update value of parameter which is specified in definition file.

[Parameters]

{0}: server ID

{1}: file name

[Action]

Find the message output before this message from display of own and other server, system log or event log, and then work around according to the Action of the message.

3.3.34 MCA00234

failed to check the consistency of LSN between server "{0}" and server "{1}"

[Description]

Failed to check the consistency of LSN between the server.

[Parameters]

{0}: server ID

{1}: server ID

[Action]

Find the message output before this message from display of own and other server, system log or event log, and then work around according to the Action of the message.

3.3.35 MCA00235

failed to update value of parameter "{2}" which is specified in file "{1}" of old candidate primary server "{0}"

[Description]

Failed to update value of parameter which is specified on old candidate primary server.

[Parameters]

{0}: server ID

{1}: file name

{2}: parameter name

[Action]

Either of the following processes will be performed befor restarting OS if automatic start and stop of Mirroring Contoroller has been setting, otherwise building in old candidate primary server to new candidate primary server.

- When update postgresql.auto.conf file has failed

Update connection setting of primary_conninfo parameter which is specified in postgresql.auto.conf file to new candidate primary server by executing ALTER SYSTEM SET statement

- When update "server identifier".conf file has failed

Edit setting of standbycenter_mode parameter in 'standby' which is specified in "server identifier".conf file.

3.3.36 MCA00236

Mirroring Controller of the server "{0}" is not running

[Description]

Mirroring Controller of the server "{0}" is not running.

[Parameters]

{0}: server ID

3.3.37 MCA00237

invalid combination of server own server type:{0} other server type:{1}

[Description]

Invalid combination of server.

[Parameters]

{0}: own server type

{1}: other server type

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description to be set reffering disaster recovery operation of "Cluster Operation Guide (Database Multiplexing)".

3.3.38 MCA00238

{0}: cannot execute detaching forcibly other than on operation center

[Description]

Detaching forcibly needs to be executed only on operation center.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

Check whether the server where the command was executed is correct.

3.3.39 MCA00239

standbycenter_mode parameter is specified in the definition file "{0}" of primary server

[Description]

standbycenter_mode parameter is specified in the definition file of primary server.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description to be set reffering disaster recovery operation of "Cluster Operation Guide (Database Multiplexing)".

3.3.40 MCA00240

promoted to the primary server, although standbycenter_mode parameter is specified in the definition file "{1}" of the server "{0}"

[Description]

Promoted to the primary server, although standbycenter_mode parameter is specified in the definition file.

[Parameters]

{0}: server ID

{1}: file name

[System Processing]

Stop monitoring.

[Action]

Correct the definition file according to the message and parameter description to be set reffering disaster recovery operation of "Cluster Operation Guide (Database Multiplexing)".

3.3.41 MCA00241

write permission is denied on definition file "{0}"

[Description]

Write permission is denied on definition file.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command, after granting the write permissions to the definition file.

3.3.42 MCA00242

{0}: invalid format value is specified for parameter "{2}" in definition file "{1}"

[Description]

The invalid format value is specified for parameter in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.3.43 MCA00243

{0}: value is not set to keyword "{1}" of primary_conninfo parameter in postgresql.auto.conf

[Description]

The value is not set to keyword of primary_conninfo parameter in postgresql.auto.conf.

[Parameters]

{0}: command name

{1}: keyword name

[System Processing]

Processing will be aborted.

[Action]

Set the value for the keyword of primary_conninfo parameter in postgresql.auto.conf file according to the description of "Setting Up the Standby Center" for disaster recovery of "Cluster Operation Guide (Database Multiplexing)".

3.3.44 MCA00244

failed to start monitoring of database process

[Description]

Failed to start monitoring of database process.

[System Processing]

Processing will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message. After that, execute the mc_ctl command to restart Mirroring Controller.

3.3.45 MCA00245

checking the consistency of LSN between server "{0}" and server "{1}" is not executed because candidate primary server is abnormal

[Description]

Checking the consistency of LSN is not executed because candidate primary server is abnormal.

[Parameters]

{0}: server ID

{1}: server ID

[System Processing]

Processing will be continued.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message, after switching over will be completed. After that, build in old candidate primary server to new candidate primary server.

3.4 Message Numbers Beginning with MCR00000

3.4.1 MCR00001

could not read file "{0}": exception={1}: {2}

[Description]

Could not read the file.

[Parameters]

{0}: file name

{1}: exception type

{2}: exception detail

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the message, and then remove it.

3.4.2 MCR00002

{0}: wrong number of server ID in definition file "{1}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.3 MCR00003

{0}: server ID specified in definition file "{1}" too long (max {2} bytes) line {3}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: max length of server ID

{3}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.4 MCR00004

{0}: wrong server ID in definition file "{1}"

[Description]

Could not use a server ID with same name in network.conf.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter descriptions of "Cluster Operation Guide (Database Multiplexing)".

3.4.5 MCR00005

invalid host name or IP address "{1}" in definition file "{0}"

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: file name

{1}: host name or IP address

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.6 MCR00006

{0}: invalid port number in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.7 MCR00007

{0}: invalid format specified in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.8 MCR00008

{0}: invalid value for parameter "{2}" in definition file "{1}"

[Description]

Invalid parameter was found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.9 MCR00009

{0}: no value for parameter "{2}" specified in definition file "{1}"

[Description]

Invalid parameter was found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.10 MCR00010

{0}: unrecognized parameter "{2}" in definition file "{1}"

[Description]

Unrecognized parameter was found in definition file.

[Parameters]

{0}: file name

{1}: command name

{2}: parameter name

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.11 MCR00011

%s: option "%s" duplicated

[Description]

Certain option is duplicated.

[Parameters]

%s: command

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.12 MCR00012

%s: "%s" option conflicts with "%s" option

[Description]

Options are conflicting.

[Parameters]

%s: command

%s: option

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.13 MCR00013

%s: option requires an argument -- %s

[Description]

No argument specified for the option.

[Parameters]

%s: command

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.14 MCR00014

%s: neither "%s" option nor environment variable "%s" specified

[Description]

Both of required option and equivalent environment variable were not specified.

[Parameters]

%s: command

%s: option

%s: environment variable

[System Processing]

Processing will be aborted.

[Action]

Re-execute after specifying required option or equivalent environment variable.

3.4.15 MCR00015

%s: argument of option "%s" is too long

[Description]

Argument of option is too long.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.16 MCR00016

%s: invalid option -- %s

[Description]

Invalid option.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.17 MCR00017

%s: option "%s" is required

[Description]

A required option is not specified.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Specify the required option, and re-execute.

3.4.18 MCR00018

%s: unnecessary operand "%s"

[Description]

Unnecessary operand.

[Parameters]

%s: command name

%s: operand

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting operand.

3.4.19 MCR00019

%s: unrecognized operation mode or no operation mode specified

[Description]

Unrecognized operation mode or no operation mode specified.

[Parameters]

%s: command name

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting or specifying operation mode.

3.4.20 MCR00020

Try "%s --help" for more information.\n

[Description]

--help option can show more additional information.

[Parameters]

%s: command name

[System Processing]

None.

[Action]

Check the message output before this message, and refer to descriptions shown by '--help' option.

3.4.21 MCR00021

%s: out of memory

[Description]

Out of memory error occurred.

[Parameters]

%s: command

[System Processing]

Processing will be aborted.

[Action]

Obtain free memory space by stopping unnecessary processes or changing system settings.

3.4.22 MCR00022

another "{0}" command is running

[Description]

Cannot execute command with this operation mode because another command is running on the same or another server.

[Parameters]

{0}: command name

[System Processing]

Processing will be aborted.

[Action]

There is a case executing another command. Wait for completion of another command on the same or another server, and then re-execute.

In addition, there are the following cases when using mc_arb command.

There is a case under processing of an arbitration by Mirroring Controller Arbitration process. Wait for completion of the processing under operation, and re-execute.

If any of the following cases occurs, there is a possibility that the processing of Mirroring Controller Arbitration process interrupts. Re-execute the mc_arb command after restarting Mirroring Controller Arbitration process.

- When abnormality occurs in the network

- When another server is downed

- When Mirroring Controller Arbitration process is stopped forcibly

3.4.23 MCR00023

Mirroring Controller Arbitration process is already running

[Description]

Mirroring Controller Arbitration process is already running.

[System Processing]

Processing will be aborted.

[Action]

If needed, stop Mirroring Controller Arbitration process, and re-execute.

If could not start although Mirroring Controller Arbitration process not started, refer to the description about workaround for failure of "Cluster Operation Guide (Database Multiplexing)".

3.4.24 MCR00024

cannot execute %s command because Mirroring Controller Arbitration process is not running

[Description]

Cannot execute Mirroring Controller Arbitration process command because Mirroring Controller Arbitration process is not running.

[Parameters]

%s: command name

[System Processing]

Processing will be aborted.

[Action]

Start Mirroring Controller Arbitration process, and re-execute.

3.4.25 MCR00025

timeout waiting for communication with Mirroring Controller Arbitration process

[Description]

Timeout waiting for communication with Mirroring Controller Arbitration process.

[System processing]

Processing will be aborted.

[Action]

Check whether a network error was detected.

If an error was not detected, there is a possibility that the load of the system may be the cause, please re-execute after a while.

3.4.26 MCR00026

could not create PID file of Mirroring Controller Arbitration process detail of cause:"{0}"

[Description]

Could not create PID file of Mirroring Controller Arbitration process.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Identify the cause according to the message, and then remove it.

3.4.27 MCR00027

could not remove PID file of Mirroring Controller Arbitration process detail of cause:"%s"

[Description]

Could not remove PID file of Mirroring Controller Arbitration process.

[Parameters]

%s: detail of cause

[Action]

Identify the cause according to the message, and then remove it.

3.4.28 MCR00028

could not read PID file of Mirroring Controller Arbitration process detail of cause:"%s"

[Description]

Could not read PID file of Mirroring Controller Arbitration process.

[Parameters]

%s: detail of cause

[Action]

Identify the cause according to the message, and then remove it.

3.4.29 MCR00029

invalid contents of PID file "%s" of Mirroring Controller Arbitration process

[Description]

The contents of PID file of Mirroring Controller Arbitration process is invalid.

[Parameters]

%s: file name

[System Processing]

Processing will be aborted.

[Action]

The following causes could be considered.

- The file was stored or replaced by mistake

- The file was corrupted

When starting Mirroring Controller Arbitration process, move or remove the file shown in the message.

When stopped Mirroring Controller Arbitration process, find ID of process named "mc_arbiter" and terminate forcibly by using OS command.

3.4.30 MCR00030

unexpected error occurred: {0}

[Description]

An unexpected error occurred.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate cause.

If you cannot clear the problem, contact Fujitsu technical support.

3.4.31 MCR00031

system call error occurred:"%s" detail of cause:"%s"

[Description]

System call error occurred.

[Parameters]

%s: system call name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.32 MCR00032

failed to open communication environment detail of cause:"{0}"

[Description]

Failed to open communication environment.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

To investigate the cause of the occurrence from the message, and remove cause.

3.4.33 MCR00033

could not read file "{0}": Permission denied

[Description]

No read permissions for the file.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command, after granting the read permissions to the file.

3.4.34 MCR00034

could not read the access privileges of {0}

[Description]

Could not read the access privileges.

[Parameters]

{0}: target directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the directory and eliminate causes, and then remove it.

3.4.35 MCR00035

failed to set the access privileges of {0}

[Description]

Failed to set the access privileges.

[Parameters]

{0}: target directory

[System Processing]

Processing will be aborted.

[Action]

Check the status of the directory and eliminate causes, and then remove it.

3.4.36 MCR00036

could not get installation path

[Description]

FUJITSU Enterprise Postgres may not be installed.

[System Processing]

Processing will be aborted.

[Action]

Re-install FUJITSU Enterprise Postgres.

3.4.37 MCR00037

could not access "{0}" file detail of cause:"{1}"

[Description]

Could not access the process information file of OS.

[Parameters]

{0}: file name

{1}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.38 MCR00038

invalid contents of "{0}" file

[Description]

Invalid contents of /proc/[pid]/status file.

[Parameters]

{0}: file name

[System Processing]

Processing will be aborted.

[Action]

Check mc_arbiter process is existed or not in yourself.

3.4.39 MCR00039

unusable character is included in path "%s" specified as a directory for Mirroring Controller Arbitration process

[Description]

Unusable character is included in path specified as a directory for Mirroring Controller Arbitration process.

[Parameters]

%s: path name

[System Processing]

Processing will be aborted.

[Action]

Correct the path specified as a directory for Mirroring Controller Arbitration process according to the message and mc_arb command descriptions of "Reference".

3.4.40 MCR00040

could not access path "%s" specified as a directory for Mirroring Controller Arbitration process detail of cause:"%s"

[Description]

Could not access path specified as a directory for Mirroring Controller Arbitration process.

[Parameters]

%s: path name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.41 MCR00041

{0}: IP address "{2}" specified for parameter "my_address" in definition file "{1}" is not found

[Description]

IP address specified for my_address parameter in arbitration.conf is not found.

[Parameters]

{0}: command name

{1}: file name

{2}: IP address

[System Processing]

Processing will be aborted.

[Action]

Check whether IP address specified by my_address parameter in arbitration.conf is correct or IP address is valid.

3.4.42 MCR00042

could not access path "{0}" for parameter "{1}" in definition file "{2}" detail of cause:"{3}"

[Description]

Either of the followings has occurred.

- File does not exist

- You do not specify a file

- Could not read the access privileges

[Parameters]

{0}: path name

{1}: parameter name

{2}: file name

{3}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.43 MCR00043

{0}: users other than a command executor have the access privileges for definition file "{1}"

[Description]

Users other than a command executor have the access privileges for definition file.

[Parameters]

{0}: command name

{1}: file name

[System Processing]

Processing will be aborted.

[Action]

Revoke all the access privileges for any users other than a command executor.

3.4.44 MCR00044

only the owner of definition file "{0}" can execute this command

[Parameters]

{0}: file name

[Description]

Only the owner who created the directory for Mirroring Controller Arbitration process can execute this command.

[System Processing]

Processing will be aborted.

[Action]

Re-execute the command by the owner who created the directory for Mirroring Controller Arbitration process.

3.4.45 MCR00045

starting Mirroring Controller Arbitration process

[Description]

Starting Mirroring Controller Arbitration process.

3.4.46 MCR00046

Mirroring Controller Arbitration process started

[Description]

Mirroring Controller Arbitration process started.

3.4.47 MCR00047

failed to start Mirroring Controller Arbitration process

[Description]

Failed to start Mirroring Controller Arbitration process.

[System Processing]

Processing will be aborted.

[Action]

Work around according to the Action of the message output before this message.

On Windows, if there is no message outputted before this message, please refer to the message outputted to an event log.

MCR00048

failed to report Mirroring Controller Arbitration process status

[Description]

Failed to report Mirroring Controller Arbitration process status.

[System Processing]

Processing will be aborted.

[Action]

Work around according to the Action of the message output before this message.

On Windows, if there is no message outputted before this message, please refer to the message outputted to an event log.

3.4.48 MCR00049

stopping Mirroring Controller Arbitration process

[Description]

Stopping Mirroring Controller Arbitration process.

3.4.49 MCR00050

Mirroring Controller Arbitration process stopped

[Description]

Mirroring Controller Arbitration process stopped.

3.4.50 MCR00051

could not stop Mirroring Controller Arbitration process because database server connects

[Description]

Could not stop Mirroring Controller Arbitration process because database server connects.

[System Processing]

Processing will be aborted.

[Action]

Execute mc_arb status command to find connected database server.

Re-execute after stopping Mirroring Controller on database server.

3.4.51 MCR00052

failed to stop Mirroring Controller Arbitration process

[Description]

Failed to stop Mirroring Controller Arbitration process.

[System Processing]

Processing will be aborted.

[Action]

Identify the cause from system log or event log on the target server, and work around.

3.4.52 MCR00053

stopping Mirroring Controller Arbitration process forcibly

[Description]

Stopping Mirroring Controller Arbitration process forcibly.

3.4.53 MCR00054

Mirroring Controller Arbitration process stopped forcibly

[Description]

Mirroring Controller Arbitration process stopped forcibly.

3.4.54 MCR00055

failed to stop Mirroring Controller Arbitration process forcibly

[Description]

Failed to stop Mirroring Controller Arbitration process forcibly.

[System Processing]

Processing will be aborted.

[Action]

Check [Action] of the message output before this message,and re-execute.

If re-execution fails, terminate forcibly mc_arbiter process with OS command.

3.4.55 MCR00056

database server "{0}" requested to arbitrate for database server "{1}" status

[Description]

Accepts a request to arbitrate from the database server which has detected an error.

[Parameters]

{0}: server ID

{1}: server ID

3.4.56 MCR00057

arbitrating the status of database server "{0}"

[Description]

Arbitrating for the status of the database server which was detected an error.

[Parameters]

{0}: server ID

[System Processing]

Arbitrating for the status of the database server which was detected an error.

3.4.57 MCR00058

received response from database server "{0}"

[Description]

A server is running normally.

[Parameters]

{0}: server ID

[System Processing]

Return result to database server.

3.4.58 MCR00059

could not receive response from database server "{0}"

[Description]

Detected the database server to be abnormal.

[Parameters]

{0}: server ID

[System Processing]

Execute fencing command.

3.4.59 MCR00060

rejected a request to arbitrate from database server "{0}"

[Description]

Either of the followings has occurred.

- Fencing command was executed just before

- The arbitration server was in the stop processing

[Parameters]

{0}: server ID

[System Processing]

Rejected a request to arbitrate from the database server.

3.4.60 MCR00061

database server "{0}" requested to fence database server "{1}"

[Description]

Accepted a request to fence from the database server which has detected an error.

[Parameters]

{0}: server ID

{1}: server ID

3.4.61 MCR00062

executing fencing command

[Description]

Executing fencing command.

[System processing]

Executing fencing command.

3.4.62 MCR00063

fencing command for database server "{0}" succeeded: result:"{1}"

[Description]

Fencing command for database server succeeded.

[parameters]

{0}: server ID

{1}: return code of command

[System processing]

Returning result to database server.

3.4.63 MCR00064

fencing command for database server "{0}" failed: result:"{1}"

[Description]

Fencing command for database server failed.

[parameters]

{0}: server ID

{1}: return code of command

[System processing]

Returning result to database server.

3.4.64 MCR00065

timeout waiting for the fencing command

[Description]

Timeout waiting for the fencing command.

[System processing]

Processing will be aborted.

[Action]

The value of fencing_command_timeout parameter in arbitration.conf is too short.

Review and extend the value of fencing_command_timeout parameter in arbitration.conf.

When find process ID of fencing command, terminate forcibly by using OS command.

3.4.65 MCR00066

rejected a request to fence from database server "{0}"

[Description]

Either of the followings is esteemed.

- The arbitration server has been executing arbitration process

- Fencing command has been executed just before

- The arbitration server was in the stop processing

[Parameters]

{0}: server ID

[System Processing]

Rejected a request to fence from database server.

3.4.66 MCR00067

rejected a request to fence from database server "{0}" because the database server is a fencing target

[Description]

The following requirements shouldn't be executed if it is requested from the database server which is a fencing target.

- request to arbitrate

- request to fence

- request to disable automatically switch

[Parameters]

{0}: server ID

[Action]

Processing will be aborted.

3.4.67 MCR00068

database server "{0}" requested to disable standby server "{1}" to automatically switch

[Description]

Accepted a request to disable the standby server to automatically switch.

[Parameters]

{0}: sever ID

{1}: sever ID

3.4.68 MCR00069

requested standby server "{0}" to disable automatically switching

[Description]

Requested the standby server to disable automatically switching.

[Parameters]

{0}: server ID

3.4.69 MCR00070

disabled standby server "{0}" to automatically switch

[Description]

Disabled the standby server to automatically switch.

[Parameters]

{0}: server ID

3.4.70 MCR00071

failed to disable standby server "{0}" to automatically switch

[Description]

Failed to disable the standby server to automatically switch.

[Parameters]

{0}: server ID

[System processing]

Executing fencing command.

3.4.71 MCR00072

omitted to disable standby server "{0}" to automatically switch

[Description]

It is not necessary to disable the standby server to automatically switch because a fencing for this database server is executing.

[Parameters]

{0}: server ID

[System processing]

Processing will be aborted.

3.4.72 MCR00073

connection was requested from database server "{0}"

[Description]

Connection was requested from database server.

[Parameters]

{0}: server ID

[Description]

Try connection to database server.

3.4.73 MCR00074

succeeded in connection with Mirroring Controller process of database server "{0}"

[Description]

Succeeded in connection with Mirroring Controller process of database server.

[Parameters]

{0}: server ID

3.4.74 MCR00075

rejected a request to connect from database server "{0}" because of during the fencing command execution

[Description]

Rejected a request to connect from database server because of during the fencing command execution.

[Parameters]

{0}: server ID

[Action]

Rejected a request to connect from database server.

3.4.75 MCR00076

disconnected from the database server "{0}"

[Description]

Disconnected from the database server.

[Parameters]

{0}: server ID

3.4.76 MCR00077

the disallowed IP address "{0}" tried to access

[Description]

The IP address which is different from the IP address in network.conf tried to access.

[parameters]

{0}: IP Adresses

[System Processing]

Connection will be rejected.

3.4.77 MCR00078

tried to access from database srever with installed different product version IP address:"{0}"

[Description]

tried to access from database server with installed different product version.

[parameters]

{0}: IP address

[System Processing]

Connection will be rejected

[Action]

Match the product version level between arbitration server and database server.

3.4.78 MCR00079

the invalid server ID tried to access IP address:"{0}"

[Description]

The server ID which is different from the server ID in network.conf tried to access.

[Parameters]

{0}: IP address

[System Processing]

Connection will be rejected.

3.4.79 MCR00080

the combination of server IDs of arbitration server is incompatible with that of database server "{0}"

[Description]

The combination of server IDs of arbitration server is incompatible with that of the database server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Check the network.conf of both database server and arbitration sever, and correct the file.

3.4.80 MCR00081

the invalid packet received

[Description]

The invalid packet received.

[System Processing]

Connection will be rejected.

3.4.81 MCR00082

{0}: invalid server kind specified in definition file "{1}" line {2}

[Description]

Invalid descriptions were found in definition file.

[Parameters]

{0}: command name

{1}: file name

{2}: line number

[System Processing]

Processing will be aborted.

[Action]

Correct the definition file according to the message and parameter description of "Cluster Operation Guide (Database Multiplexing)".

3.4.82 MCR00083

%s: invalid argument for option %s

[Description]

Invalid argument for option.

[Parameters]

%s: command name

%s: option

[System Processing]

Processing will be aborted.

[Action]

Re-execute after correcting options.

3.4.83 MCR00084

installation environment is destroyed

[Description]

FUJITSU Enterprise Postgres may not be installed correctly or may be destroyed.

[System Processing]

Processing will be aborted.

[Action]

Re-install FUJITSU Enterprise Postgres.

3.4.84 MCR00085

no authority to execute this command

[Description]

Only the user who possesses an administrative authority can run this command.

[System Processing]

Processing will be aborted.

[Action]

Invoke the administrator's prompt, and re-execute this command.

3.4.85 MCR00086

failed to start service "{0}" detail of cause:"{1}"

[Description]

Failed to start service.

[Parameters]

{0}: Service name

{1}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.86 MCR00087

service "{0}" is not registered

[Description]

Service is not registered.

[Parameters]

{0}: Service name

[System Processing]

Processing will be aborted.

[Action]

Register service, and re-execute.

3.4.87 MCR00088

service "%s" for Mirroring Controller Arbitration process was registered

[Description]

Service for Mirroring Controller Arbitration process was registered with Windows service.

[Parameters]

%s: Service name

3.4.88 MCR00089

failed to register service "%s" detail of cause:"%s"

[Description]

An error occurred during registration of service.

[Parameters]

%s: Service name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.89 MCR00090

service name "%s" is already in use

[Description]

Service name is already in use.

[Parameters]

%s: Service name

[System Processing]

Processing will be aborted.

[Action]

Check the service name, and re-execute.

3.4.90 MCR00091

service "%s" for Mirroring Controller Arbitration process was unregistered

[Description]

Service for Mirroring Controller Arbitration process was unregistered from Windows service.

[Parameters]

%s: Service name

3.4.91 MCR00092

failed to unregister service "%s" detail of cause:"%s"

[Description]

An error occurred during deregistration of service.

[Parameters]

%s: Service name

%s: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

3.4.92 MCR00093

an error occurred in Mirroring Controller Arbitration process: {0}

[Description]

An error occurred in Mirroring Controller Arbitration process.

[Parameters]

{0}: detail of cause

[System Processing]

Processing will be aborted.

[Action]

Check the error detail and eliminate causes.

If you cannot clear the problem, contact Fujitsu technical support.

After removing the cause of errors, execute mc_arb command with the -e option to stop Mirroring Controller Arbitration process forcibly.

After that, execute the mc_arb command to start Mirroring Controller Arbitration process.

3.4.93 MCR00094

value of heartbeat_interval in arbitration definition file "{1}" is too large compared with value of parameters for abnormality monitoring of operating system or server in server definition file of database server "{0}"

[Description]

Because the value of heartbeat_interval parameter in the arbitration definition file is too large compared with the value of parameters for abnormality monitoring of the operating system or server in the server definition file of the database server, the arbitration for the target database server might be delayed.

[Parameters]

{0}: server ID

{1}: file name

[System Processing]

Continues processing.

[Action]

Correct the parameters for abnormality monitoring of the operating system or server according to the message and "Tuning for Optimization of Degradation Using Abnormality Monitoring With the Arbitration Server" of "Cluster Operation Guide (Database Multiplexing)".

After that, execute the mc_arb command to restart Mirroring Controller Arbitration process.

3.4.94 MCR00095

start to monitor of database server "{0}"

[Description]

Start to monitor of the database server.

[Parameters]

{0}: server ID

3.4.95 MCR00096

failed to start monitoring of database server "{0}"

[Description]

Failed to start monitoring of the database server.

[Parameters]

{0}: server ID

[System Processing]

Processing will be aborted.

[Action]

Find the message output before this message from display, system log or event log, and then work around according to the Action of the message.

3.4.96 MCR00097

stop Mirroring Controller Arbitration process forcibly because an error has occurred in Mirroring Controller Arbitration process: {0}

[Description]

Stop Mirroring Controller Arbitration process forcibly because an error has occurred in Mirroring Controller Arbitration process

[Parameters]

{0}: detail of cause

[System Processing]

Mirroring Controller Arbitration process will be stopped forcibly.

[Action]

Check the error detail and eliminate causes.

If you cannot clear the problem, contact Fujitsu technical support.

After removing the cause of errors, execute the mc_arb command to start Mirroring Controller Arbitration process.

3.4.97 MCR00098

stop monitoring of database server "{0}"

[Description]

Stop monitoring of the database server.

[Parameters]

{0}: server ID

3.4.98 MCR00099

detected an error on database server "{0}"

[Description]

Either of the followings has occurred.

- The database server is downed

- The arbitration network is abnormal

[Parameters]

{0}: server ID

[System Processing]

Continues processing.

3.5 Message Numbers Beginning with MCR00100

3.5.1 MCR00100

detected recovery of database server "{0}"

[Description]

detected recovery of the database server.

[Parameters]

{0}: server ID

3.5.2 MCR00101

arbitration for database server "{0}" has been delayed

[Description]

Either of the followings has occurred.

- The parameters for abnormality monitoring of the operating system or server are not optimally tuned

- The arbitration server is not responding

[Parameters]

{0}: server ID

[System Processing]

Continues processing.

[Action]

Take either of the following actions.

- When parameters for abnormality monitoring of the operating system or server are not optimally tuned

Correct the value of parameters for abnormality monitoring of the operating system or server according to the message and "Tuning for Optimization of Degradation Using Abnormality Monitoring With the Arbitration Server" of "Cluster Operation Guide (Database Multiplexing)".

After that, execute the mc_ctl command to stop Mirroring Controller, and execute the mc_arb command to stop the Mirroring Controller Arbitration process.

After that, execute the mc_arb command to start the Mirroring Controller Arbitration process, and execute the mc_ctl command to start Mirroring Controller.

- When the arbitration server is not responding

Identify the cause, and then remove it.

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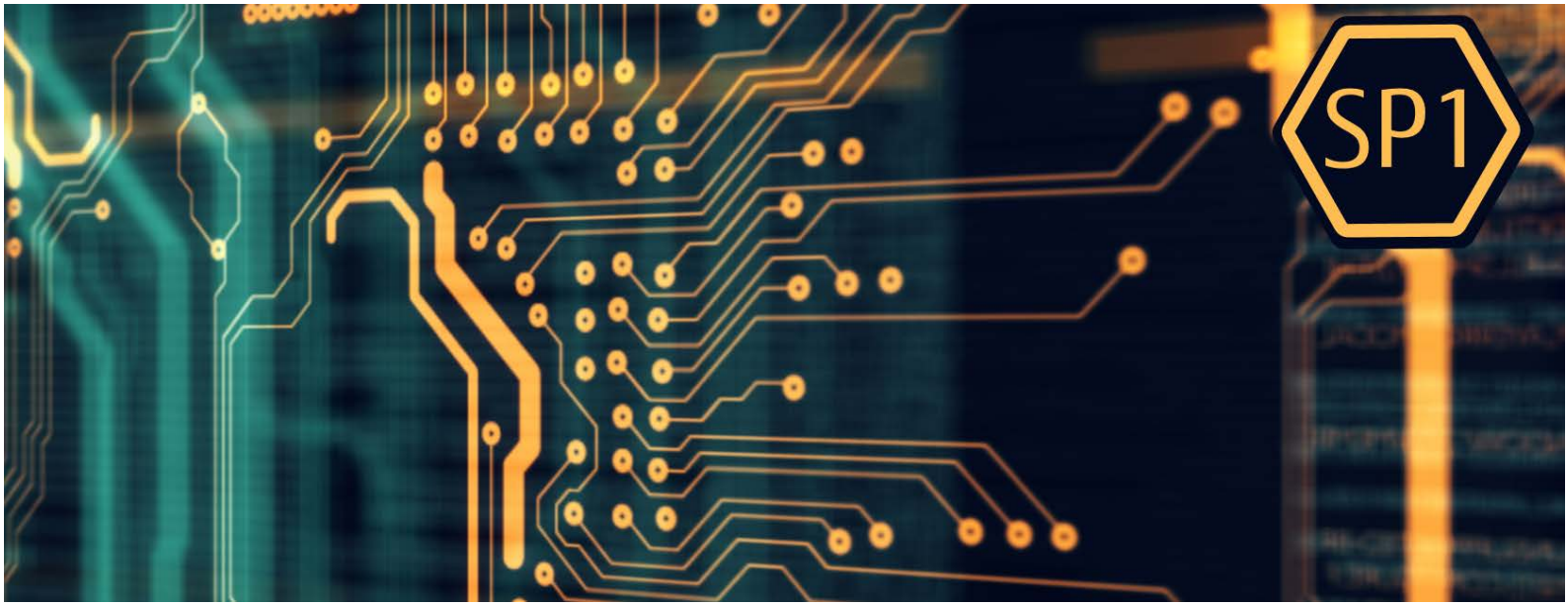

FJQSS User Guide

(Information Collection Tool)

Solaris/Linux

J2UL-1958-01ENZ0(00)
August 2021

Preface

This manual describes information to use the outline and the tool of FJQSS (Information Collection Tool).

Purpose of this Manual

The purpose of this manual is to be able to gather the collected information by using FJQSS (Information Collection Tool) when trouble occurs.

Reader of this Manual

This manual is targeted at the user who gathers the collected information when the trouble occurs.

You can obtain information on the method of gathering the function and the collected information of FJQSS (Information Collection Tool) obtain by referring to this manual.

Structure of this Manual

The structure of this manual is as follows:

Chapter 1 outline

Chapter 2 FJQSS (Information Collection Tool)

Appendix A Messages and error codes

Notations

The following notations are used in this manual;

Symbols used in this manual

The following symbols are used in this manual.

Example:[Enter]key

Symbols used in command

This subsection describes the symbols used in the examples of commands.

Example:

```
fjqss_collect [-s]
```

Meaning of Symbols

Symbol	Meaning
[]	The item enclosed with this sign is shown and omissible is shown.

Abbreviations

The following abbreviations are used in this manual:

Operating Systems

Full Name	Abbreviations
Oracle Solaris 9	Solaris 9
Oracle Solaris 10	Solaris 10
Oracle Solaris 11	Solaris 11
Oracle Solaris	Solaris
Red Hat Enterprise Linux 6 (for x86)	RHEL6(x86)
Red Hat Enterprise Linux 6 (for Intel64)	RHEL6(Intel64)
Red Hat Enterprise Linux 5 (for x86)	RHEL5(x86)
Red Hat Enterprise Linux 5 (for Intel64)	RHEL5(Intel64)

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Chapter 1 Outline

This chapter explains the outline of FJQSS (Information Collection Tool).

1.1 FJQSS (Information Collection Tool)

This appendix explains FJQSS (Information Collection Tool) that archives the information for investigation (middleware logs and operation system logs) with an easy operation. Executing FJQSS right after a problem occurs makes a rapid investigating of the causes.

Chapter 2 Collecting the information

This chapter explains the method of gathering the survey material, the confirm method of the survey material, and notes.

2.1 Collection method

This section explains the operating procedure of FJQSS (Information Collection Tool).

Collecting information can do by using the command. You can operate the Collection by the method that shows the product selection menu, or the method that does not show such the menu.

- 2.1.1 Collecting with showing menu
- 2.1.2 Collecting without showing menu

2.1.1 Collecting with showing menu

This subsection explains the operating procedure of FJQSS (Information Collection Tool) with showing the product selection menu.

Authority to execute

User Authority of the root user is necessary.

Prior confirmation

Set the output directory of the collected information if necessary. The output directory of default is the /var/tmp directory on Solaris, or the /tmp directory on Linux. See [2.3 Changing a path of the output directory] for details of changing the output directory.

Synopsis

If you execute the command specifying the output directory by the parameter:

```
fjqss_collect output_directory
```

If you execute the command specifying the output directory by the environment variable or the environmental configuration file:

```
fjqss_collect
```

Path to this command

```
/opt/FJSVqstl
```

Notes in executing the command

- Do not put fjqss_collect or its copy into any other directory. They work only if they are in the path shown above in [Path to this command].
- Execute this command immediately after the problem occurs.
- Multiple execution of this command is not available. If you do that, the following error message appears:

```
FJQSS is already started. Please restart FJQSS after the executing one ends.
```

Operating procedure

This part explains the operating procedure of FJQSS (Information Collection Tool).

1. Log on to the server, open the console window and execute the information collection command in the console window.

   Hereafter, it explains by the example when outputting the information to the default output directory:

```
> cd /opt/FJSVqstl
> ./fjqss_collect
```

2. The product selection menu appears. It shows the list of the products whose information can be collected.
3. Put the number of the product of which you want to collect the information:

```
-----------------------------------------------------
FJQSS Product Selection
-----------------------------------------------------
  1.MW Product B (Server Side)
  2.MW Product B (Client Side)

Please input a number of the product
of which you want to collect the information.>>1
```

4. Check the indicated name(s) of the middleware (s) whose investigation information are to be collected, then press the [Y] key to start.

   Collection starts and the following indicator appear in the command prompt:

```
The following product information is collected.
        MW Product B (Server Side)

Input 'Y-key' to collect data, or 'N-key' to stop.(default=N):y
preparing:            ######################################## 100% [00:01]
```

   The time and the disk space required for the collection depend on the condition of the target system.

5. Check the contents of the output directory.

   After the FJQSS (Information Collection Tool) has completed the collection, the following prompt appears. Verify that the information have been collected in the directory whose name is indicated in the prompt:

```
The following product information is collected.
        MW Product B (Server Side)

Input 'Y-key' to collect data, or 'N-key' to stop.(default=N):y
preparing:            ######################################## 100% [00:01]
collecting:           ######################################## 100% [00:01]
archiving:            ######################################## 100% [00:01]
compress:             ######################################## 100% [00:15]
Completed.
Gathered investigation informations archived to
    /tmp/ezcollect20121018172939/result20121018172939.tar.gz(206KB)
```

   This is an example on Linux.

   The gathered investigation informations are archived to /var/tmp/⋯ directory on Solaris, or /tmp/⋯ directory in Linux.

   The following files are created in the output directory (ezcollectYYYYMMDDHHMMSS: YYYYMMDDHHMMSS indicates the time (year, month, day, hours, minutes and seconds) that the collection started). See [2.2 Checking the collected information] for the output directory:

- resultYYYYMMDDHHMMSS.tar.gz

  The collected information.

- result.txt

  The result log is a text file to indicate if the collection of information has succeeded.

  This file indicates the names and the results of collection (OK/NG) of each material.

- ez.log

  The activity log of the FJQSS (Information Collection Tool).

Aborting FJQSS (Information Collection Tool)

This subsection explains how to abort running FJQSS (Information Collection Tool).

Although it is recommended that you wait until the collection ends, you can press [CTRL] + [C] key combination to abort the execution if it is necessary. The following prompt appears if [CTRL] + [C] is pressed and the execution is aborted.

```
The following product information is collected.
        MW Product B (Server Side)

Input 'Y-key' to collect data, or 'N-key' to stop.(default=N):y
preparing:            ################## 40% [00:01]
Stopped FJQSS process.
```

The output directory that has been made in the collecting might remain when the executing is aborted. There is no influence in the operation of FJQSS because the output directory will be newly made when FJQSS is executed again.

Moreover, there is no influence in the operation of FJQSS even if the remaining output directory was deleted.

Note

Do not close the command prompt before the collection ends. if you do so, the temporary directories might remain in the work directory. Please delete the following directories if they remain in the work directory.

・ezcollectYYYYMMDDHHMMSS

・ezworkYYYYMMDDHHMMSS

See 2.3 Changing a path of the output directory] for details of the work directory.

2.1.2 Collecting without showing menu

This subsection explains the operating procedure of FJQSS (Information Collection Tool) without showing the product selection menu.

You can use the procedure in the shell script.

Authority to execute

User Authority of the root user is necessary.

Prior confirmation

Verify the product identification name of the product of which you collect the information by the product information showing command. See 2.1.3 Getting the product identification name] for details.

Set the output directory of the collected information if necessary. The output directory of default is the /var/tmp directory on Solaris, or the /tmp directory on Linux. See [2.3 Changing a path of the output directory] for details of changing the output directory.

Synopsis

The specification of product identification name by "-pr <product identification name>" is necessary if you specify the silent mode option by "-s".

If you execute the command specifying the output directory by the parameter:

```
fjqss_collect -pr <product identification name> [-s] output_directory
```

If you execute the command specifying the output directory by the environment variable or the environmental configuration file:

```
fjqss_collect -pr <product identification name> [-s]
```

Description

The fjqss_collect command collects the information required for the investigation.

Option

-pr

This option specifies the product identification name of the product of which you collect the information.

-s

The command runs without asking to the operator. (It runs in silent mode.)

Path to this command

```
/opt/FJSVqstl
```

Notes in executing the command

- Do not put fjqss_collect or its copy into any other directory. They work only if they are in the path shown above in [Path to this command].
- Execute this command immediately after the problem occurs.
- Multiple execution of this command is not available. If you do that, the following error message appears:

```
FJQSS is already started. Please restart FJQSS after the executing one ends.
```

2.1.3 Getting the product identification name

This subsection explains how to get the product identification name which you specify when collecting the information without showing Product Selection Menu.

The product identification name can be got by executing the product information showing command.

Authority to execute

User Authority of the root user is necessary.

Synopsis

```
fjqss_mwpinfolist
```

Description

This command shows the list of the information of products of which the information collection is available.

Each product's information is shown in one line.

The product's Information is shown in order of "No." (number), "KEY" (product identification name), "DispName" (product name) and "Path" (destination directory of the information)

Example of the result of executing the product information showing command:

```
MW Product List
No. KEY        DispName                Path
--------------------------------------------------------------------------------
1.  PRODUCTA  MW PRODUCT A            /opt/FJSVPRDA/server/fjqss_tool1
2.  PRODUCTB  MW PRODUCT B            /opt/FJSVPRDB/server/fjqss_tool1
3.  PRODUCTC  MW PRODUCT C            /opt/FJSVPRDC/server/fjqss_tool1
```

If you collect the information of the product No.1, specify the product identification name "PRODUCTA" as the parameter

to collect the information of the "MW PRODUCT A" by the procedure of 2.1.2 Collecting without showing menu].

Path to this command

```
/opt/FJSVqstl
```

2.2 Checking the collected information

The collected information are created in the output directory (ezcollectYYYYMMDDHHMMSS) as file "resultYYYYMMDDHHMMSS.tar.gz".

The output directory is created at the output specified for an environmental configuration file destination at the output destination. If no destination is specified, then the output directory is created at the /var/tmp directory on Solaris, or the /tmp directory on LInux.

You can specify a path of the output directory if you execute the information collecting command in the console window. See [2.3 Changing a path of the output directory].for details of the environmental configuration file ant the output destination.

Verify that the following file and directory exist:

- Result log (result.txt)

  The result log is a text file to indicate if the collection of information has succeeded.

  This file indicates the names and the results of collection (OK/NG) of each material.

- Collected information (resultYYYYMMDDHHMMSS.tar.gz)

Note

Collected information (resultYYYYMMDDHHMMSS.tar.gz) is compressed and archived by gzip and tar. Collected information contains the following files.

- resultdir

  This directory contains the collected files.

- result.txt

  The result log is a text file to indicate if the collection of information has succeeded.

  This file indicates the names and the results of collection (OK/NG) of each material.

- ez.log

  The activity log of the FJQSS (Information Collection Tool).

- convert.txt

  If the file path name of information collecting is too long and information collecting can't get in former file name, file path name is converted and gathered. Former file path name and Converted file path name are output to convert.txt.convert.txt is output in the form of the following.

  Output form

  <Former file path name>,<Converted file path name>

  convert.txt is output when there was only information collecting for which the conversion of the file path name was necessary.

2.3 Changing a path of the output directory

You can change a path of the output directory by two methods below.

- Specifying a path of the output directory in the option of the information collecting command.
- Specifying a path of the output directory by setting the environment variable.
- Specifying a path of the output directory by updating the environmental configuration file.

The method of specifying in the option of the command explains in 2.1.1 Collecting with showing menu and 2.1.2 Collecting without showing menu]. Hereafter, the method of specifying by the environment variable and by the environmental configuration file will be explained.

-

Specifying a path of the output directory by setting the environment variable

You can specify the directory where the output directory will be created by setting the environment variable EZ_OUTPUTDIR before executing this command.

Description format:

```
EZ_OUTPUTDIR="the directory path where the output directory will be created"
export EZ_OUTPUTDIR
```

Example:

If “/etc/work” is specified to %EZ_OUTPUTDIR%:

```
EZ_OUTPUTDIR=/etc/work
export EZ_OUTPUTDIR
```

Then the directory below will be created as the output directory:

```
/etc/work/ezcollectYYYYMMDDHHMMSS
```

Specifying a path of the output directory by updating the environmental configuration file

Environmental configuration file (FJQSSconf.txt) is a file that defines the operating environment of FJQSS.

It exists in following directory.

```
<Directory where the product is installed>/fjqss_tooln (n=1,2,..,9)
```

The items that can be specified for environmental configuration file are shown below.

Item	Outline	Omission
OutputDir	The directory path where the output directory will be created (*3).	Possible (*2)
WorkDir	The directory path where the work directory (*1) will be created by FJQSS execution (*3).	Possible(*2)

(*1)The work directory is a directory that temporarily stores information necessary for the execution of FJQSS. When FJQSS ends, stored information is automatically deleted.

(*2) If the specification is wrong or omitted, the /var/tmp directory (on Solaris), or the /tmp directory (on Linux) is used.

(*3) You can specify the directory by the relative path from an absolute path or environmental configuration file.

The format of environmental configuration file is shown below.

Description format:

```
OutputDir="the directory path where the output directory will be created"
WorkDir=” work directory”
```

Example:

If “/etc/work” is specified to OutputDir, “/etc/tmp” is specified to WorkDIr.

```
OutputDir=/etc/work
WorkDir=/etc/tmp
```

Then the directory below will be created as the output directory:

```
/etc/work/ezcollectYYYYMMDDHHMMSS
```

And the directory below will be created as the work directory:

```
/etc/tmp/ezworkYYYMMDDHHMMSS
```

Note

If the plural specifications of the output directory is done, then the specification becomes effective in the following order by priority:

1. Specification in the option of the information collecting command.
2. Specification by setting the environment variable.
3. Specification by updating the environmental configuration file.

Appendix A Messages and error codes

A.1 Error Messages

The message which FJQSS outputs can have an error code. See [A.2 Error Codes]. for detail of error codes.

Look for	What to do
FJQSS is already started. Please restart FJQSS after the executing one ends.	Check if FJQSS is running. Multiple execution of it is not available.
The file used with FJQSS is not found. Please contact a Fujitsu technological member. (product= PRODUCT_IDETIFICATION_NAME, errcode= ERROR_CODE)	Please contact the Fujitsu engineer, and pass on the PRODUCT_IDENTIFICATION_NAME, PATH_NAME and ERROR_CODE in the message. About detail meanings of the ERROR_CODE, see [A.2 Error Codes].
Failed in the copy of materials used with FJQSS to the work directory. Please contact a Fujitsu technological member. (PATH= PATH_NAME, errcode= ERROR_CODE)	
Failed in the access of the file used with FJQSS. Please contact a Fujitsu technological member. (errcode= ERROR_CODE)	
The file used with FJQSS is not found or broken. Please contact a Fujitsu technological member. (PATH= PATH_NAME)	
Failed in the access of the directory used with FJQSS. Please contact a Fujitsu technological member. (PATH= PATH_NAME)	
Failed in the current directory change to the work directory. Please contact a Fujitsu technological member. (PATH= PATH_NAME)	
Failed to execute FJQSS.Please contact Fujitsu technical staff.	
There is a wrong option in the command line. Please restart FJQSS with the correct option.	Execute FJQSS again after removing the cause according to the left messages. About Environmental configuration file, see [2.3 Changing a path of the output directory].
Not super-user. Please restart FJQSS by super-user	
A memory is insufficient. Please stop unnecessary applications and restart FJQSS.	
The product specified by the -pr option is not found. Please restart FJQSS with the correct option. (product= PRODUCT_IDETIFICATION_NAME)	
Japanese characters are included in the directory name at the 'OutputDir' of environmental file. Japanese characters cannot be used. Please correct environmental file and restart FJQSS. (environmental file=PATH_NAME)	

Look for	What to do
Japanese characters are included in the directory name at the 'WorkDir' of environmental file. Japanese characters cannot be used. Please correct environmental file and restart FJQSS. (environmental file=PATH_NAME)	
Failed in making the output directory. Please confirm the following. -There must be an authority to make the folder. -Passing in xx bytes or less must be specified. -The length of each directory name must be 255 bytes or less.	
Failed in making the work directory. Please confirm the following. -There must be an authority to make the folder. -Passing in xx bytes or less must be specified. -The length of each directory name must be 255 bytes or less.	
Output directory is too long at the 'OutputDir' of environmental file.Please adjust the output directory to xx bytes or less and restart FJQSS (environmental file= PATH_NAME)	
Work directory is too long at the 'WorkDir' of environmental file. Please adjust the output directory to xx bytes or less and restart FJQSS (environmental file= PATH_NAME)	
The output directory is too long specified in the option. Please adjust the output directory to %s bytes or less and restart FJQSS.	
Japanese characters are included in the output directory specified in the option. Japanese characters cannot be used. Please correct the output directory and restart FJQSS.	
The output directory is too long specified with the environment variable:EZ_OUTPUTDIR. Please adjust environment variable:EZ_OUTPUTDIR to xx byte or less.	
Failed to create log.(PATH=PATH_NAME) Take action indicated the following items: - Create the output folder if it doesn't exist. - Set the role to the output folder.	
Products are not installed.Please make sure that the products that are installed.	
The is no installed product of which FJQSS can collect the information. FJQSS ends.	
Stopped FJQSS process.	No user action is necessary.

A.2 Error Codes

Error Code	Cause
0	No error.

Error Code	Cause
1	Command operand error
2	Insufficient memory
3	Failed to execute without administrator permissions
5	Though "-s" option exists, "-pr" option does not exist
6	FJQSS common component has been already done
10	Middleware products' list file does not exist
11	Middleware product specified with -pr option does not exist
13	The built-in directory of the target middleware product of collecting information does not exist
15	Japanese characters are included in the directory name at the output directory of environmental file
16	Japanese characters are included in the directory name at the work directory of environmental file
17	Too long path name is specified in the directory name at the output directory of environmental file
18	Too long path name is specified in the directory name at the work directory of environmental file
19	Failed to create the output directory
20	Failed to create the work directory
21	Failed to access the directory
22	Failed to copy the common materials and built-in materials of the product directory to the work directory
23	Failed to show the information of the product to collect its information materials
24	Failed to change the current directory to the work directory
25	Too long path name is specified to the parameter that specifies the output directory
26	Japanese characters are included in the parameter that specifies the output directory
27	Products of which collecting information is available are not installed
28	Failed to execute FJQSS