

FUJITSU Enterprise Postgres 12 SP1



Release Notes

Windows/Linux

August 2021

Linux >

Windows >



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Linux

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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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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
12 SP1	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y
	Application development	Support for OpenJDK	Y	Y
12	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y
	Platform enhancement	Additional Operating System Support for Server Feature	Y	Y
		Additional Operating System Support for Client Feature	Y	Y
		Additional Operating System Support for Server Assistant Feature	Y	N
	Operation	Database Multiplexing Improvements	Y	N
		Connection Manager	Y	N
	Performance	Global Meta Cache	Y	N
		VACUUM/TRUNCATE Improvements	Y	Y
	Application development	Support for Visual Studio 2019	Y	Y
		Support for .NET Framework 4.8	Y	Y

1.1 Features Added in 12 SP1

This section explains new features and improvements in FUJITSU Enterprise Postgres 12 SP1.

1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.1.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 12.7.



See

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

1.1.1.2 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.

1.1.2 Application Development

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

- Support for OpenJDK

1.1.2.1 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 Features Added in 12

This section explains new features and improvements in FUJITSU Enterprise Postgres 12.

1.2.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.2.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 12.1.



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

1.2.1.2 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.

1.2.2 Platform Enhancement

This section explains the new features related to platform enhancement:

- Additional operating system support for server
- Additional operating system support for client
- Additional operating system support for server assistant

1.2.2.1 Additional Operating System Support for Server Feature

The following additional operating system is supported:

- RHEL8.1



.....
Refer to "Required Operating System" in the Installation and Setup Guide for Server for details.
.....

1.2.2.2 Additional Operating System Support for Client Feature

The following additional operating system is supported:

- RHEL8.1



.....
Refer to "Required Operating System" in the Installation and Setup Guide for Client for details.
.....

1.2.2.3 Additional Operating System Support for Server Assistant Feature

The following additional operating system is supported:

- RHEL8.1



.....
Refer to "Required Operating System" in the Installation and Setup Guide for Server Assistant for details.
.....

1.2.3 Operation

This section explains the new feature related to OSS:

- Database Multiplexing Improvements
- Connection Manager

1.2.3.1 Database Multiplexing Improvements

The database multiplexing introduces the following new features.

- Heartbeat monitoring of database processes

Monitoring retries no longer occur when a database process is detected as down.



.....
Refer to "Server Configuration File for the Database Servers" in the Cluster Operation Guide (Database Multiplexing) for details.
.....

- Faster detection time for heartbeat monitoring of the operating system or server

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.

Previously, when an arbitration server received a query, it inquired about the state of the other database server, but now the arbitration server can respond immediately to the query from the database server by periodically heartbeating the database server. Accordingly, reduced error detection time in heartbeat monitoring of the operating system or server.



See

Refer to "Tuning Abnormality Monitoring for Operations that Use an Arbitration Server for Automatic Degeneration" in the Cluster Operation Guide (Database Multiplexing) for details.

- WebAdmin Mirroring Controller integration

You can now set the heartbeat_error_action parameter to specify what happens when a heartbeat error is detected in the heartbeat monitoring of the operating system or server during Mirroring Controller setup in WebAdmin. You can also edit the settings after you set up Mirroring Controller. Accordingly, the database operation using WebAdmin becomes more flexible.



See

Refer to "Mirroring Controller Configuration" in the Cluster Operation Guide (Database Multiplexing) for details.

1.2.3.2 Connection Manager

With the Connection Manager features, replication operation can be continued without being aware of the connection destination of the applications.

The Connection Manager provides the following capabilities:

- When a client error occurs, force a reclaim of the SQL connection with the client.
- When a server error occurs, the application is notified as a SQL error.
- Applications connect to the appropriate server without being aware of the server state (Primary, Standby).



See

Refer to Connection Manager User's Guide for details.

1.2.4 Performance

This section explains the new feature added to improve performance:

- Global Meta Cache
- VACUUM/TRUNCATE improvements

1.2.4.1 Global Meta Cache

Before FUJITSU Enterprise Postgres 11, information about system catalogs and table definitions was cached in per-process memory. You can cache some of this information in shared memory by using the Global Meta Cache feature. This reduces overall system memory usage.



See

Refer to "Memory usage reduction by Global Meta Cache" in the General Description for details.

1.2.4.2 VACUUM/TRUNCATE Improvements

If VACUUM/TRUNCATE truncates empty pages and relation indexes at the end of a transaction, or if relations are truncated, improve processing time by doing the following:

- Reduce the number of scan loops when deleting a relation buffer
- Reduce the number of shared buffer scans

This reduces WAL apply time independent of the size of the shared buffer.

1.2.5 Application Development

This section explains the new features related to application development:

- Support for Visual Studio 2019
- Support for .NET Framework 4.8

1.2.5.1 Support for Visual Studio 2019

Visual Studio 2019 is supported as a development environment of the FUJITSU Enterprise Postgres client feature for Windows(R).



See

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

1.2.5.2 Support for .NET Framework 4.8

.NET Framework 4.8 is supported as a development environment of the FUJITSU Enterprise Postgres client feature for Windows(R).



See

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

Chapter 2 Compatibility Information

This chapter explains incompatible items and actions required when migrating from an earlier version to FUJITSU Enterprise Postgres 12 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
Removing Operating System Support for Client Feature	Y	Y	Y	Y	Y
Changing Database Server System V IPC Parameter Settings During Instance Creation and Removal in WebAdmin	Y	Y	Y	Y	Y
Changing WebAdmin Output Messages	N	Y	Y	Y	Y
Removing Operating System Support for Client Feature	Y	Y	Y	Y	N
Removing Operating System Support for Server Feature	Y	Y	Y	Y	N
Changing the way OSS is set up	Y	Y	Y	Y	N
Modifying Pgpool-II Installation Handling	Y	Y	Y	Y	N
Changing Core and Log File Paths when Instance is Created with WebAdmin	Y	Y	Y	Y	N
Renaming WebAdmin Services	Y	Y	Y	Y	N
Changing the features targeted for installation in a 64-bit environment	Y	Y	N	N	N
Changing the access permissions of the Windows client installation folder	Y	Y	N	N	N
Changing the WebAdmin installation method	Y	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 12 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 Changing Database Server System V IPC Parameter Settings During Instance Creation and Removal in WebAdmin

Incompatibility

FUJITSU Enterprise Postgres 12 SP1 and later changes the System V IPC parameter settings on the database server when an instance is created and deleted using WebAdmin.

FUJITSU Enterprise Postgres 12 or earlier

Set the System V IPC parameters using PostgreSQL 9.2 formulas.

FUJITSU Enterprise Postgres 12 SP1

Set the System V IPC parameter using the formula of the version of PostgreSQL on which FUJITSU Enterprise Postgres is based.

Action method

None.

2.1.3 Changing WebAdmin Output Messages

Incompatibility

In FUJITSU Enterprise Postgres 12 SP1 and later, changes the messages output by WebAdmin when the WebAdmin language and system locale are different.

FUJITSU Enterprise Postgres 12 or earlier

Output a message in the system locale.

FUJITSU Enterprise Postgres 12 SP1

Output messages in the WebAdmin language.

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.

- RHEL6

Action method

None.

2.1.6 Changing the Way OSS is Set Up

Incompatibility

FUJITSU Enterprise Postgres 12 and 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 Modifying Pgpool-II Installation Handling

Incompatibility

For FUJITSU Enterprise Postgres 12 and 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.

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

Incompatibility

In FUJITSU Enterprise Postgres 12 and 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`

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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.

2.1.9 Renaming WebAdmin Services

Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

fsep_xSPz_edition_64_WebAdmin_Port1

fsep_xSPz_edition_64_WebAdmin_Port2

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fsep_xSPz_WA_64_WebAdmin_Port1

fsep_xSPz_WA_64_WebAdmin_Port2

Action method

None.

2.1.10 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 and later.

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

Action method

None.

2.1.11 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.

2.1.12 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
Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type	Y	Y	Y	Y	N
Changing the method of specifying the application connection switch feature	Y	Y	N	N	N
PostgreSQL compatibility of embedded SQL applications in C and COBOL	Y	Y	N	N	N
Changing Vertical Clustered Index (VCI)	Y	Y	N	N	N
Changing how to use the features compatible with Oracle databases	Y	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.2.1 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".

2.2.2 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	-	-
Priority given to a standby server	No change	prefer_standby	preferSlave	prefer_standby	prefer-read
Any	No change	-	any	-	any

2.2.3 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.

2.2.4 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

2.2.5 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
Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down	N	N	N	N	Y
Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection	N	N	N	N	Y
Mirroring Controller no longer retries to monitor database processes when they are detected as down	Y	N	Y	Y	N
Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command	N	N	Y	Y	N
Changing Mirroring Controller User Command Input Values	N	N	Y	Y	N
Changing the maximum number of connections per server	Y	Y	N	N	N

Item	Pre-migration version				
	9.5	9.6	10	11	12
Changing the encryption settings using the ALTER TABLESPACE statement	Y	Y	N	N	N
Changing the default configuration of the cluster system using database multiplexing	Y	N	N	N	N
Changing the default operation when mc_ctl command options are omitted	Y	N	N	N	N
Changing the connection settings when Mirroring Controller connects to an instance	Y	N	N	N	N
Changing the status display of the Mirroring Controller server	Y	N	N	N	N
Changing the operation when the synchronous_standby_names parameter is changed during database multiplexing operation	Y	N	N	N	N
Changing masking policy definition for unsupported data types	Y	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 12 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 12 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=xxxxxx
pid=xxxxxx
```

FUJITSU Enterprise Postgres 12 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=xxxxxx
pid=xxxxxx
```

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 12 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 12 or earlier

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

FUJITSU Enterprise Postgres 12 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 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.

2.3.4 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 and 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.

2.3.5 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.

2.3.6 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.

2.3.7 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.

2.3.8 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

2.3.9 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.

2.3.10 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'.

2.3.11 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.

2.3.12 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'

2.3.13 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 .NET Data Provider Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

FUJITSU Enterprise Postgres 10 and 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.

2.5 oracle_fdw Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

2.5.1 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.

2.6 pgaudit Incompatibility

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

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 12 SP1, 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 12 SP1 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 12 SP1



Release Notes

Windows

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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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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
12 SP1	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y
	Application development	Support for OpenJDK	Y	Y
12	OSS	PostgreSQL Rebase	Y	Y
		Update of OSS Provided	Y	Y
	Platform enhancement	Additional Operating System Support for Client Feature	Y	Y
		Additional Operating System Support for Server Assistant Feature	Y	N
	Operation	Database Multiplexing Improvements	Y	N
	Performance	Global Meta Cache	Y	N
		VACUUM/TRUNCATE Improvements	Y	Y
	Application development	Support for Visual Studio 2019	Y	Y
		Support for .NET Framework 4.8	Y	Y

1.1 Features Added in 12 SP1

This section explains new features and improvements in FUJITSU Enterprise Postgres 12 SP1.

1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.1.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 12.7.

 See

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

1.1.1.2 Update of OSS Provided

The OSS provided by FUJITSU Enterprise Postgres have been updated.

 See

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

1.1.2 Application Development

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

- Support for OpenJDK

1.1.2.1 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 Features Added in 12

This section explains new features and improvements in FUJITSU Enterprise Postgres 12.

1.2.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

1.2.1.1 PostgreSQL Rebase

The PostgreSQL version that FUJITSU Enterprise Postgres is based on is 12.1.



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

1.2.1.2 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.

1.2.2 Platform Enhancement

This section explains the new features related to platform enhancement:

- Additional operating system support for client
- Additional operating system support for server assistant

1.2.2.1 Additional Operating System Support for Client Feature

The following additional operating system is supported:

- RHEL8.1



See

Refer to "Required Operating System" in the Installation and Setup Guide for Client for details.

1.2.2.2 Additional Operating System Support for Server Assistant Feature

The following additional operating system is supported:

- RHEL8.1



See

Refer to "Required Operating System" in the Installation and Setup Guide for Server Assistant for details.

1.2.3 Operation

This section explains the new feature related to OSS:

- Database Multiplexing Improvements

1.2.3.1 Database Multiplexing Improvements

The database multiplexing introduces the following new features.

- Heartbeat monitoring of database processes

Monitoring retries no longer occur when a database process is detected as down.



See

Refer to "Server Configuration File for the Database Servers" in the Cluster Operation Guide (Database Multiplexing) for details.

- Faster detection time for heartbeat monitoring of the operating system or server

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.

Previously, when an arbitration server received a query, it inquired about the state of the other database server, but now the arbitration server can respond immediately to the query from the database server by periodically heartbeating the database server. Accordingly, reduced error detection time in heartbeat monitoring of the operating system or server.



See

Refer to "Tuning Abnormality Monitoring for Operations that Use an Arbitration Server for Automatic Degeneration" in the Cluster Operation Guide (Database Multiplexing) for details.

- WebAdmin Mirroring Controller integration

You can now set the `heartbeat_error_action` parameter to specify what happens when a heartbeat error is detected in the heartbeat monitoring of the operating system or server during Mirroring Controller setup in WebAdmin. You can also edit the settings after you set up Mirroring Controller. Accordingly, the database operation using WebAdmin becomes more flexible.



See

Refer to "Mirroring Controller Configuration" in the Cluster Operation Guide (Database Multiplexing) for details.

1.2.4 Performance

This section explains the new feature added to improve performance:

- Global Meta Cache
- VACUUM/TRUNCATE improvements

1.2.4.1 Global Meta Cache

Before FUJITSU Enterprise Postgres 11, information about system catalogs and table definitions was cached in per-process memory. You can cache some of this information in shared memory by using the Global Meta Cache feature. This reduces overall system memory usage.



.....
Refer to "Memory usage reduction by Global Meta Cache" in the General Description for details.
.....

1.2.4.2 VACUUM/TRUNCATE Improvements

If VACUUM/TRUNCATE truncates empty pages and relation indexes at the end of a transaction, or if relations are truncated, improve processing time by doing the following:

- Reduce the number of scan loops when deleting a relation buffer
- Reduce the number of shared buffer scans

This reduces WAL apply time independent of the size of the shared buffer.

1.2.5 Application Development

This section explains the new features related to application development:

- Support for Visual Studio 2019
- Support for .NET Framework 4.8

1.2.5.1 Support for Visual Studio 2019

Visual Studio 2019 is supported as a development environment of the FUJITSU Enterprise Postgres client feature for Windows(R).



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

1.2.5.2 Support for .NET Framework 4.8

.NET Framework 4.8 is supported as a development environment of the FUJITSU Enterprise Postgres client feature for Windows(R).



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

Chapter 2 Compatibility Information

This chapter explains incompatible items and actions required when migrating from an earlier version to FUJITSU Enterprise Postgres 12 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
Removing Operating System Support for Client Feature	Y	Y	Y	Y	Y
Removing Operating System Support for Server Feature	Y	Y	Y	Y	Y
Changing the Output List in the [Type] Column on the [Client Authentication] Tab in WebAdmin	Y	Y	Y	Y	Y
Changing WebAdmin Output Messages	N	Y	Y	Y	Y
Removing Operating System Support for Client Feature	Y	Y	Y	Y	N
Removing Operating System Support for Server Feature	Y	Y	Y	Y	N
Changing the way OSS is set up	Y	Y	Y	Y	N
Changing Core and Log File Paths when Instance is Created with WebAdmin	Y	Y	Y	Y	N
Renaming WebAdmin Services	Y	Y	Y	Y	N
Changing the features targeted for installation in a 64-bit environment	Y	Y	N	N	N
Changing the access permissions of the Windows client installation folder	Y	Y	N	N	N
Changing the WebAdmin installation method	Y	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 12 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 12 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 Changing the Output List in the [Type] Column on the [Client Authentication] Tab in WebAdmin

Incompatibility

For FUJITSU Enterprise Postgres 12 SP1 and later, in the [Client Authentication] tab of WebAdmin, change the list output in the [Type] column.

FUJITSU Enterprise Postgres 12 or earlier

In the WebAdmin client authentication configuration screen, you can make settings that do not conform to PostgreSQL specifications.

FUJITSU Enterprise Postgres 12 SP1

In the WebAdmin client authentication configuration screen, you will not be able to make settings that do not conform to PostgreSQL specifications.

Action method

None.

2.1.4 Changing WebAdmin Output Messages

Incompatibility

In FUJITSU Enterprise Postgres 12 SP1 and later, changes the messages output by WebAdmin when the WebAdmin language and system locale are different.

FUJITSU Enterprise Postgres 12 or earlier

Output a message in the system locale.

FUJITSU Enterprise Postgres 12 SP1

Output messages in the WebAdmin language.

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.

- Windows Server(R) 2008

Action method

None.

2.1.7 Changing the Way OSS is Set Up

Incompatibility

FUJITSU Enterprise Postgres 12 and 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 Changing Core and Log File Paths when Instance is Created with WebAdmin

Incompatibility

In FUJITSU Enterprise Postgres 12 and 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.

2.1.9 Renaming WebAdmin Services

Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

fsep_xSPz_edition_64_WebAdmin_Port1

fsep_xSPz_edition_64_WebAdmin_Port2

FUJITSU Enterprise Postgres 12

fsep_xSPz_WA_64_WebAdmin_Port1

fsep_xSPz_WA_64_WebAdmin_Port2

Action method

None.

2.1.10 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 and later.

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

Action method

None.

2.1.11 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.

2.1.12 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
Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type	Y	Y	Y	Y	N
Removing UTL_FILE for Oracle Database Compatibility Features	Y	Y	Y	Y	N
Changing the method of specifying the application connection switch feature	Y	Y	N	N	N
PostgreSQL compatibility of embedded SQL applications in C and COBOL	Y	Y	N	N	N
Changing Vertical Clustered Index (VCI)	Y	Y	N	N	N
Changing how to use the features compatible with Oracle databases	Y	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.2.1 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".

2.2.2 Removing UTL_FILE for Oracle Database Compatibility Features

Incompatibility

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

Action method

None.

2.2.3 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 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	-	-
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
Mirroring Controller no longer retries to monitor database processes when they are detected as down	Y	N	Y	Y	N
Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command	N	N	Y	Y	N
Changing Mirroring Controller User Command Input Values	N	N	Y	Y	N

Item	Pre-migration version				
	9.5	9.6	10	11	12
Changing the maximum number of connections per server	Y	Y	N	N	N
Changing the encryption settings using the ALTER TABLESPACE statement	Y	Y	N	N	N
Changing the default configuration of the cluster system using database multiplexing	Y	N	N	N	N
Changing the default operation when mc_ctl command options are omitted	Y	N	N	N	N
Changing the connection settings when Mirroring Controller connects to an instance	Y	N	N	N	N
Changing the status display of the Mirroring Controller server	Y	N	N	N	N
Changing the operation when the synchronous_standby_names parameter is changed during database multiplexing operation	Y	N	N	N	N
Changing masking policy definition for unsupported data types	Y	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.3.1 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.

2.3.2 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 and 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.

2.3.3 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.

2.3.4 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.

2.3.5 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.

2.3.6 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

2.3.7 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.

2.3.8 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'.

2.3.9 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.

2.3.10 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'

2.3.11 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 .NET Data Provider Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

FUJITSU Enterprise Postgres 10 and 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.

2.5 pgaudit Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

In FUJITSU Enterprise Postgres 12 SP1, 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 12 SP1 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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