

Fujitsu Enterprise Postgres 18 for x86

Release Notes

Windows/Linux

Fujitsu Enterprise Postgres 18 for x86

Release Notes

Linux

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 \(List\)](#)

Provides a list of incompatible items when migrating from previous versions.

[Chapter 3 Compatibility Information \(Details\)](#)

Explains incompatibilities and corrective actions to be taken when migrating from previous versions.

[Chapter 4 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
18	AI Application Development Support	In-database Inference	Y	Y
	Operation	Multi-master Replication	Y	-
	Application Development	COBOL Performance Improvement	Y	Y
	Install	RPM-based Installation	Y	Y
	OSS	PostgreSQL Rebase	Y	Y
		OSS Updates Provided	Y	Y

1.1 Features Added in 18

This section explains new features and improvements in Fujitsu Enterprise Postgres 18.

1.1.1 AI Application Development Support

This section explains the new feature related to support AI application development.

- In-database Inference

1.1.1.1 In-database Inference

Provides the ability to import and use ONNX format models in the database. In Fujitsu Enterprise Postgres 18, only embedded models with vectorization can be imported. You can make the imported model available and implement vectorization for semantic text search.



See

Refer to "Protect and Efficiently Manage and Use Knowledge Data for AI Applications" in the General Description for details.

1.1.2 Operation

This section explains the new feature related to Operation.

- Multi-master replication

1.1.2.1 Multi-master Replication

The multi-master replication feature enables the construction of a replication configuration where independent data updates can be processed on multiple nodes. In this multi-master configuration, all nodes function as masters, allowing clients to write (update, insert, delete) data to any node, and those changes are automatically synchronized to all other nodes.

By utilizing this multi-master replication feature, you can enhance business continuity in disaster recovery.



See

Refer to Cluster Operation Guide (Multi-master Replication) for details.

1.1.3 Application Development

This section explains the new features related to application development.

- COBOL Performance Improvement

1.1.3.1 COBOL Performance Improvement

Caching of host variables in the COBOL precompiler. This function is expected to improve the processing performance of embedded COBOL applications that use host variables.



See

.....
Refer to "Embedded SQL in COBOL" in the Application Development Guide for details.
.....

1.1.4 Install

This section explains the new feature related to install.

- RPM-based Installation

1.1.4.1 RPM-based Installation

You can now install from RPM packages.



See

.....
Refer to Installation and Setup Guide for Server, Installation and Setup Guide for Client, and Installation and Setup Guide for Server Assistant for details.
.....

1.1.5 OSS

This section explains the new feature related to OSS.

- PostgreSQL Rebase
- OSS Updates Provided

1.1.5.1 PostgreSQL Rebase

The PostgreSQL version that Fujitsu Enterprise Postgres is based on is 18.

1.1.5.2 OSS Updates Provided

The OSS provided by Fujitsu Enterprise Postgres has been updated.



See

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

Chapter 2 Compatibility Information (List)

Lists incompatible items when migrating from previous versions.

2.1 If the version before migration is Fujitsu Enterprise Postgres 17 SP2

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	There is no incompatibility.
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	There is no incompatibility.
psycpg	3.13.1 Python Version Changes Required When Using psycpg
WebAdmin	There is no incompatibility.
Connection Manager	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.2 If the Version Before Migration is Fujitsu Enterprise Postgres 17 SP1

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	There is no incompatibility.
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.

Classification	Reference
orafce	There is no incompatibility.
psycopg	3.13.1 Python Version Changes Required When Using psycopg
WebAdmin	There is no incompatibility.
Connection Manager	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.3 If the Version Before Migration is Fujitsu Enterprise Postgres 17

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	There is no incompatibility.
WebAdmin	There is no incompatibility.
Connection Manager	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.4 If the Version Before Migration is Fujitsu Enterprise Postgres 16 SP1

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python

Classification	Reference
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	There is no incompatibility.
Connection Manager	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.5 If the Version Before Migration is Fujitsu Enterprise Postgres 16

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema

Classification	Reference
	3.9.4 Change the Default Value of thestattarget Column of the column Table in the statsrepo Schema
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
Connection Manager	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.6 If the Version Before Migration is Fujitsu Enterprise Postgres 15 SP2

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.8 Modifying the Installation of pgBackRest
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of thestattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication

Classification	Reference
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
Connection Manager	There is no incompatibility.
Confidentiality Management	3.16.1 Changes due to Changes in the pg_dump Specification
	3.16.2 Changing Permission Settings by Changing the CREATEROLE Permission
	3.16.3 Change due to Restriction of CREATEROLE Privilege

2.7 If the Version Before Migration is Fujitsu Enterprise Postgres 15 SP1

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.8 Modifying the Installation of pgBackRest
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
Application	3.2.1 Output File Change
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of thestattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'

Classification	Reference
Connection Manager	There is no incompatibility.
Confidentiality Management	3.16.1 Changes due to Changes in the pg_dump Specification
	3.16.2 Changing Permission Settings by Changing the CREATEROLE Permission
	3.16.3 Change due to Restriction of CREATEROLE Privilege

2.8 If the Version Before Migration is Fujitsu Enterprise Postgres 15

Classification	Reference
Installation/Setup	3.1.1 Removing Old llvm Support for JIT compilation
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
Application	3.2.1 Output File Change
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of thestattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication

Classification	Reference
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
Connection Manager	There is no incompatibility.
Confidentiality Management	3.16.1 Changes due to Changes in the pg_dump Specification
	3.16.2 Changing Permission Settings by Changing the CREATEROLE Permission
	3.16.3 Change due to Restriction of CREATEROLE Privilege

2.9 If the Version Before Migration is FUJITSU Enterprise Postgres 14 SP1

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.4 Adding the key_name Column to the View pgx_tde_master_key
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items

Classification	Reference
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
Connection Manager	There is no incompatibility.

2.10 If the Version Before Migration is FUJITSU Enterprise Postgres 14

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature

Classification	Reference
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	There is no incompatibility.
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
Connection Manager	There is no incompatibility.

2.11 If the Version Before Migration is FUJITSU Enterprise Postgres 13 SP1

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1

Classification	Reference
	3.3.3 Abolition of Message Numbers
	3.3.5 Changing the Output of the Status Mode of the cm_ctl Command
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.14.3 Cannot specify prefer-read for target_session_attrs
Connection Manager	3.15.1 Behavior change when "read-write" is specified for the target_session_attrs parameter

2.12 If the Version Before Migration is FUJITSU Enterprise Postgres 13

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated

Classification	Reference
Application	3.1.12 How max_worker_processes is calculated
	3.1.13 Removing Operating System Support for Client Feature
	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
Operation	3.2.8 Changing the Trigger Replacement Process
	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.5 Changing the Output of the Status Mode of the cm_ctl Command
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.14.3 Cannot specify prefer-read for target_session_attrs
Connection Manager	3.15.1 Behavior change when "read-write" is specified for the target_session_attrs parameter

2.13 If the Version Before Migration is FUJITSU Enterprise Postgres 12 SP1

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
	3.1.14 Removing Operating System Support for Client Feature
	3.1.15 Removing Operating System Support for Server Feature
	3.1.16 Changing kernel parameter settings when an instance is created with WebAdmin
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.5 Changing the Output of the Status Mode of the cm_ctl Command
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.8 Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items

Classification	Reference
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.14.3 Cannot specify prefer-read for target_session_attrs
Connection Manager	3.15.1 Behavior change when "read-write" is specified for the target_session_attrs parameter

2.14 If the Version Before Migration is FUJITSU Enterprise Postgres 12

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Old llvm Support for JIT compilation
	3.1.4 Removing Operating System Support for Client Feature
	3.1.5 Removing Operating System Support for Server Feature
	3.1.6 Removing Operating System Support for Server Assistant Feature
	3.1.7 Python Version Changes Required When Using PL/Python
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Client Feature
	3.1.15 Removing Operating System Support for Server Feature
	3.1.16 Changing kernel parameter settings when an instance is created with WebAdmin
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Adding a TAP Test Framework

Classification	Reference
	3.2.10 Change the "elif" Statement Behavior in ecobpg
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.5 Changing the Output of the Status Mode of the cm_ctl Command
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.7 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down
	3.3.9 Changing the Value of the Category Column in the pg_settings view
	3.3.10 Changing pgx_stat_lwlock of the Statistics View
	3.3.11 Changing the Behavior of pgx_rcvall
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	There is no incompatibility.
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
	3.10.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.14.3 Cannot specify prefer-read for target_session_attrs
Connection Manager	3.15.1 Behavior change when "read-write" is specified for the target_session_attrs parameter

2.15 If the Version Before Migration is FUJITSU Enterprise Postgres 11

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature

Classification	Reference
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Client Feature
	3.1.15 Removing Operating System Support for Server Feature
	3.1.16 Changing kernel parameter settings when an instance is created with WebAdmin
	3.1.17 Removing Operating System Support for Client Feature
	3.1.18 Removing Operating System Support for Server Feature
	3.1.19 Changing the Way OSS is Set Up
	3.1.20 Modifying Pgpool-II Installation Handling
	3.1.21 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.22 Renaming WebAdmin Services
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Adding a TAP Test Framework
	3.2.10 Change the "elif" Statement Behavior in ecobpg
	3.2.11 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.9 Changing the Value of the Category Column in the pg_settings view
	3.3.10 Changing pgx_stat_lwlock of the Statistics View
	3.3.11 Changing the Behavior of pgx_rcvall
	3.3.12 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down
	3.3.13 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command
	3.3.14 Changing Mirroring Controller User Command Input Values
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs

Classification	Reference
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	3.8.1 Changing the Oracle Client Version
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of thestattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
	3.10.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.3 Cannot specify prefer-read for target_session_attrs

2.16 If the Version Before Migration is FUJITSU Enterprise Postgres 10

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Client Feature
	3.1.15 Removing Operating System Support for Server Feature
	3.1.16 Changing kernel parameter settings when an instance is created with WebAdmin
	3.1.17 Removing Operating System Support for Client Feature
	3.1.18 Removing Operating System Support for Server Feature
	3.1.19 Changing the Way OSS is Set Up
	3.1.20 Modifying Pgpool-II Installation Handling
	3.1.21 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.22 Renaming WebAdmin Services
Application	3.2.1 Output File Change

Classification	Reference
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Adding a TAP Test Framework
	3.2.10 Change the "elif" Statement Behavior in ecobpg
	3.2.11 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.9 Changing the Value of the Category Column in the pg_settings view
	3.3.10 Changing pgx_stat_lwlock of the Statistics View
	3.3.11 Changing the Behavior of pgx_rcvall
	3.3.12 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down
	3.3.13 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command
	3.3.14 Changing Mirroring Controller User Command Input Values
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
oracle_fdw	3.8.1 Changing the Oracle Client Version
pg_statsinfo	3.9.1 Changing Simple Report Items
	3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema
	3.9.3 Rename Columns in statement Table in statsrepo Schema
	3.9.4 Change the Default Value of the stattarget Column of the column Table in the statsrepo Schema
pgaudit	3.10.1 Repairing Unwanted Output in the Audit Log
	3.10.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index

Classification	Reference
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.3 Cannot specify prefer-read for target_session_attrs

2.17 If the Version Before Migration is FUJITSU Enterprise Postgres 9.6

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
	3.1.12 How max_worker_processes is calculated
	3.1.13 Removing Operating System Support for Client Feature
	3.1.16 Changing kernel parameter settings when an instance is created with WebAdmin
	3.1.17 Removing Operating System Support for Client Feature
	3.1.18 Removing Operating System Support for Server Feature
	3.1.19 Changing the Way OSS is Set Up
	3.1.20 Modifying Pgpool-II Installation Handling
	3.1.21 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.22 Renaming WebAdmin Services
	3.1.23 Changing the Features Targeted for Installation in a 64-bit Environment
	3.1.24 Changing the Access Permissions of the Windows Client Installation Folder
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Adding a TAP Test Framework
	3.2.10 Change the "elif" Statement Behavior in ecobpg
	3.2.11 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.12 Changing the Method of Specifying the Application Connection Switch Feature
	3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature
	3.2.14 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL
	3.2.15 Changing Vertical Clustered Index (VCI)
Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto

Classification	Reference
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
	3.3.9 Changing the Value of the Category Column in the pg_settings view
	3.3.10 Changing pgx_stat_lwlock of the Statistics View
	3.3.11 Changing the Behavior of pgx_rcvll
	3.3.15 Changing the Maximum Number of Connections per Server
	3.3.16 Changing the Encryption Settings Using the ALTER TABLESPACE Statement
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
	3.6.6 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.3 Cannot specify prefer-read for target_session_attrs

2.18 If the Version Before Migration is FUJITSU Enterprise Postgres 9.5

Classification	Reference
Installation/Setup	3.1.2 Removing Operating System Support for Client Feature
	3.1.9 Removing Operating System Support for Client Feature
	3.1.10 Removing Operating System Support for Server Feature
	3.1.11 How max_wal_senders is calculated
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	3.1.21 Changing Core and Log File Paths when Instance is Created with WebAdmin
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Classification	Reference
	3.1.24 Changing the Access Permissions of the Windows Client Installation Folder
	3.1.25 Changing the WebAdmin Installation Method
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Adding a TAP Test Framework
	3.2.10 Change the "elif" Statement Behavior in ecobpg
	3.2.11 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.12 Changing the Method of Specifying the Application Connection Switch Feature
	3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature
	3.2.14 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL
	3.2.15 Changing Vertical Clustered Index (VCI)
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Operation	3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.2 Deprecation of Certificates Signed Using SHA1
	3.3.3 Abolition of Message Numbers
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	3.3.16 Changing the Encryption Settings Using the ALTER TABLESPACE Statement
	3.3.17 Changing the Default Configuration of the Cluster System Using Database Multiplexing
	3.3.18 Changing the Default Operation when mc_ctl Command Options are Omitted
	3.3.19 Changing the Connection Settings when Mirroring Controller Connects to an Instance
	3.3.20 Changing the Status Display of the Mirroring Controller Server
	3.3.21 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation
	3.3.22 Changing Masking Policy Definition for Unsupported Data Types
JDBC Driver	3.4.1 Changing the targetServerType Value
	3.4.2 Changing the Statement Cache Limit Setting Method
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature

Classification	Reference
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
	3.6.6 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pg_dbms_stats	3.11.1 Change in Execution Plan due to Fixed Height of Btree index
	3.11.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.12.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.14.1 Linux server behavior changes for login authentication
	3.14.3 Cannot specify prefer-read for target_session_attrs

Chapter 3 Compatibility Information (Details)

This chapter explains incompatible items and actions required when migrating from an earlier version to Fujitsu Enterprise Postgres 18. Check compatibility before migrating and take the appropriate action.

3.1 Installation/Setup Incompatibility

3.1.1 Removing Old llvm Support for JIT compilation

Incompatibility

In Fujitsu Enterprise Postgres 18, the following llvm which JIT compilation can use have been removed when operating on RHEL8.

- llvm version 13
- llvm version 14

Action method

None.

3.1.2 Removing Operating System Support for Client Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 SP2 , the following operating systems have been removed.

- Windows(R) 10

Action method

None.

3.1.3 Removing Old llvm Support for JIT compilation

Incompatibility

In Fujitsu Enterprise Postgres 17, the following llvm which JIT compilation can use have been removed.

[RHEL8]

- llvm version 9
- llvm version 10
- llvm version 11
- llvm version 12

[SLES 15]

- llvm version 7

Action method

None.

3.1.4 Removing Operating System Support for Client Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following operating systems have been removed.

- RHEL8.5 or earlier
- SLES 15 SP3 or earlier

Action method

None.

3.1.5 Removing Operating System Support for Server Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following operating systems have been removed.

- RHEL8.5 or earlier
- SLES 15 SP3 or earlier

Action method

None.

3.1.6 Removing Operating System Support for Server Assistant Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following operating systems have been removed.

- RHEL8.5 or earlier
- SLES 15 SP3 or earlier

Action method

None.

3.1.7 Python Version Changes Required When Using PL/Python

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, when operating on RHEL8, changes the required Python version to 3.9.x when using PL/Python based on the Python 3 language.

Action method

None.

3.1.8 Modifying the Installation of pgBackRest

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, pgBackRest is not automatically installed during server and client installation.

Action method

If you want to use pgBackRest, install pgBackRest separately from the server or client installation.

If you want to use pgBackRest on the same server as the database server, refer to "Setting Up and Removing OSS" in the Installation and Setup Guide for Server.

If you want to use pgBackRest on a different server than the database server, refer to "Setting Up and Removing OSS" in the Installation and Setup Guide for Client.

3.1.9 Removing Operating System Support for Client Feature

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, the following operating systems have been removed.

- RHEL7
- SLES 12

Action method

None.

3.1.10 Removing Operating System Support for Server Feature

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, the following operating systems have been removed.

- RHEL7
- SLES 12

Action method

None.

3.1.11 How max_wal_senders is calculated

Incompatibility

In Fujitsu Enterprise Postgres 15 SP1 or later, Fujitsu Enterprise Postgres uses the following values from the value set for the max_wal_senders parameter:

Policy-based password management in a streaming replication environment : Number of direct downstream hot standby servers

Action method

If necessary add a value for the max_wal_senders parameter.

3.1.12 How max_worker_processes is calculated

Incompatibility

In Fujitsu Enterprise Postgres 15 SP1 or later, Fujitsu Enterprise Postgres uses the following values from the value set for the max_worker_processes parameter:

Default value to use : 1

Policy-based password management in a streaming replication environment with a hot standby server : 1

Action method

If necessary add a value for the max_worker_processes parameter.

3.1.13 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.

3.1.14 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.

3.1.15 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.

3.1.16 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 <i>currentValue</i> < <i>calculatedValue</i> , configure the calculated value	$((1800 + 270 * \text{max_locks_per_transaction}) * \text{max_connections} + (1800 + 270 * \text{max_locks_per_transaction}) * \text{autovacuum_max_workers} + (770 + 270 * \text{max_locks_per_transaction}) * \text{max_prepared_transactions} + (\text{shared_buffer}) + (16 * 1024 * 1024) + (770 * 1024)) * 1.05$
SHMALL	Specify <i>currentValue</i> + <i>calculatedValue</i>	$(\text{SHMMAX} / \text{PAGESIZE}) + 1$ PAGESIZE = 4K
SEMMNI	Specify <i>currentValue</i> + <i>calculatedValue</i>	$\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + 4) / 16)$
SEMMNS	Specify <i>currentValue</i> + <i>calculatedValue</i>	$\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + 4) / 16) * 17$

FUJITSU Enterprise Postgres 13 or later

Kernel Parameters	Value	Calculated Value
SHMMAX	Do not change value	-
SHMALL	Do not change value	-
SEMMNI	Specify <i>currentValue</i> + <i>calculatedValue</i>	- For instances of FUJITSU Enterprise Postgres 9.5 to 11: $\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + \text{max_worker_processes} + 5) / 16)$ - For Fujitsu Enterprise Postgres 12 and later instances: $\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + \text{max_wal_senders} + \text{max_worker_processes} + 5) / 16)$
SEMMNS	Specify <i>currentValue</i> + <i>calculatedValue</i>	- For instances of FUJITSU Enterprise Postgres 9.5 to 11: $\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + \text{max_worker_processes} + 5) / 16) * 17$ - For Fujitsu Enterprise Postgres 12 and later instances: $\text{ceil}((\text{max_connections} + \text{autovacuum_max_workers} + \text{max_wal_senders} + \text{max_worker_processes} + 5) / 16) * 17$

Action method

None.

3.1.17 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.

3.1.18 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.

3.1.19 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.

3.1.20 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.

3.1.21 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.

3.1.22 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_xSPz_edition_64_WebAdmin_Port1`

`fsep_xSPz_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.

3.1.23 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.

3.1.24 Changing the Access Permissions of the Windows Client Installation Folder

Incompatibility

In FUJITSU Enterprise Postgres 10 or later, 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.

3.1.25 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.

3.2 Application Migration Incompatibility

3.2.1 Output File Change

Incompatibility

In Fujitsu Enterprise Postgres 18, generates two temporary files during execution of the ecobpg command.

These temporary files are deleted upon successful or abnormal termination of the ecobpg command.

If an issue occurs during ecobpg command execution, these temporary files may remain. In such cases, delete them.

File names are output in the following format:

Output_filename.4-digit_random_number.{COB|IPB}.ecw

Action method

None.

3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters

Incompatible

In Fujitsu Enterprise Postgres 15, OIDs for national character data types (NCHAR types) have changed.

Action method

If you are using a national character data type (NCHAR type), recompile the application and run it with Fujitsu Enterprise Postgres 15 or later clients.

3.2.3 Changed the Specification Method of the Application Connection Switch Feature

Incompatible

In Fujitsu Enterprise Postgres 15, the name of the "target server" specified by the application connection switch feature will be changed.

Action method

For applications that specify a target server as the application connection switch feature, change the target server according to the table below, recompile, and then execute using a client of Fujitsu Enterprise Postgres 15 or later.

Table 3.1 Specified name of the target server.

Target of use	Before modification	After modification
Leverage .NET Data Provider	TargetServerType	TargetSessionAttributes

3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers

Incompatible

In Fujitsu Enterprise Postgres 15, if the SQL statement contains a zero-length Unicode identifier, Change precompilation to fail.

Action method

None.

3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity

Incompatibility

In FUJITSU Enterprise Postgres 14, the display result when data masking is applied to NaN, infinity, and -infinity will be changed.

FUJITSU Enterprise Postgres 13 SP1 or earlier

If the float type NaN, infinity, and -infinity are partially masking with (9,1,2), the following will be displayed.

```
NaN : 99
Infinity : 99
-Infinity : 99
```

FUJITSU Enterprise Postgres 14 or later

If the float type NaN, infinity, and -infinity are partially masking with (9,1,2), the following will be displayed.

```
NaN : NaN
Infinity : Infinity
-Infinity : -Infinity
```

Action method

If the application is analyzing the SQL masking output result, please consider the non-numeric output result and correct it.

3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement

Incompatibility

In FUJITSU Enterprise Postgres 14 will change the valid range of identifiers defined by a DECLARE STATEMENT statement in ecpg/ecobpg.

FUJITSU Enterprise Postgres 13 SP1 or earlier

The valid range is now per process.

FUJITSU Enterprise Postgres 14 or later

The valid range is now per file.

Action method

None.

3.2.7 Changing Precompile Results

Incompatibility

In FUJITSU Enterprise Postgres 14 removed the ECPGdeclare/ECPGopen function. Therefore, results precompiled from earlier versions of FUJITSU Enterprise Postgres will not be available in FUJITSU Enterprise Postgres 14.

Action method

Rebuild the application.

3.2.8 Changing the Trigger Replacement Process

Incompatibility

In FUJITSU Enterprise Postgres 14 will change restricted triggers to not be supported by replace operations (OR REPLACE).

FUJITSU Enterprise Postgres 13 SP1 or earlier

You can replace a constraint trigger.

[Example]

```
=# CREATE OR REPLACE CONSTRAINT TRIGGER my_constraint_trigger AFTER DELETE ON my_table
-# FOR EACH ROW
-# EXECUTE PROCEDURE funcA();
CREATE TRIGGER
```

FUJITSU Enterprise Postgres 14 or later

It does not support replacing a constraint trigger.

[Example]

```
=# CREATE OR REPLACE CONSTRAINT TRIGGER my_constraint_trigger AFTER DELETE ON my_table
-# FOR EACH ROW
-# EXECUTE PROCEDURE funcA();
ERROR: CREATE OR REPLACE CONSTRAINT TRIGGER is not supported
```

Action method

None.

3.2.9 Adding a TAP Test Framework

Incompatibility

In FUJITSU Enterprise Postgres 13, the TAP testing framework allows users to create and run TAP tests for their own extensions.

TAP test framework stored in:

<FUJITSU Software Enterprise Postgres installation directory>/lib/pgxs/src/test/perl/PostgreSQL/Test

Action method

None.

3.2.10 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.

3.2.11 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".

3.2.12 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

3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature

Incompatibility

Changes the order of the servers to be connected when you use the application connection switch feature.

FUJITSU Enterprise Postgres 9.6 or earlier

On subsequent connections within the same process, the server with the server attributes specified in target_session_attrs will try to connect first.

For example, if you specify host=host1, host2, host3 and target_session_attrs = read-write in a connection string in keyword/value format, and if host2 is the primary server during the first connection attempt, the connection attempts are made to host2, host3, and host1 in that order.

FUJITSU Enterprise Postgres 10 or later

Always attempt connections in the order specified in the connection string.

For example, if you specify host=host1, host2, host3 in a connection string in keyword/value format, connections are always attempted in the following order: host1, host2, host3.

Action method

None.

3.2.14 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.

3.2.15 Changing Vertical Clustered Index (VCI)

Incompatibility

In FUJITSU Enterprise Postgres 10, 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

3.2.16 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.

3.3 Operation Migration Incompatibility

3.3.1 Deprecation of Some Encryption Algorithms in pgcrypto

Incompatibility

In Fujitsu Enterprise Postgres 15 SP2 and later, the PostgreSQL extension pgcrypto does not support the use of the encryption algorithm, which has become a legacy algorithm in the OpenSSL3 family, by default.

The encryption algorithms that are no longer available by default are:

- BF
- CAST5
- DES-ECB
- DES-CBC
- MD4
- Whirlpool

Action method

If you use a legacy OpenSSL provider, create an OpenSSL configuration file and set the parameters in postgresql.conf. Refer to "Settings for Using Legacy OpenSSL Providers" in the Installation and Setup Guide for Server for information .

3.3.2 Deprecation of Certificates Signed Using SHA1

Incompatibility

In Fujitsu Enterprise Postgres 15 SP2 and later, you cannot connect to a database server using a certificate signed using SHA1.

Action method

Resubmit the certificate used for certificate authentication with SHA2 or higher.

3.3.3 Abolition of Message Numbers

Incompatibility

In Fujitsu Enterprise Postgres 15, the message number output at the end of the message is abolished.

Message numbers are output for messages output by Mirroring Controller.

For FUJITSU Enterprise Postgres 14 SP1 or earlier

The message number was printed at the end of the message.

[example]

```
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)
```

For Fujitsu Enterprise Postgres 15

No message number is output at the end of the message.

[example]

```
3D000: 2023-04-10 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
```

Action method

None.

3.3.4 Adding the key_name Column to the View pgx_tde_master_key

Incompatibility

In Fujitsu Enterprise Postgres 15, add a key_name column to the view pgx_tde_master_key.

Action method

None.

3.3.5 Changing the Output of the Status Mode of the cm_ctl Command

Incompatibility

Changes the display of the output of the status mode of the cm_ctl command.

(If it has been modified by the P number PH21029, and you have applied an urgent fix that includes it, FUJITSU Enterprise Postgres 14 will work.)

When the cm_ctl command was executed in status mode, there was omission of the output of the header "pid" displayed in "application_information" which outputs the information of the application.

Correct the following in PH21029.

- Add ':' to 'application_information' to output application information
Output "application_information:"
- Add the header "pid" output to "application_information"
Outputs "pid" whose header information is missing.
- Changes the number of digits in the numeric portion of connected_time
Change the display start position of the date and time connected to the connmgr process to correct the gap between the start position of the header and the numeric part. (5 digits backward)

This fix causes the following incompatibilities when running the cm_ctl command in status mode:

- Add ":" to the display of "application_information"
- Display the header "pid" in "application_information"
- Change the output start position of the "connected_time" header of "application_information"
- Change the start of the date and time output of "connected_time" in "application_information" to 5 digits later.

FUJITSU Enterprise Postgres 13 SP1 or earlier

application_information			
addr	port	connected_time	
10.xxx.x.xx	99999	21655	2021-10-20 09:18:51

FUJITSU Enterprise Postgres 14

application_information:			
addr	port	pid	connected_time
10.xxx.x.xx	99999	21655	2021-10-20 09:18:51

When analyzing the output of the `cm_ctl` command in status mode in a batch or shell script, it may not work correctly if the header is referenced and the third is "connected_time".

For example, when identifying a row of data (numeric part), a string up to the header "addr", "port", and "connected_time" one row before is searched for and identified.

Action method

If you are using a batch or shell script to parse the output of the `cm_ctl` command in status mode, modify it to take into account the number of digits in the header and numeric part of the output.

3.3.6 Rename column "master_pid" in pgx_loader_state to "leader_pid"

Incompatibility

In FUJITSU Enterprise Postgres 14 renames column "master_pid" to "leader_pid" in the `pgx_loader_state` table.

Action method

None.

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

Incompatibility

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, 13, 13SP1, 14, 14SP1, 15

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 12 SP1, 15SP1 or later

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.

3.3.8 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, 13 or later

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.

3.3.9 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.

3.3.10 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_tuplstore (*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.

3.3.11 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.

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

Incompatibility

For the FUJITSU Enterprise Postgres 12 Mirroring Controller, change the heartbeat monitoring of the database process so that it does not retry monitoring when it detects down.

Action method

None.

3.3.13 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.

3.3.14 Changing Mirroring Controller User Command Input Values

Incompatibility

In FUJITSU Enterprise Postgres 12, 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.

3.3.15 Changing the Maximum Number of Connections per Server

Incompatibility

In FUJITSU Enterprise Postgres 10, the maximum number of connections per server is changed from 262,143 to 65,535.

Action method

None.

3.3.16 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

Incompatibility

In FUJITSU Enterprise Postgres 10, the ALTER TABLESPACE statement can be used to change the tablespace encryption settings if data is not stored in the tablespace.

Action method

None.

3.3.17 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

3.3.18 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.

3.3.19 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'.

3.3.20 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.

3.3.21 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'

3.3.22 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.

3.4 JDBC Driver Incompatibility

3.4.1 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 3.2 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

3.4.2 Changing the Statement Cache Limit Setting Method

Incompatibility

FUJITSU Enterprise Postgres 9.6 changes the way the statement cache cap is set.

FUJITSU Enterprise Postgres 9.5 or earlier

The maxStatements parameter of the connection string or the setMaxStatements method.

FUJITSU Enterprise Postgres 9.6 or later

Specified in the connection string or property by the preparedStatementCacheQueries and preparedStatementCacheSizeMiB parameters.

Action method

None.

3.5 ODBC Driver Incompatibility

3.5.1 Cannot specify prefer-read for target_session_attrs

Incompatibility

FUJITSU Enterprise Postgres 14 users will not see the "prefer-read" radio button in the "Target_Session_Attrs" item of the data source option selection screen.

Action method

Select prefer-standby.

3.6 .NET Data Provider Incompatibility

3.6.1 .NET Application Development and Operating Environment Changes

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following .NET have been removed from the environment required to develop and run .NET applications:

- .NET 6.0
- .NET 7.0

Action method

None.

3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature

Incompatibility

In Fujitsu Enterprise Postgres 15, the name of the "target server" specified by the connection switching function will be changed from "TargetServerType" to "TargetSessionAttributes", and the specified value will also be changed.

Action method

If the target server is specified, change the target server and specified value as follows.

Table 3.3 How to specify the connection destination switching function of the application and the specified value

Fujitsu Enterprise Postgres version		FUJITSU Enterprise Postgres 9.6 or earlier	FUJITSU Enterprise Postgres 10/11/12	FUJITSU Enterprise Postgres 13/14	Fujitsu Enterprise Postgres 15
Keywords to specify in the connection string		target_server	TargetServerType	TargetServerType	TargetSessionAttributes
Server selection order	Primary Server	primary(*1)	master(*1)	primary(*1)	read-write(*1) primary(*2)
	Standby Server	-	slave(*2)	standby(*2)	standby read-only(*2)
	Prefer Primary Server	-	-	-	prefer-primary
	Prefer Standby Server	prefer_standby	preferSlave	preferStandby	prefer-standby
	Any	-	any	any	any

*1: A primary server whose default transaction mode is read-only are not selected.

*2: A primary server whose default transaction mode is read-only is also selected.

3.6.3 Changing the Behavior of the Application Connection Switch Feature

Incompatibility

In Fujitsu Enterprise Postgres 15, when only one Host keyword is specified in the connection string, if a target server other than Any is specified, an exception will occur.

FUJITSU Enterprise Postgres 14 SP1 earlier

For example, if the connection string specifies "Host=host1, TargetServerType=primary", it will connect to host1 if host1 is the appropriate connection target.

Fujitsu Enterprise Postgres 15

For example, if "Host=host1, TargetSessionAttributes=primary" is specified in the connection string, an exception will always occur because the target server other than Any is specified for the specification of only one host information.

Action method

None.

3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String

Incompatibility

In Fujitsu Enterprise Postgres 15, when multiple hosts are specified in the connection string, even if one of them has an empty string specified, if another connectable connection destination is specified, that connection destination will be connected. In the old version, if there was even one host with an empty string, an exception would occur at that point.

FUJITSU Enterprise Postgres 14 SP1 earlier

For example, if "Host = host1," is specified in the connection string, an exception will always occur because the second host information is an empty string.

Fujitsu Enterprise Postgres 15

For example, if the connection string specifies "Host = host1," and if host1 is reachable, it will connect to host1 without throwing an exception.

Action method

None.

3.6.5 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 3.4 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

3.6.6 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.

3.7 C Library (libpq) Migration Incompatibility

3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter

Incompatibility

In FUJITSU Enterprise Postgres 14 changes the attach server priority if any of the following servers are specified simultaneously with "prefer-read" as the target_session_attrs parameter:

- Primary server (default_transaction_read_only = ON)
- Standby server

FUJITSU Enterprise Postgres 13 SP1 or earlier

The primary server (default_transaction_read_only = ON) and standby servers have the same priority.

FUJITSU Enterprise Postgres 14 or later

Standby servers connect in preference to primary servers (default_transaction_read_only = ON).

Action method

None.

3.8 oracle_fdw Incompatibility

3.8.1 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.

3.9 pg_statsinfo Incompatibility

3.9.1 Changing Simple Report Items

Incompatibility

In Fujitsu Enterprise Postgres 17, the following items have been removed from the BGWriter Statistics items output by the simple report function.

- Written Buffers By Backend (Average)
- Written Buffers By Backend (Maximum)
- Backend Executed fsync (Average)
- Backend Executed fsync (Maximum)

Action method

None.

3.9.2 Change the Contents of the bgwriter Table in the statsrepo Schema

Incompatibility

In Fujitsu Enterprise Postgres 17, remove buffers_backend and buffers_backend_fsync from the columns in the bgwriter table in the statsrepo schema.

Action method

None.

3.9.3 Rename Columns in statement Table in statsrepo Schema

Incompatibility

In Fujitsu Enterprise Postgres 17, rename the blk_read_time column to shared_blk_read_time and the blk_write_time column to shared_blk_write_time in the statement table of the statsrepo schema.

Action method

None.

3.9.4 Change the Default Value of the sttarget Column of the column Table in the statsrepo Schema

Incompatibility

In Fujitsu Enterprise Postgres 17, change the default value of the sttarget column of the column table in the statsrepo schema from "-1" to "NULL".

Action method

None.

3.10 pgaudit Incompatibility

3.10.1 Repairing Unwanted Output in the Audit Log

Incompatibility

In Fujitsu Enterprise Postgres 16, we changed the audit log so that it no longer contains unwanted information at the end.

Fujitsu Enterprise Postgres 15 SP2 or earlier

Some audit logs contain unwanted content at the end.

[Example]

```
Input: INSERT INTO trig_test VALUES ('new value');
Part of the audit log: NOTICE:  AUDIT: SESSION,WRITE,,[local],,pg_regress/class,,baz,,
11,2,INSERT,,TABLE,public.trig_audit,,INSERT INTO trig_audit SELECT 'I', now(), user, NULL,
NEW.*,("new value")  trig_audit AFTER ROW INSERT 16484 trig_test trig_test public 0  f"
```

Fujitsu Enterprise Postgres 16

Prevent unwanted from being output to the audit log.

[Example]

```
Input: INSERT INTO trig_test VALUES ('new value');
Part of the audit log: NOTICE:  AUDIT: SESSION,WRITE,,[local],,pg_regress/class,,baz,,
11,2,INSERT,,TABLE,public.trig_audit,,INSERT INTO trig_audit SELECT 'I', now(), user, NULL,
NEW.*,("new value")"
```

Action method

None.

3.10.2 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.

3.11 pg_dbms_stats Incompatibility

3.11.1 Change in Execution Plan due to Fixed Height of Btree index

Incompatibility

Fixing statistics with the following features may change the execution plan because the height of the Btree index is now fixed as well:

- `dbms_stats.lock_*`
- `dbms_stats.restore_*`
- `dbms_stats.import_*`

Action method

If you want to run compatibility with Fujitsu Enterprise Postgres 15 SP2 and earlier, configure the following:

- `pg_dbms_stats.use_tree_height`
- `pg_dbms_stats.lock_tree_height`

3.11.2 Incompatibility of Import Features with Fixed Height of Btree index

Incompatibility

Statistics exported by the export function in pg_dbms_stats prior to Fujitsu Enterprise Postgres 15 SP2 cannot be imported using the legacy import function.

Action method

When importing statistics exported by the export function in pg_dbms_stats prior to Fujitsu Enterprise Postgres 15 SP2, use a function with the suffix "_no_tree_height" appended to its name.

3.12 orafce Incompatibility

3.12.1 Interface changes due to enhancements to the DBMS_SQL package

Incompatibility

In Fujitsu Enterprise Postgres 17, includes enhancements to the DBMS_SQL package. The I/O interfaces of some functions have changed accordingly.

Refer to "Compatibility with Oracle Databases" in Application Development Guide.

Action method

If you are using the DBMS_SQL package, you will need to switch to the same procedures as Fujitsu Enterprise Postgres 16 SP1 or earlier for Oracle database compatibility enhancements, or modify your application.

Refer to "Compatibility with Oracle Databases" in Application Development Guide.

3.13 psycopg Incompatibility

3.13.1 Python Version Changes Required When Using psycopg

Incompatibility

In Fujitsu Enterprise Postgres 18 or later, the following Python required for using psycopg on Windows have been removed from the Python distribution.

- Python version 3.9
- Python version 3.10

Action method

None.

3.14 WebAdmin Incompatibility

3.14.1 Linux server behavior changes for login authentication

Incompatibility

In Fujitsu Enterprise Postgres 16 SP1, the security policy for accounts in the OS is now also in effect upon login authentication from WebAdmin.

As a result, the following events may occur:

- If the number of authentication failures exceeds the login failure limit, the OS account is also locked.

Action method

If your account is locked due to an authentication failure, ask your system administrator to unlock it.

To check whether a login failure occurred in WebAdmin, see the WebAdmin log in the following folder, and check whether a log containing "password is incorrect" was output.

/opt/fsepv<x>webadmin/log

3.14.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'

Incompatibility

In Fujitsu Enterprise Postgres 16, the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options' in the view 'PostgreSQL configuration' is changed in order to match the default value of PostgreSQL.

Fujitsu Enterprise Postgres 15 SP2 or earlier

0

Fujitsu Enterprise Postgres 16 or later

1

Action method

Change the value of the item 'Number of digits for floating values', if necessary.

3.14.3 Cannot specify prefer-read for target_session_attrs

Incompatibility

FUJITSU Enterprise Postgres 14 will no longer allow prefer-read to target_session_attrs as a connection method to an upstream server that is specified when creating an instance of a standby server.

Action method

Specify prefer-standby.

3.15 Connection Manager Incompatibility

3.15.1 Behavior change when "read-write" is specified for the target_session_attrs parameter

Incompatibility

FUJITSU Enterprise Postgres 13 SP1 or earlier

May be connected to primary server (default_transaction_read_only = ON).

FUJITSU Enterprise Postgres 14 or later

It is not connected to the primary server (default_transaction_read_only = ON).

Action method

For FUJITSU Enterprise Postgres 13 SP1 and earlier, specify "primary" for the target_session_attrs parameter.

3.16 Confidentiality Management Incompatibility

3.16.1 Changes due to Changes in the pg_dump Specification

Incompatibility

If you are using multiple non-superuser sensitivity confidentiality management role to manage the sensitivity matrix, run the product-provided policy configuration script to define a row-level security feature policy on the table provided by the sensitivity support feature to make the sensitivity management roles independent of each other.

In Fujitsu Enterprise Postgres 15 SP2 or earlier, the effects of this script could be retained and backed up by pg_dump, but as of Fujitsu Enterprise Postgres 16, policy settings can no longer be backed up.

Action method

In Fujitsu Enterprise Postgres 16 or later, if you are managing a sensitivity matrix using more than one confidentiality management role other than superuser, then immediately after restoring a clear-text dump file using pg_dump, run the following command as superuser to reapply the confidentiality management feature policy:

```
psql -f ${install_dir}/share/extension/pgx_confidential_management_support_policy.sql
```

3.16.2 Changing Permission Settings by Changing the CREATEROLE Permission

Incompatibility

In Fujitsu Enterprise Postgres 16, if you want to use a non-superuser role as a confidentiality management role, you may need to set additional permissions for the confidentiality management role.

Action method

The confidentiality management role must already have the privileges it expects to operate on, other than the CREATEROLE privilege.

[Example]

If the confidentiality management role "manager_role" is also going to work with CREATEDB privileges, it will also set CREATEDB privileges when the role is created, like this:

```
CREATE ROLE manager_role LOGIN CREATEROLE CREATEDB;
```

If the required permissions are not set, the sensitivity management API terminates abnormally with a message similar to the following:

```
ERROR: permission denied to create role
DETAIL: Only roles with the CREATEDB attribute may create roles with the CREATEDB attribute.
```

3.16.3 Change due to Restriction of CREATEROLE Privilege

Incompatibility

In Fujitsu Enterprise Postgres 16, if you want to use a non-superuser role as a secret management role, the permissions on the roles that can be set in the secret group are different, and the roles that you set in the secret group must be granted ADMIN OPTION permission on the secret confidentiality management role before they can be used.

Action method

Take one of the following actions:

- A role created with the privileges of the confidentiality management role is to be managed in the confidential group. This creates a role that grants only the ADMIN OPTIN privilege to the sensitive confidentiality management role.
- Grant ADMIN OPTION permission on the role to the sensitive management role before setting the managed role to the sensitive group.

[Example]

You want to grant only the ADMIN OPTION privilege for role "user_role1" to the confidentiality management role "manager_role".

```
GRANT user_role1 TO manager_role WITH ADMIN TRUE, INHERIT FALSE, SET FALSE;
```

If the required permissions are not set, the sensitivity management API terminates abnormally with a message similar to the following:

```
ERROR: permission denied to alter role
```

```
DETAIL: Only roles with the CREATEROLE attribute and the ADMIN option on role "user_role1" may  
alter this role.
```

Chapter 4 Program Updates

This version incorporates the following fixes:

- PostgreSQL 18



See

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

[PostgreSQL 18]

<https://www.postgresql.org/docs/18/release-18.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.

4.1 Fujitsu Enterprise Postgres 18 Program Updates

Table 4.1 Fujitsu Enterprise Postgres 18 Program Updates

P number	Update summary	AE	SE
PH24267	Even if a disk failure causing I/O errors occurs in the table space, WAL storage area, or database storage area, switching or disconnecting procedures may not occur.	Y	Y
PH24912	Replace OpenLDAP with 2.6.10.	Y	Y
PH24913	Replace libxml2 with 2.13.9.	Y	Y
PH24914	Replace OpenSSL with 3.5.4.	Y	Y
PH24916	Replace Kerberos with 1.22.1.	Y	Y
PH24917	Replace icu with 77.1.	Y	Y
PH24920	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pgBackRest 2.56.0.	Y	Y
PH24921	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pgAdmin4 9.6, 9.7, 9.8.	Y	Y
PH24922	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pg_bigm 1.2-20250903.	Y	Y
PH24923	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pgvector 0.8.1.	Y	Y
PH24924	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pg_cron 1.6.6, 1.6.7.	Y	Y
PH24926	Fujitsu Enterprise Postgres and the OSS Postgres have different public functions, causing issues for users such as errors during the build of peripheral OSS software.	Y	Y
PH24980	Update security bug fixes absorbed by PostgreSQL18.1 to Fujitsu Enterprise Postgres. - CVE-2025-12817 - CVE-2025-12818	Y	Y
PH24985	When using the transparent data encryption feature, errors may occur.	Y	Y

Y : Fixed

- : Not relevant to this product

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Fujitsu Enterprise Postgres 18 for x86

Release Notes

Windows

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 \(List\)](#)

Provides a list of incompatible items when migrating from previous versions.

[Chapter 3 Compatibility Information \(Details\)](#)

Explains incompatibilities and corrective actions to be taken when migrating from previous versions.

[Chapter 4 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
18	Application Development	COBOL Performance Improvement	Y	Y
	Install	RPM-based Installation	Y	Y
	OSS	PostgreSQL Rebase	Y	Y
		OSS Updates Provided	Y	Y

1.1 Features Added in 18

This section explains new features and improvements in Fujitsu Enterprise Postgres 18.

1.1.1 Application Development

This section explains the new features related to application development.

- COBOL Performance Improvement

1.1.1.1 COBOL Performance Improvement

Caching of host variables in the COBOL precompiler. This function is expected to improve the processing performance of embedded COBOL applications that use host variables.



See

Refer to "Embedded SQL in COBOL" in the Application Development Guide for details.

1.1.2 Install

This section explains the new feature related to install.

- RPM-based Installation

1.1.2.1 RPM-based Installation

You can now install from RPM packages.



See

Refer to Installation and Setup Guide for Client, and Installation and Setup Guide for Server Assistant for details.

1.1.3 OSS

This section explains the new feature related to OSS.

- PostgreSQL Rebase
- OSS Updates Provided

1.1.3.1 PostgreSQL Rebase

The PostgreSQL version that Fujitsu Enterprise Postgres is based on is 18.

1.1.3.2 OSS Updates Provided

The OSS provided by Fujitsu Enterprise Postgres has been updated.



See

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

Chapter 2 Compatibility Information (List)

Lists incompatible items when migrating from previous versions.

2.1 If the version before migration is Fujitsu Enterprise Postgres 17 SP2

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	There is no incompatibility.
C Library (libpq)	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	There is no incompatibility.
psycopg	3.11.1 Python Version Changes Required When Using psycopg
WebAdmin	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.2 If the Version Before Migration is Fujitsu Enterprise Postgres 17 SP1

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
Operation	There is no incompatibility.
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	There is no incompatibility.
C Library (libpq)	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	There is no incompatibility.
psycopg	3.11.1 Python Version Changes Required When Using psycopg
WebAdmin	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.3 If the Version Before Migration is Fujitsu Enterprise Postgres 17

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	There is no incompatibility.
WebAdmin	3.12.1 Changing the TLS Version Limit for HTTPS Connections in WebAdmin
Confidentiality Management	There is no incompatibility.

2.4 If the Version Before Migration is Fujitsu Enterprise Postgres 16 SP1

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
Application	3.2.1 Output File Change
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.

Classification	Reference
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.1 Changing the TLS Version Limit for HTTPS Connections in WebAdmin
Confidentiality Management	There is no incompatibility.

2.5 If the Version Before Migration is Fujitsu Enterprise Postgres 16

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
Application	3.2.1 Output File Change
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
pgaudit	There is no incompatibility.
pg_dbms_stats	There is no incompatibility.
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	There is no incompatibility.
Confidentiality Management	There is no incompatibility.

2.6 If the Version Before Migration is Fujitsu Enterprise Postgres 15

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
Application	3.2.1 Output File Change
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.1 .NET Application Development and Operating Environment Changes
C Library (libpq)	There is no incompatibility.
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
Confidentiality Management	3.13.1 Changes due to Changes in the pg_dump Specification
	3.13.2 Changing Permission Settings by Changing the CREATEROLE Permission
	3.13.3 Change due to Restriction of CREATEROLE Privilege

2.7 If the Version Before Migration is FUJITSU Enterprise Postgres 14

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl

Classification	Reference
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
JDBC Driver	There is no incompatibility.
ODBC Driver	There is no incompatibility.
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	There is no incompatibility.
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'

2.8 If the Version Before Migration is FUJITSU Enterprise Postgres 13 SP1

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl

Classification	Reference
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.12.3 Cannot specify prefer-read for target_session_attrs

2.9 If the Version Before Migration is FUJITSU Enterprise Postgres 13

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl

Classification	Reference
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'

Classification	Reference
	3.12.3 Cannot specify prefer-read for target_session_attrs

2.10 If the Version Before Migration is FUJITSU Enterprise Postgres 12 SP1

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.12 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
JDBC Driver	There is no incompatibility.
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter

Classification	Reference
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.12.3 Cannot specify prefer-read for target_session_attrs

2.11 If the Version Before Migration is FUJITSU Enterprise Postgres 12

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.3 Removing Operating System Support for Client Feature
	3.1.4 Removing Operating System Support for Server Assistant Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
	3.1.12 Removing Operating System Support for Client Feature
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Change the "elif" Statement Behavior in ecobpg
Operation	3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller
	3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller
	3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller
	3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller
	3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller
	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1

Classification	Reference
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.10 Changing the Value of the Category Column in the pg_settings view
	3.3.11 Changing pgx_stat_lwlock of the Statistics View
	3.3.12 Changing the Behavior of pgx_rcvall
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
	3.8.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'
	3.12.3 Cannot specify prefer-read for target_session_attrs

2.12 If the Version Before Migration is FUJITSU Enterprise Postgres 11

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
	3.1.12 Removing Operating System Support for Client Feature
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Server Feature
	3.1.15 Changing the Way OSS is Set Up

Classification	Reference
	3.1.16 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.17 Renaming WebAdmin Services
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Change the "elif" Statement Behavior in ecobpg
	3.2.10 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.11 Removing UTL_FILE for Oracle Database Compatibility Features
Operation	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.10 Changing the Value of the Category Column in the pg_settings view
	3.3.11 Changing pgx_stat_lwlock of the Statistics View
	3.3.12 Changing the Behavior of pgx_rcvall
	3.3.13 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down
	3.3.14 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command
	3.3.15 Changing Mirroring Controller User Command Input Values
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
	3.8.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.3 Cannot specify prefer-read for target_session_attrs

2.13 If the Version Before Migration is FUJITSU Enterprise Postgres 10

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
	3.1.12 Removing Operating System Support for Client Feature
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Server Feature
	3.1.15 Changing the Way OSS is Set Up
	3.1.16 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.17 Renaming WebAdmin Services
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Change the "elif" Statement Behavior in ecobpg
	3.2.10 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.11 Removing UTL_FILE for Oracle Database Compatibility Features
Operation	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"
	3.3.10 Changing the Value of the Category Column in the pg_settings view
	3.3.11 Changing pgx_stat_lwlock of the Statistics View
	3.3.12 Changing the Behavior of pgx_rcvall
	3.3.13 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down
	3.3.14 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command

Classification	Reference
	3.3.15 Changing Mirroring Controller User Command Input Values
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pgaudit	3.8.1 Repairing Unwanted Output in the Audit Log
	3.8.2 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.3 Cannot specify prefer-read for target_session_attrs

2.14 If the Version Before Migration is FUJITSU Enterprise Postgres 9.6

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl
	3.1.2 Removing Operating System Support for Client Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Server Feature
	3.1.15 Changing the Way OSS is Set Up
	3.1.16 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.17 Renaming WebAdmin Services
	3.1.18 Changing the Features Targeted for Installation in a 64-bit Environment
	3.1.19 Changing the Access Permissions of the Windows Client Installation Folder
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature

Classification	Reference
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Change the "elif" Statement Behavior in ecobpg
	3.2.10 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.11 Removing UTL_FILE for Oracle Database Compatibility Features
	3.2.12 Changing the Method of Specifying the Application Connection Switch Feature
	3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature
	3.2.14 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL
	3.2.15 Changing Vertical Clustered Index (VCI)
Operation	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.10 Changing the Value of the Category Column in the pg_settings view
	3.3.11 Changing pgx_stat_lwlock of the Statistics View
	3.3.12 Changing the Behavior of pgx_rcvall
	3.3.16 Changing the Maximum Number of Connections per Server
	3.3.17 Changing the Encryption Settings Using the ALTER TABLESPACE Statement
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
	3.6.6 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.3 Cannot specify prefer-read for target_session_attrs

2.15 If the Version Before Migration is FUJITSU Enterprise Postgres 9.5

Classification	Reference
Installation/Setup	3.1.1 Perl Version Changes Required When Using PL/Perl

Classification	Reference
	3.1.2 Removing Operating System Support for Client Feature
	3.1.5 Perl Version Changes Required When Using PL/Perl
	3.1.6 Tcl Version Changes Required When Using PL/Tcl
	3.1.7 Removing Operating System Support for Client Feature
	3.1.8 How max_wal_senders is calculated
	3.1.9 How max_worker_processes is calculated
	3.1.10 Removing Operating System Support for Client Feature
	3.1.11 Removing Operating System Support for Server Feature
	3.1.13 Removing Operating System Support for Client Feature
	3.1.14 Removing Operating System Support for Server Feature
	3.1.15 Changing the Way OSS is Set Up
	3.1.16 Changing Core and Log File Paths when Instance is Created with WebAdmin
	3.1.17 Renaming WebAdmin Services
	3.1.18 Changing the Features Targeted for Installation in a 64-bit Environment
	3.1.19 Changing the Access Permissions of the Windows Client Installation Folder
	3.1.20 Changing the WebAdmin Installation Method
Application	3.2.1 Output File Change
	3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters
	3.2.3 Changed the Specification Method of the Application Connection Switch Feature
	3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers
	3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity
	3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement
	3.2.7 Changing Precompile Results
	3.2.8 Changing the Trigger Replacement Process
	3.2.9 Change the "elif" Statement Behavior in ecobpg
	3.2.10 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type
	3.2.11 Removing UTL_FILE for Oracle Database Compatibility Features
	3.2.12 Changing the Method of Specifying the Application Connection Switch Feature
	3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature
	3.2.14 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL
	3.2.15 Changing Vertical Clustered Index (VCI)
	3.2.16 Changing how to Use the Features Compatible with Oracle Databases
Operation	3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto
	3.3.7 Deprecation of Certificates Signed Using SHA1
	3.3.8 Abolition of Message Numbers
	3.3.12 Changing the Behavior of pgx_rcvall
	3.3.13 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down
	3.3.16 Changing the Maximum Number of Connections per Server

Classification	Reference
	3.3.17 Changing the Encryption Settings Using the ALTER TABLESPACE Statement
	3.3.18 Changing the Default Configuration of the Cluster System Using Database Multiplexing
	3.3.19 Changing the Default Operation when mc_ctl Command Options are Omitted
	3.3.20 Changing the Connection Settings when Mirroring Controller Connects to an Instance
	3.3.21 Changing the Status Display of the Mirroring Controller Server
	3.3.22 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation
	3.3.23 Changing Masking Policy Definition for Unsupported Data Types
JDBC Driver	3.4.1 Changing the targetServerType Value
ODBC Driver	3.5.1 Cannot specify prefer-read for target_session_attrs
.NET Data Provider	3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature
	3.6.3 Changing the Behavior of the Application Connection Switch Feature
	3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String
	3.6.5 Changing the TargetServerType Value
	3.6.6 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider
C Library (libpq)	3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter
pg_dbms_stats	3.9.1 Change in Execution Plan due to Fixed Height of Btree index
	3.9.2 Incompatibility of Import Features with Fixed Height of Btree index
orafce	3.10.1 Interface changes due to enhancements to the DBMS_SQL package
WebAdmin	3.12.3 Cannot specify prefer-read for target_session_attrs

Chapter 3 Compatibility Information (Details)

This chapter explains incompatible items and actions required when migrating from an earlier version to Fujitsu Enterprise Postgres 18. Check compatibility before migrating and take the appropriate action.

3.1 Installation/Setup Incompatibility

3.1.1 Perl Version Changes Required When Using PL/Perl

Incompatibility

In Fujitsu Enterprise Postgres 18 or later, change the required Perl version to 5.42.x when using PL/Perl.

Action method

None.

3.1.2 Removing Operating System Support for Client Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 SP2, the following operating systems have been removed.

- Windows(R) 10

Action method

None.

3.1.3 Removing Operating System Support for Client Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following operating systems have been removed.

- RHEL8.5 or earlier
- SLES 15 SP3 or earlier

Action method

None.

3.1.4 Removing Operating System Support for Server Assistant Feature

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following operating systems have been removed.

- RHEL8.5 or earlier
- SLES 15 SP3 or earlier

Action method

None.

3.1.5 Perl Version Changes Required When Using PL/Perl

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, change the required Perl version to 5.40.0 when using PL/Perl.

Action method

None.

3.1.6 Tcl Version Changes Required When Using PL/Tcl ---

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, changes the required Tcl version to 9.0 when using PL/Tcl based on the Python 3 language.

Action method

None.

3.1.7 Removing Operating System Support for Client Feature ---

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, the following operating systems have been removed.

- RHEL7
- SLES 12

Action method

None.

3.1.8 How max_wal_senders is calculated ---

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, Fujitsu Enterprise Postgres uses the following values from the value set for the max_wal_senders parameter:

Policy-based password management in a streaming replication environment : Number of direct downstream hot standby servers

Action method

If necessary add a value for the max_wal_senders parameter.

3.1.9 How max_worker_processes is calculated ---

Incompatibility

In Fujitsu Enterprise Postgres 16 or later, Fujitsu Enterprise Postgres uses the following values from the value set for the max_worker_processes parameter:

Default value to use : 1

Policy-based password management in a streaming replication environment with a hot standby server : 1

Action method

If necessary add a value for the max_worker_processes parameter.

3.1.10 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.

3.1.11 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.

3.1.12 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.

3.1.13 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.

3.1.14 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.

3.1.15 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.

3.1.16 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.

3.1.17 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_xSPz_edition_64_WebAdmin_Port1

fsep_xSPz_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.

3.1.18 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.

3.1.19 Changing the Access Permissions of the Windows Client Installation Folder

Incompatibility

In FUJITSU Enterprise Postgres 10 or later, 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 `installDi\setup\revert_cacls.bat` as an administrator after installation.

3.1.20 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.

3.2 Application Migration Incompatibility

3.2.1 Output File Change

Incompatibility

In Fujitsu Enterprise Postgres 18, generates two temporary files during execution of the `ecobpg` command.

These temporary files are deleted upon successful or abnormal termination of the ecobpg command.

If an issue occurs during ecobpg command execution, these temporary files may remain. In such cases, delete them.

File names are output in the following format:

Output_filename.4-digit_random_number.{COB|IPB}.ecw

Action method

None.

3.2.2 Changing the OID of the Data Type (NCHAR type) that Handles National Characters

Incompatible

In Fujitsu Enterprise Postgres 15, OIDs for national character data types (NCHAR types) have changed.

Action method

If you are using a national character data type (NCHAR type), recompile the application and run it with Fujitsu Enterprise Postgres 15 or later clients.

3.2.3 Changed the Specification Method of the Application Connection Switch Feature

Incompatible

In Fujitsu Enterprise Postgres 15, the name of the "target server" specified by the application connection switch feature will be changed.

Action method

For applications that specify a target server as the application connection switch feature, change the target server according to the table below, recompile, and then execute using a client of Fujitsu Enterprise Postgres 15 or later.

Table 3.1 Specified name of the target server.

Target of use	Before modification	After modification
Leverage .NET Data Provider	TargetServerType	TargetSessionAttributes

3.2.4 Changes in ecpg/ecobpg Handling of Zero-Length Unicode Identifiers

Incompatible

In Fujitsu Enterprise Postgres 15, if the SQL statement contains a zero-length Unicode identifier, Change precompilation to fail.

Action method

None.

3.2.5 Changing the display result when data masking is applied to NaN, infinity, -infinity

Incompatibility

In FUJITSU Enterprise Postgres 14, the display result when data masking is applied to NaN, infinity, and -infinity will be changed.

FUJITSU Enterprise Postgres 13 SP1 or earlier

If the float type NaN, infinity, and -infinity are partially masking with (9,1,2), the following will be displayed.

```
NaN : 99
Infinity : 99
-Infinity : 99
```

FUJITSU Enterprise Postgres 14 or later

If the float type NaN, infinity, and -infinity are partially masking with (9,1,2), the following will be displayed.

```
NaN : NaN
Infinity : Infinity
-Infinity : -Infinity
```

Action method

If the application is analyzing the SQL masking output result, please consider the non-numeric output result and correct it.

3.2.6 Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement

Incompatibility

In FUJITSU Enterprise Postgres 14 will change the valid range of identifiers defined by a DECLARE STATEMENT statement in ecpg/ecobpg.

FUJITSU Enterprise Postgres 13 SP1 or earlier

The valid range is now per process.

FUJITSU Enterprise Postgres 14 or later

The valid range is now per file.

Action method

None.

3.2.7 Changing Precompile Results

Incompatibility

In FUJITSU Enterprise Postgres 14 removed the ECPGdeclare/ECPGopen function. Therefore, results precompiled from earlier versions of FUJITSU Enterprise Postgres will not be available in FUJITSU Enterprise Postgres 14.

Action method

Rebuild the application.

3.2.8 Changing the Trigger Replacement Process

Incompatibility

In FUJITSU Enterprise Postgres 14 will change restricted triggers to not be supported by replace operations (OR REPLACE).

FUJITSU Enterprise Postgres 13 SP1 or earlier

You can replace a constraint trigger.

[Example]

```
=# CREATE OR REPLACE CONSTRAINT TRIGGER my_constraint_trigger AFTER DELETE ON my_table
-# FOR EACH ROW
-# EXECUTE PROCEDURE funcA();
CREATE TRIGGER
```

FUJITSU Enterprise Postgres 14 or later

It does not support replacing a constraint trigger.

[Example]

```
=# CREATE OR REPLACE CONSTRAINT TRIGGER my_constraint_trigger AFTER DELETE ON my_table
-# FOR EACH ROW
-# EXECUTE PROCEDURE funcA();
ERROR: CREATE OR REPLACE CONSTRAINT TRIGGER is not supported
```

Action method

None.

3.2.9 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.

3.2.10 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".

3.2.11 Removing UTL_FILE for Oracle Database Compatibility Features

Incompatibility

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

Action method

None.

3.2.12 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 Environment variable (PGTARGETSESSIONATTRS)

Usage target	Before correction	After correction
	Environment variable (PGXTARGETSERVER)	
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

3.2.13 Changing the order of servers to be connected by the Application Connection Switch Feature

Incompatibility

Changes the order of the servers to be connected when you use the application connection switch feature.

FUJITSU Enterprise Postgres 9.6 or earlier

On subsequent connections within the same process, the server with the server attributes specified in target_session_attrs will try to connect first.

For example, if you specify host=host1, host2, host3 and target_session_attrs = read-write in a connection string in keyword/value format, and if host2 is the primary server during the first connection attempt, the connection attempts are made to host2, host3, and host1 in that order.

FUJITSU Enterprise Postgres 10 or later

Always attempt connections in the order specified in the connection string.

For example, if you specify host=host1, host2, host3 in a connection string in keyword/value format, connections are always attempted in the following order: host1, host2, host3.

Action method

None.

3.2.14 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.

3.2.15 Changing Vertical Clustered Index (VCI)

Incompatibility

In FUJITSU Enterprise Postgres 10, 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

3.2.16 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.

3.3 Operation Migration Incompatibility

3.3.1 Disabling TLS1.0 and TLS1.1 Connections on the Mirroring Controller

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the Mirroring Controller no longer supports SSL connections using TLS1.0 and TLS1.1.

Action method

If ssl_min_protocol or ssl_max_protocol is set to allow only TLS1.0 or TLS1.1, change it to allow TLS1.2 or later.

3.3.2 Disabling Some Elliptic Curve Cryptography Algorithms in the Mirroring Controller

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the Mirroring Controller no longer supports SSL connections using the following elliptic curve cryptography algorithms:

- secp112r*
- secp128r*
- secp160*
- secp192*
- secp224*
- secp256k1
- sect113r*
- sect131r*
- sect163*
- sect193r*
- sect233*
- sect239k1
- sect283*
- sect409*
- sect571*
- X9.62 c2tnb191v*
- X9.62 c2tnb239v*
- X9.62 c2tnb359v1
- X9.62 c2tnb431r1
- X9.62 prime192v2
- X9.62 prime192v3
- X9.62 prime239v*
- brainpoolP256r1
- brainpoolP320r1
- brainpoolP384r1
- brainpoolP512r1

Action method

Change `ssl_ecdh_curve` to an allowed elliptic curve.

3.3.3 Changing the Default Protocol for SSL Connections on the Mirroring Controller

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the default protocol for SSL connections on the Mirroring Controller has been changed to TLS1.3.

Action method

Set `ssl_min_protocol` or `ssl_max_protocol` to allow TLS1.3 connections.

3.3.4 Disabling a portion of Root Certificates on the Mirroring Controller

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the following root certificates can no longer be used to establish an SSL connection with the Mirroring Controller:

- Alias name: entrustevca [jdk]
- Alias name: entrustrootcaec1 [jdk]
- Alias name: entrustrootcag2 [jdk]
- Alias name: entrustrootcag4 [jdk]
- Alias name: entrust2048ca [jdk]
- Alias name: affirmtrustcommercialca [jdk]
- Alias name: affirmtrustnetworkingca [jdk]
- Alias name: affirmtrustpremiumca [jdk]
- Alias name: affirmtrustpremiumeccca [jdk]
- Alias Name: thawtepremiumserverca [jdk]
- Alias Name: verisignclass2g2ca [jdk]
- Alias Name: verisignclass3ca [jdk]
- Alias Name: verisignclass3g2ca [jdk]
- Alias Name: verisigntsaca [jdk]
- Alias Name: soneraclass2ca
- Alias Name: identrustdstx3 [jdk]
- Alias Name: globalsignr2ca [jdk]
- Alias Name: secomscrootca1 [jdk]

Action method

If you are using an applicable root certificate, change it to a valid root certificate.

3.3.5 Disabling the TLS_ECDH_* Cipher Suite on the Mirroring Controller

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the Mirroring Controller can no longer use the TLS_ECH_* cipher suite during SSL connections.

Action method

Change ssl_cipher to use a cipher suite other than TLS_ECDH_*.

3.3.6 Deprecation of Some Encryption Algorithms in pgcrypto

Incompatibility

In Fujitsu Enterprise Postgres 16 and later, the PostgreSQL extension pgcrypto does not support the use of the encryption algorithm, which has become a legacy algorithm in the OpenSSL3 family, by default.

The encryption algorithms that are no longer available by default are:

- BF
- CAST5

- DES-ECB
- DES-CBC
- MD4
- Whirlpool

Action method

If you use a legacy OpenSSL provider, create an OpenSSL configuration file and set the parameters in postgresql.conf. Refer to "Settings for Using Legacy OpenSSL Providers" in the Installation and Setup Guide for Server for information .

3.3.7 Deprecation of Certificates Signed Using SHA1

Incompatibility

In Fujitsu Enterprise Postgres 16 and later, you cannot connect to a database server using a certificate signed using SHA1.

Action method

Resubmit the certificate used for certificate authentication with SHA2 or higher.

3.3.8 Abolition of Message Numbers

Incompatibility

In Fujitsu Enterprise Postgres 15, the message number output at the end of the message is abolished.

Message numbers are output for messages output by Mirroring Controller.

For FUJITSU Enterprise Postgres 14 or earlier

The message number was printed at the end of the message.

[example]

```
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)
```

For Fujitsu Enterprise Postgres 15

No message number is output at the end of the message.

[example]

```
3D000: 2023-04-10 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
```

Action method

None.

3.3.9 Rename column "master_pid" in pgx_loader_state to "leader_pid"

Incompatibility

In FUJITSU Enterprise Postgres 14 renames column "master_pid" to "leader_pid" in the pgx_loade_state table.

Action method

None.

3.3.10 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.

3.3.11 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

FUJITSU Enterprise Postgres 12 or earlier	FUJITSU Enterprise Postgres 13
session_typmod_table (*3)	PerSessionRecordTypmod
shared_tupstore (*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.

3.3.12 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.

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

Incompatibility

For the FUJITSU Enterprise Postgres 12 Mirroring Controller, change the heartbeat monitoring of the database process so that it does not retry monitoring when it detects down.

Action method

None.

3.3.14 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.

3.3.15 Changing Mirroring Controller User Command Input Values

Incompatibility

In FUJITSU Enterprise Postgres 12, 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.

3.3.16 Changing the Maximum Number of Connections per Server

Incompatibility

In FUJITSU Enterprise Postgres 10, the maximum number of connections per server is changed from 262,143 to 65,535.

Action method

None.

3.3.17 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

Incompatibility

In FUJITSU Enterprise Postgres 10, the ALTER TABLESPACE statement can be used to change the tablespace encryption settings if data is not stored in the tablespace.

Action method

None.

3.3.18 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

3.3.19 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.

3.3.20 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'.

3.3.21 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.

3.3.22 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'

3.3.23 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.

3.4 JDBC Driver Incompatibility

3.4.1 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 3.2 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

3.5 ODBC Driver Incompatibility

3.5.1 Cannot specify prefer-read for target_session_attrs

Incompatibility

FUJITSU Enterprise Postgres 14 users will not see the "prefer-read" radio button in the "Target_Session_Attrs" item of the data source option selection screen.

Action method

Select prefer-standby.

3.6 .NET Data Provider Incompatibility

3.6.1 .NET Application Development and Operating Environment Changes

Incompatibility

In Fujitsu Enterprise Postgres 17 or later, the following .NET have been removed from the environment required to develop and run .NET applications:

- .NET 6.0
- .NET 7.0

Action method

None.

3.6.2 Changing the Specification Method and Specified Values for the Application Connection Switch Feature

Incompatibility

In Fujitsu Enterprise Postgres 15, the name of the "target server" specified by the connection switching function will be changed from "TargetServerType" to "TargetSessionAttributes", and the specified value will also be changed.

Action method

If the target server is specified, change the target server and specified value as follows.

Table 3.3 How to specify the connection destination switching function of the application and the specified value

Fujitsu Enterprise Postgres version		FUJITSU Enterprise Postgres 9.6 or earlier	FUJITSU Enterprise Postgres 10/11/12	FUJITSU Enterprise Postgres 13/14	Fujitsu Enterprise Postgres 15
Keywords to specify in the connection string		target_server	TargetServerType	TargetServerType	TargetSessionAttributes
Server selection order	Primary Server	primary(*1)	master(*1)	primary(*1)	read-write(*1) primary(*2)
	Standby Server	-	slave(*2)	standby(*2)	standby read-only(*2)
	Prefer Primary Server	-	-	-	prefer-primary
	Prefer Standby Server	prefer_standby	preferSlave	preferStandby	prefer-standby
	Any	-	any	any	any

*1: A primary server whose default transaction mode is read-only are not selected.

*2: A primary server whose default transaction mode is read-only is also selected.

3.6.3 Changing the Behavior of the Application Connection Switch Feature

Incompatibility

In Fujitsu Enterprise Postgres 15, when only one Host keyword is specified in the connection string, if a target server other than Any is specified, an exception will occur.

FUJITSU Enterprise Postgres 14 earlier

For example, if the connection string specifies "Host=host1, TargetServerType=primary", it will connect to host1 if host1 is the appropriate connection target.

Fujitsu Enterprise Postgres 15

For example, if "Host=host1, TargetSessionAttributes=primary" is specified in the connection string, an exception will always occur because the target server other than Any is specified for the specification of only one host information.

Action method

None.

3.6.4 Behavior Change when Multiple Host Information is Specified in the Connection String

Incompatibility

In Fujitsu Enterprise Postgres 15, when multiple hosts are specified in the connection string, even if one of them has an empty string specified, if another connectable connection destination is specified, that connection destination will be connected. In the old version, if there was even one host with an empty string, an exception would occur at that point.

FUJITSU Enterprise Postgres 14 earlier

For example, if "Host = host1," is specified in the connection string, an exception will always occur because the second host information is an empty string.

Fujitsu Enterprise Postgres 15

For example, if the connection string specifies "Host = host1," and if host1 is reachable, it will connect to host1 without throwing an exception.

Action method

None.

3.6.5 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 3.4 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

3.6.6 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.

3.7 C Library (libpq) Migration Incompatibility

3.7.1 Changing when "prefer-read" is Specified for the target_session_attrs Parameter

Incompatibility

In FUJITSU Enterprise Postgres 14 changes the attach server priority if any of the following servers are specified simultaneously with "prefer-read" as the target_session_attrs parameter:

- Primary server (default_transaction_read_only = ON)
- Standby server

FUJITSU Enterprise Postgres 13 SP1 or earlier

The primary server (default_transaction_read_only = ON) and standby servers have the same priority.

FUJITSU Enterprise Postgres 14 or later

Standby servers connect in preference to primary servers (default_transaction_read_only = ON).

Action method

None.

3.8 pgaudit Incompatibility

3.8.1 Repairing Unwanted Output in the Audit Log

Incompatibility

In Fujitsu Enterprise Postgres 16, we changed the audit log so that it no longer contains unwanted information at the end.

Fujitsu Enterprise Postgres 15 or earlier

Some audit logs contain unwanted content at the end.

[Example]

```
Input: INSERT INTO trig_test VALUES ('new value');
Part of the audit log: NOTICE:  AUDIT: SESSION,WRITE,,[local],,pg_regress/class,,baz,,
11,2,INSERT,,TABLE,public.trig_audit,,INSERT INTO trig_audit SELECT 'I', now(), user, NULL,
NEW.*, "new value")  trig_audit AFTER ROW INSERT 16484 trig_test trig_test public 0  f"
```

Fujitsu Enterprise Postgres 16

Prevent unwanted from being output to the audit log.

[Example]

```
Input: INSERT INTO trig_test VALUES ('new value');
Part of the audit log: NOTICE:  AUDIT: SESSION,WRITE,,[local],,pg_regress/class,,baz,,
11,2,INSERT,,TABLE,public.trig_audit,,INSERT INTO trig_audit SELECT 'I', now(), user, NULL,
NEW.*, "new value")
```

Action method

None.

3.8.2 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.

3.9 pg_dbms_stats Incompatibility

3.9.1 Change in Execution Plan due to Fixed Height of Btree index

Incompatibility

Fixing statistics with the following features may change the execution plan because the height of the Btree index is now fixed as well:

- dbms_stats.lock_*
- dbms_stats.restore_*
- dbms_stats.import_*

Action method

If you want to run compatibility with Fujitsu Enterprise Postgres 15 and earlier, configure the following:

- pg_dbms_stats.use_tree_height
- pg_dbms_stats.lock_tree_height

3.9.2 Incompatibility of Import Features with Fixed Height of Btree index

Incompatibility

Statistics exported by the export function in pg_dbms_stats prior to Fujitsu Enterprise Postgres 15 cannot be imported using the legacy import function.

Action method

When importing statistics exported by the export function in pg_dbms_stats prior to Fujitsu Enterprise Postgres 15, use a function with the suffix "_no_tree_height" appended to its name.

3.10 orafce Incompatibility

3.10.1 Interface changes due to enhancements to the DBMS_SQL package

Incompatibility

In Fujitsu Enterprise Postgres 17, includes enhancements to the DBMS_SQL package. The I/O interfaces of some functions have changed accordingly.

Refer to "Compatibility with Oracle Databases" in Application Development Guide.

Action method

If you are using the DBMS_SQL package, you will need to switch to the same procedures as Fujitsu Enterprise Postgres 16 SP1 or earlier for Oracle database compatibility enhancements, or modify your application.

Refer to "Compatibility with Oracle Databases" in Application Development Guide.

3.11 psycopg Incompatibility

3.11.1 Python Version Changes Required When Using psycopg

Incompatibility

In Fujitsu Enterprise Postgres 18 or later, the following Python required for using psycopg on Windows have been removed from the Python distribution.

- Python version 3.9
- Python version 3.10

Action method

None.

3.12 WebAdmin Incompatibility

3.12.1 Changing the TLS Version Limit for HTTPS Connections in WebAdmin

Incompatibility

In Fujitsu Enterprise Postgres 17 SP1, the use of TLS1.0 and TLS1.1 is disabled when WebAdmin is configured to use HTTPS connections.

Action method

To access WebAdmin, use a browser that supports TLS1.2 or later.

3.12.2 Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'

Incompatibility

In Fujitsu Enterprise Postgres 16, the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options' in the view 'PostgreSQL configuration' is changed in order to match the default value of PostgreSQL.

Fujitsu Enterprise Postgres 15 or earlier

0

Fujitsu Enterprise Postgres 16 or later

1

Action method

Change the value of the item 'Number of digits for floating values', if necessary.

3.12.3 Cannot specify prefer-read for target_session_attrs

Incompatibility

FUJITSU Enterprise Postgres 14 will no longer allow prefer-read to target_session_attrs as a connection method to an upstream server that is specified when creating an instance of a standby server.

Action method

Specify prefer-standby.

3.13 Confidentiality Management Incompatibility

3.13.1 Changes due to Changes in the pg_dump Specification

Incompatibility

If you are using multiple non-superuser sensitivity confidentiality management role to manage the sensitivity matrix, run the product-provided policy configuration script to define a row-level security feature policy on the table provided by the sensitivity support feature to make the sensitivity management roles independent of each other.

In Fujitsu Enterprise Postgres 15 or earlier, the effects of this script could be retained and backed up by pg_dump, but as of Fujitsu Enterprise Postgres 16, policy settings can no longer be backed up.

Action method

In Fujitsu Enterprise Postgres 16 or later, if you are managing a sensitivity matrix using more than one confidentiality management role other than superuser, then immediately after restoring a clear-text dump file using pg_dump, run the following command as superuser to reapply the confidentiality management feature policy:

```
psql -f ${install_dir}/share/extension/pgx_confidential_management_support_policy.sql
```

3.13.2 Changing Permission Settings by Changing the CREATEROLE Permission

Incompatibility

In Fujitsu Enterprise Postgres 16, if you want to use a non-superuser role as a confidentiality management role, you may need to set additional permissions for the confidentiality management role.

Action method

The confidentiality management role must already have the privileges it expects to operate on, other than the CREATEROLE privilege.

[Example]

If the confidentiality management role "manager_role" is also going to work with CREATEDB privileges, it will also set CREATEDB privileges when the role is created, like this:

```
CREATE ROLE manager_role LOGIN CREATEROLE CREATEDB;
```

If the required permissions are not set, the sensitivity management API terminates abnormally with a message similar to the following:

```
ERROR: permission denied to create role
DETAIL: Only roles with the CREATEDB attribute may create roles with the CREATEDB attribute.
```

3.13.3 Change due to Restriction of CREATEROLE Privilege

Incompatibility

In Fujitsu Enterprise Postgres 16, if you want to use a non-superuser role as a secret management role, the permissions on the roles that can be set in the secret group are different, and the roles that you set in the secret group must be granted ADMIN OPTION permission on the secret confidentiality management role before they can be used.

Action method

Take one of the following actions:

- A role created with the privileges of the confidentiality management role is to be managed in the confidential group. This creates a role that grants only the ADMIN OPTIN privilege to the sensitive confidentiality management role.
- Grant ADMIN OPTION permission on the role to the sensitive management role before setting the managed role to the sensitive group.

[Example]

You want to grant only the ADMIN OPTION privilege for role "user_role1" to the confidentiality management role "manager_role".

```
GRANT user_role1 TO manager_role WITH ADMIN TRUE, INHERIT FALSE, SET FALSE;
```

If the required permissions are not set, the sensitivity management API terminates abnormally with a message similar to the following:

```
ERROR: permission denied to alter role
DETAIL: Only roles with the CREATEROLE attribute and the ADMIN option on role "user_role1" may
alter this role.
```

Chapter 4 Program Updates

This version incorporates the following fixes:

- PostgreSQL 18



See

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

[PostgreSQL 18]

<https://www.postgresql.org/docs/18/release-18.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.

4.1 Fujitsu Enterprise Postgres 18 Program Updates

Table 4.1 Fujitsu Enterprise Postgres 18 Program Updates

P number	Update summary	AE	SE
PH24267	Even if a disk failure causing I/O errors occurs in the table space, WAL storage area, or database storage area, switching or disconnecting procedures may not occur.	Y	Y
PH24912	Replace OpenLDAP with 2.6.10.	Y	Y
PH24913	Replace libxml2 with 2.13.9.	Y	Y
PH24914	Replace OpenSSL with 3.5.4.	Y	Y
PH24916	Replace Kerberos with 1.22.1.	Y	Y
PH24917	Replace icu with 77.1.	Y	Y
PH24921	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pgAdmin4 9.6, 9.7, 9.8.	Y	Y
PH24923	Update Fujitsu Enterprise Postgres with bug fixes absorbed by pgvector 0.8.1.	Y	Y
PH24926	Fujitsu Enterprise Postgres and the OSS Postgres have different public functions, causing issues for users such as errors during the build of peripheral OSS software.	Y	Y
PH24980	Update security bug fixes absorbed by PostgreSQL18.1 to Fujitsu Enterprise Postgres. - CVE-2025-12817 - CVE-2025-12818	Y	Y
PH24985	When using the transparent data encryption feature, errors may occur.	Y	Y

Y : Fixed

- : Not relevant to this product

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