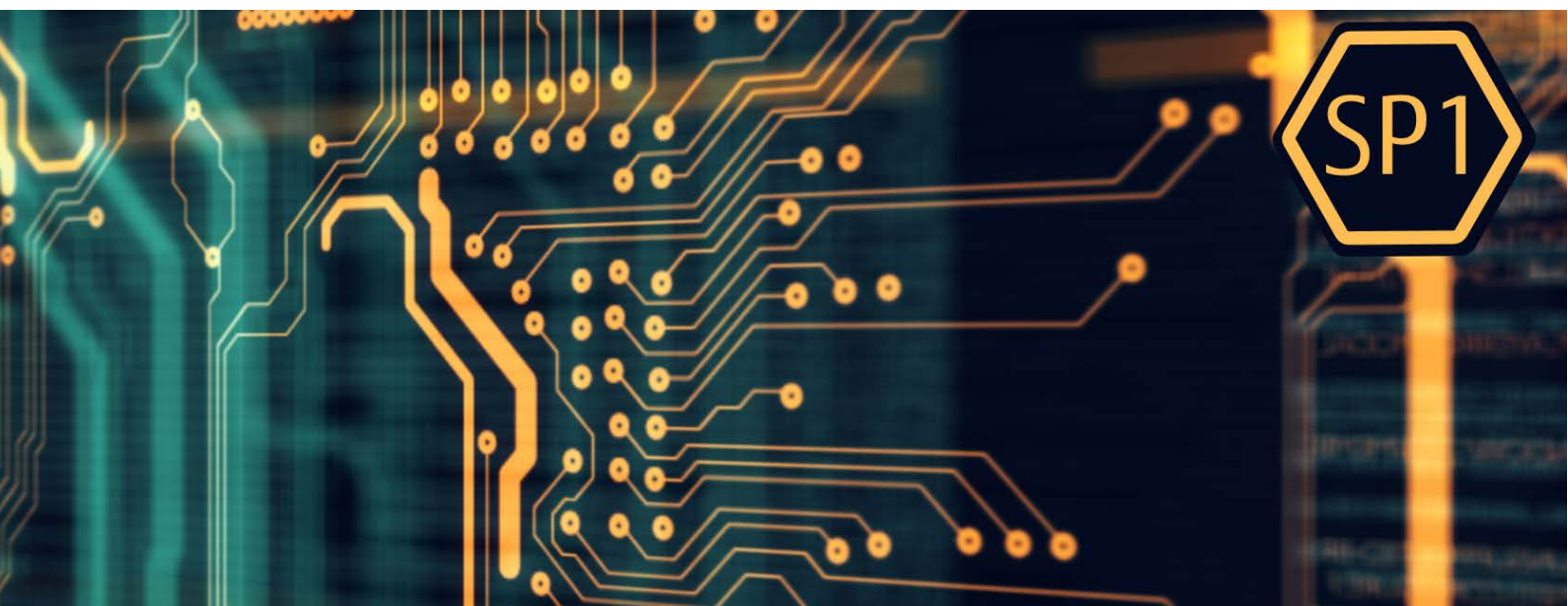


# FUJITSU Enterprise Postgres 13

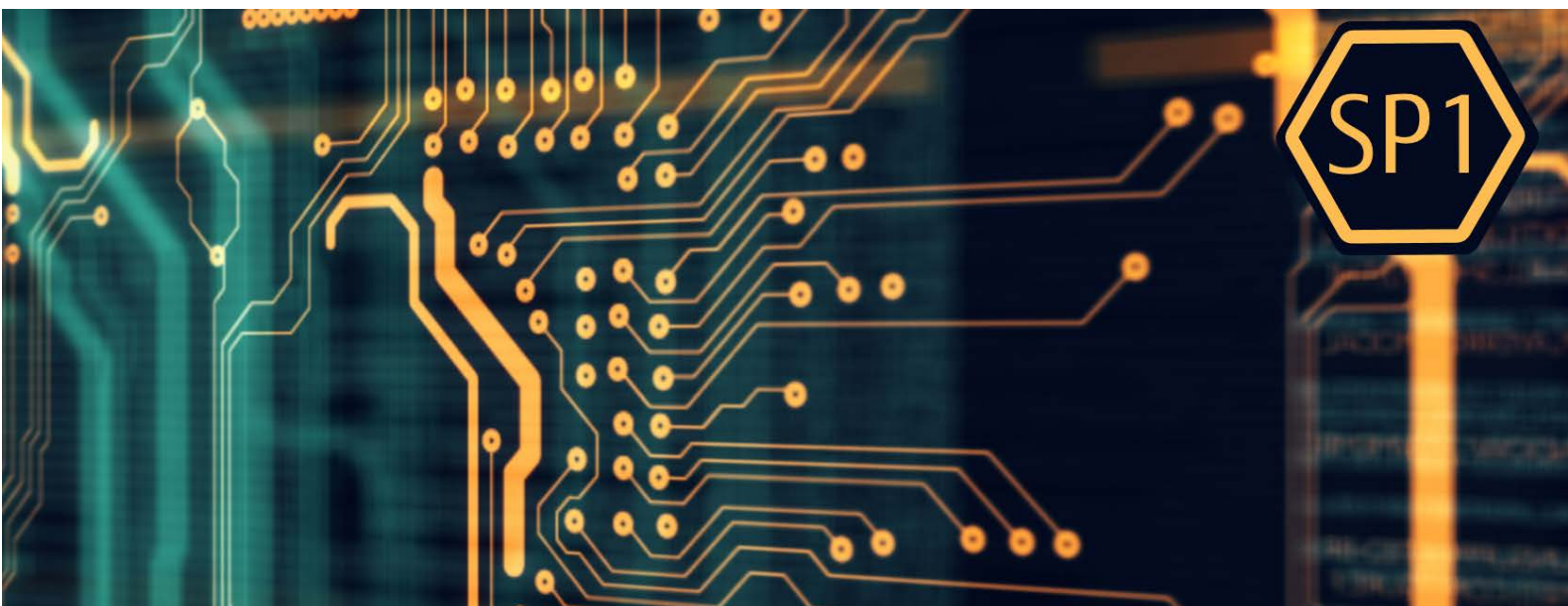


## Release Notes

[Linux >](#)

[Windows >](#)

# FUJITSU Enterprise Postgres 13



## Release Notes

*(Linux)*

Linux

J2UL-2671-02ENZ0(00)

August 2021

# Preface

---

## Purpose of this document

This document provides release information for FUJITSU Enterprise Postgres.

## Structure of this document

This document is structured as follows:

### [Chapter 1 New Features and Improvements](#)

Explains the new features and improvements in this version.

### [Chapter 2 Compatibility Information](#)

Provides information regarding compatibility.

### [Chapter 3 Program Updates](#)

Explains updates incorporated in this version.

## Export restrictions

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

## Issue date and version

|   |
|---|
| Edition 2.0: August 2021<br>Edition 1.0: April 2021 |
|---|

## Copyright

Copyright 2015-2021 FUJITSU LIMITED

# Contents

---

|   |    |
|---|----|
| Chapter 1 New Features and Improvements.....  | 1  |
| 1.1 Features Added in 13 SP1.....   | 1  |
| 1.1.1 OSS.....  | 1  |
| 1.1.1.1 PostgreSQL Rebase.....  | 1  |
| 1.2 Features Added in 13.....   | 1  |
| 1.2.1 Application Development.....  | 1  |
| 1.2.1.1 Support for OpenJDK.....  | 1  |
| 1.2.2 OSS.....  | 1  |
| 1.2.2.1 PostgreSQL Rebase.....  | 2  |
| 1.2.2.2 Update of OSS Provided.....   | 2  |
| Chapter 2 Compatibility Information.....  | 3  |
| 2.1 Installation/Setup Incompatibility.....   | 3  |
| 2.1.1 Removing Operating System Support for Client Feature.....   | 3  |
| 2.1.2 Removing Operating System Support for Client Feature.....   | 3  |
| 2.1.3 Removing Operating System Support for Server Feature.....   | 4  |
| 2.1.4 Changing kernel parameter settings when an instance is created with WebAdmin.....   | 4  |
| 2.1.5 Removing Operating System Support for Client Feature.....   | 5  |
| 2.1.6 Removing Operating System Support for Server Feature.....   | 5  |
| 2.1.7 Changing the Way OSS is Set Up.....   | 5  |
| 2.1.8 Modifying Pgpool-II Installation Handling.....  | 6  |
| 2.1.9 Changing Core and Log File Paths when Instance is Created with WebAdmin.....  | 6  |
| 2.1.10 Renaming WebAdmin Services.....  | 6  |
| 2.1.11 Changing the Features Targeted for Installation in a 64-bit Environment.....   | 7  |
| 2.1.12 Changing the Access Permissions of the Windows Client Installation Folder.....   | 7  |
| 2.1.13 Changing the WebAdmin Installation Method.....   | 7  |
| 2.2 Application Migration Incompatibility.....  | 8  |
| 2.2.1 Change the "elif" Statement Behavior in ecobpg.....   | 8  |
| 2.2.2 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type.....                     | 9  |
| 2.2.3 Changing the Method of Specifying the Application Connection Switch Feature.....  | 9  |
| 2.2.4 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL.....   | 10 |
| 2.2.5 Changing Vertical Clustered Index (VCI).....  | 10 |
| 2.2.6 Changing how to Use the Features Compatible with Oracle Databases.....  | 11 |
| 2.3 Operation Migration Incompatibility.....  | 11 |
| 2.3.1 Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down.....               | 12 |
| 2.3.2 Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection.....                      | 12 |
| 2.3.3 Changing the Value of the Category Column in the pg_settings view.....  | 13 |
| 2.3.4 Changing pgx_stat_lwlock of the Statistics View.....  | 13 |
| 2.3.5 Changing the Behavior of pgx_rcvall.....  | 14 |
| 2.3.6 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down.....                    | 15 |
| 2.3.7 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command.....                                  | 15 |
| 2.3.8 Changing Mirroring Controller User Command Input Values.....  | 15 |
| 2.3.9 Changing the Maximum Number of Connections per Server.....  | 16 |
| 2.3.10 Changing the Encryption Settings Using the ALTER TABLESPACE Statement.....   | 16 |
| 2.3.11 Changing the Default Configuration of the Cluster System Using Database Multiplexing.....                                  | 16 |
| 2.3.12 Changing the Default Operation when mc_ctl Command Options are Omitted.....  | 17 |
| 2.3.13 Changing the Connection Settings when Mirroring Controller Connects to an Instance.....                                    | 17 |
| 2.3.14 Changing the Status Display of the Mirroring Controller Server.....  | 17 |
| 2.3.15 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation..... | 18 |
| 2.3.16 Changing Masking Policy Definition for Unsupported Data Types.....   | 18 |
| 2.4 JDBC Drive Incompatibility.....   | 19 |
| 2.4.1 Changing the targetServerType Value.....  | 19 |
| 2.5 .NET Data Provider Incompatibility.....   | 19 |
| 2.5.1 Changing the TargetServerType Value.....  | 20 |

|  |    |
|--|----|
| 2.5.2 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider.....          | 20 |
| 2.6 oracle_fdw Incompatibility.....  | 20 |
| 2.6.1 Changing the Oracle Client Version.....  | 20 |
| 2.7 pgaudit Incompatibility.....   | 21 |
| 2.7.1 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes..... | 21 |
| Chapter 3 Program Updates.....   | 22 |
| Index.....   | 23 |

# Chapter 1 New Features and Improvements

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

Table 1.1 New features and improvements

| Version and level | Classification          | Feature                                | Provided in AE | Provided in SE |
|-------------------|-------------------------|--|----------------|----------------|
| 13 SP1            | OSS                     | <a href="#">PostgreSQL Rebase</a>      | Y              | Y              |
| 13                | Application development | <a href="#">Support for OpenJDK</a>    | Y              | Y              |
|                   | OSS                     | <a href="#">PostgreSQL Rebase</a>      | Y              | Y              |
|                   |                         | <a href="#">Update of OSS Provided</a> | Y              | Y              |

## 1.1 Features Added in 13 SP1

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

### 1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase

#### 1.1.1.1 PostgreSQL Rebase

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



See

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

## 1.2 Features Added in 13

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

### 1.2.1 Application Development

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

- Support for OpenJDK

#### 1.2.1.1 Support for OpenJDK

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



See

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

### 1.2.2 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

### 1.2.2.1 PostgreSQL Rebase

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



See

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

### 1.2.2.2 Update of OSS Provided

The OSS provided by FUJITSU Enterprise Postgres have been updated.



See

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

## Chapter 2 Compatibility Information

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

### 2.1 Installation/Setup Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

#### 2.1.1 Removing Operating System Support for Client Feature

##### Incompatibility

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

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

##### Action method

None.

#### 2.1.2 Removing Operating System Support for Client Feature

##### Incompatibility

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



- SLES 12 SP4 or earlier

#### Action method

None.

### 2.1.3 Removing Operating System Support for Server Feature

---

#### Incompatibility

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

- SLES 12 SP4 or earlier

#### Action method

None.

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

---

#### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

| Kernel Parameters | Value  | Calculated Value  |
|-------------------|--|---|
| SHMMAX            | If <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>                             | $(\text{SHMMAX} / \text{PAGESIZE}) + 1$<br><br>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:<br><br>$\text{ceil}((\text{max\_connections} + \text{autovacuum\_max\_workers} + \text{max\_worker\_processes} + 5) / 16)$ |

| Kernel Parameters | Value  | Calculated Value  |
|-------------------|--|---|
|                   |  | <p>- For Fujitsu Enterprise Postgres 12 and later instances:</p> <pre>ceil((max_connections + autovacuum_max_workers + max_wal_senders + max_worker_processes + 5) / 16)</pre>  |
| SEMMNS            | Specify <i>currentValue</i> + <i>calculatedValue</i> | <p>- For instances of FUJITSU Enterprise Postgres 9.5 to 11:</p> <pre>ceil((max_connections + autovacuum_max_workers + max_worker_processes + 5) / 16) * 17</pre> <p>- For Fujitsu Enterprise Postgres 12 and later instances:</p> <pre>ceil((max_connections + autovacuum_max_workers + max_wal_senders + max_worker_processes + 5) / 16) * 17</pre> |

#### Action method

None.

## 2.1.5 Removing Operating System Support for Client Feature

---

#### Incompatibility

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

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

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

#### Action method

None.

## 2.1.6 Removing Operating System Support for Server Feature

---

#### Incompatibility

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

- RHEL6

#### Action method

None.

## 2.1.7 Changing the Way OSS is Set Up

---

## Incompatibility

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

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

## Action method

None.

## 2.1.8 Modifying Pgpool-II Installation Handling

---

### Incompatibility

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

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

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

### Action method

None.

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

---

### Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

Log File Path: `/var/tmp/fsep_version/instanceAdminUser_instanceNamePortNumber/log`

Core File Path: `/var/tmp/fsep_version/instanceAdminUser_instanceNamePortNumber/core`  
*version*: product version\_edition\_architecture

[Example]

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

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

FUJITSU Enterprise Postgres 12

Log File Path: `/var/tmp/fsep_version/instanceAdminUser_instanceNamePortNumber/log`

Core File Path: `/var/tmp/fsep_version/instanceAdminUser_instanceNamePortNumber/core`  
*version*: product version\_WA\_architecture

[Example]

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

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

### Action method

None.

## 2.1.10 Renaming WebAdmin Services

---

## Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

`fsep_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.

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

---

### Incompatibility

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

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

### Action method

None.

## 2.1.12 Changing the Access Permissions of the Windows Client Installation Folder

---

### Incompatibility

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

The above changes apply to non-administrators.

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

### Action method

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

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

## 2.1.13 Changing the WebAdmin Installation Method

---

### Incompatibility

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

### Action method

None.

## 2.2 Application Migration Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.2.1 Change the "elif" Statement Behavior in ecobpg

#### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

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

[Example]

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

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

FUJITSU Enterprise Postgres 13 or later

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

[Example]

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

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

#### Action method

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

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

---

### Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

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

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

- 1) Create a Masking policy. and
- 2) Execute a SELECT statement. and
- 3) Execute an operator or function in the SELECT statement of 2). and
- 4) The operator or function argument of 3) includes a subquery. and
- 5) The operator or function argument of 3) contains the column to be protected created in 1). and
- 6) The operator or function of 3) returns a type not listed in "Data Types for Masking" in "Operation Guide".

FUJITSU Enterprise Postgres 12 or later

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

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

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

### Action method

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

- 1) Modify the Masking policy to prevent masking from being performed for the user executing the SQL.
- 2) Modify SQL to not use operators or functions that return types not listed in "Data Types for Masking" in "Operation Guide".

## 2.2.3 Changing the Method of Specifying the Application Connection Switch Feature

---

### Incompatibility

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

### Action method

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

Specified name of the target server

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

| Usage target | Before correction                         | After correction                               |
|--------------|---|--|
|              | Environment variable<br>(PGXTARGETSERVER) | Environment variable<br>(PGTARGETSESSIONATTRS) |
| Embedded SQL | target_server                             | target_session_attrs                           |
| psql         | Environment variable<br>(PGXTARGETSERVER) | Environment variable<br>(PGTARGETSESSIONATTRS) |

Specified value for the target server

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

## 2.2.4 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL

---

### Incompatibility

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

### Action method

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

## 2.2.5 Changing Vertical Clustered Index (VCI)

---

### Incompatibility

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

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

### Action method

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

[Example]

Before: select age(column A), current\_date from table

After: select age(column A, now()), (select current\_date) from table

## 2.2.6 Changing how to Use the Features Compatible with Oracle Databases

### Incompatibility

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

```
CREATE EXTENSION oracle_compatible
```

### Action method

None.

## 2.3 Operation Migration Incompatibility

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



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

Y: Incompatibility exists

N: Incompatibility does not exist

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

---

### Incompatibility

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

Incompatibilities may occur if:

- 1) The application server is using the Connection Manager. and
- 2) The database server is running the watchdog process. and
- 3) 1) Application server or Connection Manager goes down.

#### FUJITSU Enterprise Postgres 13 or earlier

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

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

#### FUJITSU Enterprise Postgres 13 SP1

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

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

### Action method

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

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

---

### Incompatibility

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

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

Incompatibilities may occur if the following conditions are met:

- 1) The application uses one of the following drivers. and
  - libpq (C Library)
  - ECPG (Embedded SQL in C)
- 2) You are using the Connection Manager. and

- 3) The database server to which the application in 1) was connected goes down. and
- 4) The Connection Manager notifies the application in 1) of an error when the database is down in 3). and
- 5) The application in 1) does not disconnect from the database server that is down, but executes SQL using the connection.

#### FUJITSU Enterprise Postgres 13 or earlier

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

#### FUJITSU Enterprise Postgres 13 SP1

The following error information is returned:

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

### Action method

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

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

## 2.3.3 Changing the Value of the Category Column in the pg\_settings view

### Incompatibility

For FUJITSU Enterprise Postgres 13, change the value of the category column in the pg\_settings view.

#### FUJITSU Enterprise Postgres 12 or earlier

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

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

#### FUJITSU Enterprise Postgres 13 or later

The correct value is the category column in the pg\_settings view.

### Action method

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

## 2.3.4 Changing pgx\_stat\_lwlock of the Statistics View

### Incompatibility

In FUJITSU Enterprise Postgres 13, change the wait event name displayed in the lwlock\_name column of the statistics view pgx\_stat\_lwlock.

#### Wait Event Name

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

| FUJITSU Enterprise Postgres 12 or earlier | FUJITSU Enterprise Postgres 13 |
|---|--------------------------------|
| multixact_offset (*1)                     | MultiXactOffsetBuffer          |
| multixact_member (*1)                     | MultiXactMemberBuffer          |
| async (*1)                                | NotifyBuffer                   |
| oldserxid (*1)                            | SerialBuffer                   |
| wal_insert (*1)                           | WALInsert                      |
| buffer_content (*1)                       | BufferContent                  |
| buffer_io (*1)                            | BufferIO                       |
| replication_origin (*1)                   | ReplicationOriginState         |
| replication_slot_io (*1)                  | ReplicationSlotIO              |
| proc (*1)                                 | LockFastPath                   |
| buffer_mapping (*1)                       | BufferMapping                  |
| lock_manager (*1)                         | LockManager                    |
| predicate_lock_manager (*1)               | PredicateLockManager           |
| parallel_hash_join (*3)                   | ParallelHashJoin               |
| parallel_query_dsa (*2)                   | ParallelQueryDSA               |
| session_dsa (*3)                          | PerSessionDSA                  |
| session_record_table (*3)                 | PerSessionRecordType           |
| session_typmod_table (*3)                 | PerSessionRecordTypmod         |
| shared_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.

## 2.3.5 Changing the Behavior of pgx\_rcvall

### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

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

FUJITSU Enterprise Postgres 13 or later

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

#### Action method

Specify recovery objectives correctly, if necessary.

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

---

#### Incompatibility

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

#### Action method

None.

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

---

#### Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

- Command Name  
post-promote command
- The parameter name in the server configuration file that specifies the post-promote command  
post\_promote\_command

FUJITSU Enterprise Postgres 12 or later

- Command Name  
post-switch command
- The parameter name in the server configuration file that specifies the post-promote command  
post\_switch\_command

#### Action method

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

## 2.3.8 Changing Mirroring Controller User Command Input Values

---

## Incompatibility

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

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

## Action method

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

## 2.3.9 Changing the Maximum Number of Connections per Server

---

### Incompatibility

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

### Action method

None.

## 2.3.10 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

---

### Incompatibility

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

### Action method

None.

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

---

### Incompatibility

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

FUJITSU Enterprise Postgres 9.6 or earlier

A cluster system comprises two database servers.

FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- Parameter: heartbeat\_error\_action
- Value: fallback

## 2.3.12 Changing the Default Operation when mc\_ctl Command Options are Omitted

---

### Incompatibility

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

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

FUJITSU Enterprise Postgres 9.6 or earlier

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

FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

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

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

---

### Incompatibility

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

- Application name

FUJITSU Enterprise Postgres 9.6 or earlier

- The application name is an empty string.

FUJITSU Enterprise Postgres 10 or later

- The application name is 'mc\_agent'.

### Action method

There is no method for changing the application name.

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

## 2.3.14 Changing the Status Display of the Mirroring Controller Server

---

### Incompatibility

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

- Role of the applicable server (host\_role): standby (standby)
- Display item: DBMS process status (db\_proc\_status)
- Display content: abnormal (abnormal process name)  
The applicability for incompatibility is determined based on whether 'wal\_receiver' is included in the abnormality process name.

#### FUJITSU Enterprise Postgres 9.6 or earlier

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

#### FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- If 'wal\_sender' is included in the abnormal process name displayed in the 'abnormal' db\_proc\_status item of the 'primary' host\_role, it is determined that an abnormality has occurred in the WAL receive process.
- If 'wal\_sender' is not included in the abnormal process name displayed in the 'abnormal' db\_proc\_status item of the 'primary' host\_role, it is determined that an abnormality has not occurred in the WAL receive process.

## 2.3.15 Changing the Operation when the synchronous\_standby\_names Parameter is Changed during Database Multiplexing Operation

---

### Incompatibility

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

#### FUJITSU Enterprise Postgres 9.6 or earlier

Mirroring Controller checks if the synchronous\_standby\_names parameter in postgresql.conf has been mistakenly changed by the user.

#### FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- Parameter: check\_synchronous\_standby\_names\_validation
- Value: 'on'

## 2.3.16 Changing Masking Policy Definition for Unsupported Data Types

---

### Incompatibility

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

#### FUJITSU Enterprise Postgres 9.5

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

## FUJITSU Enterprise Postgres 9.6 or later

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

### Action method

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

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

## 2.4 JDBC Drive Incompatibility

| Item  | Pre-migration version |     |    |    |    |    |
|---|-----------------------|-----|----|----|----|----|
|   | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing the targetServerType Value</a> | Y                     | Y   | Y  | Y  | Y  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.4.1 Changing the targetServerType Value

#### Incompatibility

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

#### Action method

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

Table 2.1 Specified values for the target server

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

## 2.5 .NET Data Provider Incompatibility

| Item   | Pre-migration version |     |    |    |    |    |
|--|-----------------------|-----|----|----|----|----|
|  | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing the TargetServerType Value</a>  | Y                     | Y   | Y  | Y  | Y  | N  |
| <a href="#">Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider</a> | Y                     | Y   | N  | N  | N  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist



## 2.5.1 Changing the TargetServerType Value

### Incompatibility

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

### Action method

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

Table 2.2 Specified values for the target server

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

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

### Incompatibility

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

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

### Action method

None.

## 2.6 oracle\_fdw Incompatibility

| Item   | Pre-migration version |     |    |    |    |    |
|--|-----------------------|-----|----|----|----|----|
|  | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing the Oracle Client Version</a> | N                     | N   | Y  | Y  | N  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist

## 2.6.1 Changing the Oracle Client Version

### Incompatibility

FUJITSU Enterprise Postgres 12 change the version of the Oracle client used to build oracle\_fdw to 11.2.

## Action method

Use Oracle client version 11.2 or later.

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

## 2.7 pgaudit Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

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

#### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

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

[Example]

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

FUJITSU Enterprise Postgres 13 or later

NEW, OLD values are output.

[Example]

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

## Action method

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

## Chapter 3 Program Updates

For program fix information, see "Program Updates".

# Index

---

[C]

Compatibility Information.....3

[F]

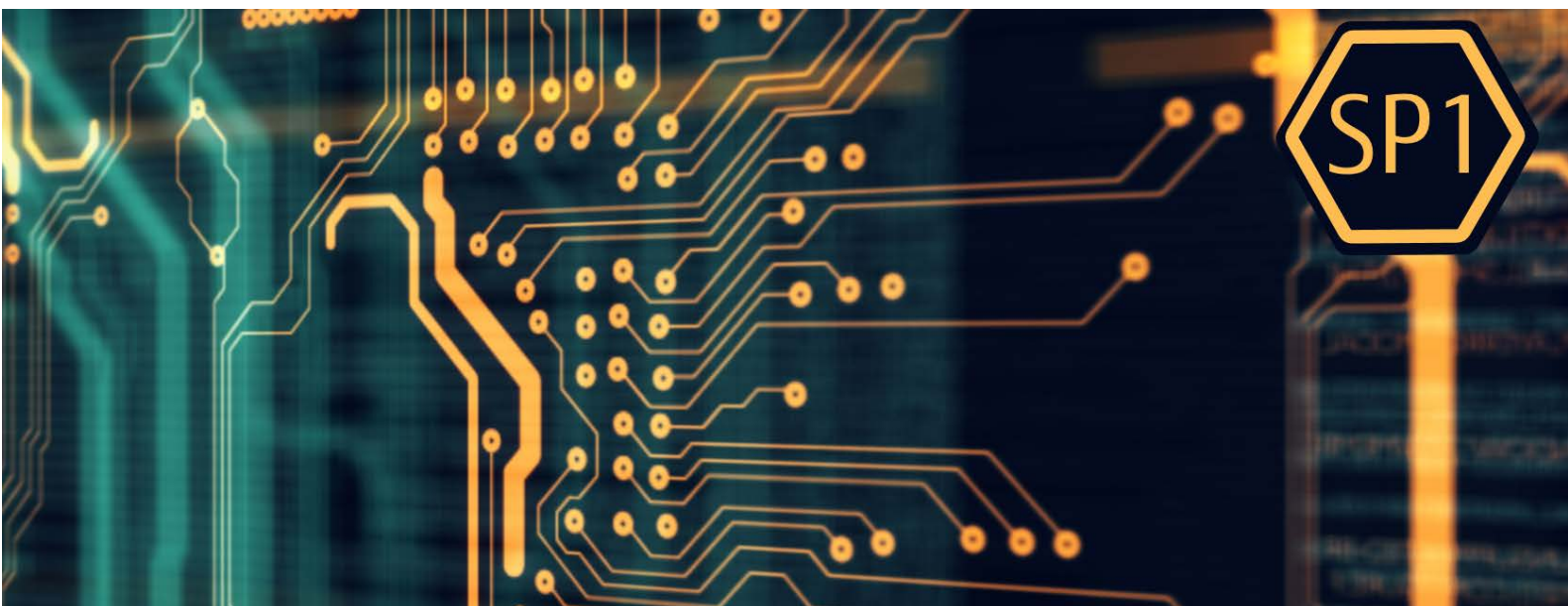
Features Added in 13.....1

Features Added in 13 SP1.....1

[P]

Program Updates.....22

# FUJITSU Enterprise Postgres 13



## Release Notes

*(Windows)*

Windows

B1WS-1436-02ENZ0(00)

August 2021

# Preface

---

## Purpose of this document

This document provides release information for FUJITSU Enterprise Postgres.

## Structure of this document

This document is structured as follows:

### [Chapter 1 New Features and Improvements](#)

Explains the new features and improvements in this version.

### [Chapter 2 Compatibility Information](#)

Provides information regarding compatibility.

### [Chapter 3 Program Updates](#)

Explains updates incorporated in this version.

## Export restrictions

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

## Issue date and version

|   |
|---|
| Edition 2.0: August 2021<br>Edition 1.0: April 2021 |
|---|

## Copyright

Copyright 2015-2021 FUJITSU LIMITED

# Contents

---

|   |    |
|---|----|
| Chapter 1 New Features and Improvements.....  | 1  |
| 1.1 Features Added in 13 SP1.....   | 1  |
| 1.1.1 OSS.....  | 1  |
| 1.1.1.1 PostgreSQL Rebase.....  | 1  |
| 1.2 Features Added in 13.....   | 1  |
| 1.2.1 Application Development.....  | 1  |
| 1.2.1.1 Support for OpenJDK.....  | 1  |
| 1.2.2 OSS.....  | 1  |
| 1.2.2.1 PostgreSQL Rebase.....  | 2  |
| 1.2.2.2 Update of OSS Provided.....   | 2  |
| Chapter 2 Compatibility Information.....  | 3  |
| 2.1 Installation/Setup Incompatibility.....   | 3  |
| 2.1.1 Removing Operating System Support for Client Feature.....   | 3  |
| 2.1.2 Removing Operating System Support for Server Feature.....   | 3  |
| 2.1.3 Removing Operating System Support for Client Feature.....   | 4  |
| 2.1.4 Removing Operating System Support for Client Feature.....   | 4  |
| 2.1.5 Removing Operating System Support for Server Feature.....   | 4  |
| 2.1.6 Changing the Way OSS is Set Up.....   | 4  |
| 2.1.7 Changing Core and Log File Paths when Instance is Created with WebAdmin.....  | 4  |
| 2.1.8 Renaming WebAdmin Services.....   | 5  |
| 2.1.9 Changing the Features Targeted for Installation in a 64-bit Environment.....  | 5  |
| 2.1.10 Changing the Access Permissions of the Windows Client Installation Folder.....   | 6  |
| 2.1.11 Changing the WebAdmin Installation Method.....   | 6  |
| 2.2 Application Migration Incompatibility.....  | 6  |
| 2.2.1 Change the "elif" Statement Behavior in ecobpg.....   | 6  |
| 2.2.2 Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type.....                     | 7  |
| 2.2.3 Removing UTL_FILE for Oracle Database Compatibility Features.....   | 8  |
| 2.2.4 Changing the Method of Specifying the Application Connection Switch Feature.....  | 8  |
| 2.2.5 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL.....   | 9  |
| 2.2.6 Changing Vertical Clustered Index (VCI).....  | 9  |
| 2.2.7 Changing how to Use the Features Compatible with Oracle Databases.....  | 9  |
| 2.3 Operation Migration Incompatibility.....  | 10 |
| 2.3.1 Changing the Value of the Category Column in the pg_settings view.....  | 10 |
| 2.3.2 Changing pgx_stat_lwlock of the Statistics View.....  | 11 |
| 2.3.3 Changing the Behavior of pgx_rcvall.....  | 12 |
| 2.3.4 Mirroring Controller no Longer Retries to Monitor Database Processes when they are Detected as Down.....                    | 12 |
| 2.3.5 Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command.....                                  | 12 |
| 2.3.6 Changing Mirroring Controller User Command Input Values.....  | 13 |
| 2.3.7 Changing the Maximum Number of Connections per Server.....  | 13 |
| 2.3.8 Changing the Encryption Settings Using the ALTER TABLESPACE Statement.....  | 13 |
| 2.3.9 Changing the Default Configuration of the Cluster System Using Database Multiplexing.....                                   | 14 |
| 2.3.10 Changing the Default Operation when mc_ctl Command Options are Omitted.....  | 14 |
| 2.3.11 Changing the Connection Settings when Mirroring Controller Connects to an Instance.....                                    | 14 |
| 2.3.12 Changing the Status Display of the Mirroring Controller Server.....  | 15 |
| 2.3.13 Changing the Operation when the synchronous_standby_names Parameter is Changed during Database Multiplexing Operation..... | 15 |
| 2.3.14 Changing Masking Policy Definition for Unsupported Data Types.....   | 16 |
| 2.4 JDBC Drive Incompatibility.....   | 16 |
| 2.4.1 Changing the targetServerType Value.....  | 16 |
| 2.5 .NET Data Provider Incompatibility.....   | 17 |
| 2.5.1 Changing the TargetServerType Value.....  | 17 |
| 2.5.2 Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider.....                                 | 17 |
| 2.6 pgaudit Incompatibility.....  | 18 |
| 2.6.1 Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes.....                        | 18 |

Chapter 3 Program Updates.....20

Index.....21



# Chapter 1 New Features and Improvements

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

Table 1.1 New features and improvements

| Version and level | Classification          | Feature                                | Provided in AE | Provided in SE |
|-------------------|-------------------------|--|----------------|----------------|
| 13 SP1            | OSS                     | <a href="#">PostgreSQL Rebase</a>      | Y              | Y              |
| 13                | Application development | <a href="#">Support for OpenJDK</a>    | Y              | Y              |
|                   | OSS                     | <a href="#">PostgreSQL Rebase</a>      | Y              | Y              |
|                   |                         | <a href="#">Update of OSS Provided</a> | Y              | Y              |

## 1.1 Features Added in 13 SP1

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

### 1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase

#### 1.1.1.1 PostgreSQL Rebase

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



See

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

## 1.2 Features Added in 13

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

### 1.2.1 Application Development

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

- Support for OpenJDK

#### 1.2.1.1 Support for OpenJDK

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



See

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

### 1.2.2 OSS

This section explains the new feature related to OSS:

- PostgreSQL rebase
- Update of OSS provided

### 1.2.2.1 PostgreSQL Rebase

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



See

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

### 1.2.2.2 Update of OSS Provided

The OSS provided by FUJITSU Enterprise Postgres have been updated.



See

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

## Chapter 2 Compatibility Information

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

### 2.1 Installation/Setup Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

#### 2.1.1 Removing Operating System Support for Client Feature

##### Incompatibility

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

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

##### Action method

None.

#### 2.1.2 Removing Operating System Support for Server Feature

##### Incompatibility

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

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

**Action method**

None.

## **2.1.3 Removing Operating System Support for Client Feature**

---

**Incompatibility**

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

- SLES 12 SP4 or earlier

**Action method**

None.

## **2.1.4 Removing Operating System Support for Client Feature**

---

**Incompatibility**

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

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

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

**Action method**

None.

## **2.1.5 Removing Operating System Support for Server Feature**

---

**Incompatibility**

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

- Windows Server(R) 2008

**Action method**

None.

## **2.1.6 Changing the Way OSS is Set Up**

---

**Incompatibility**

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

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

**Action method**

None.

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

---

## Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

Log File Path: *userProfileFolder\localSettingsFolder\Fujitsu\fsep\_version\instanceNamePortNumber\log*

Core File Path: *userProfileFolder\localSettingsFolder\Fujitsu\fsep\_version\instanceNamePortNumber\core*

*version*: product version\_edition\_architecture

[Example]

Log File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep\_110\_AE\_64\myinst27599\log

Core File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep\_110\_AE\_64\myinst27599\core

FUJITSU Enterprise Postgres 12

*userProfileFolder\localSettingsFolder\Fujitsu\fsep\_version\instanceNamePortNumber\log*

Core File Path: *userProfileFolder\localSettingsFolder\Fujitsu\fsep\_version\instanceNamePortNumber\core*

*version*: product version\_WA\_architecture

[Example]

Log File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep\_120\_WA\_64\myinst27599\log

Core File Path: C:\Users\naomi\AppData\Local\Fujitsu\fsep\_120\_WA\_64\myinst27599\core

## Action method

None.

## 2.1.8 Renaming WebAdmin Services

---

### Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

*fsep\_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.

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

---

### Incompatibility

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

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

### Action method

None.

## 2.1.10 Changing the Access Permissions of the Windows Client Installation Folder

---

### Incompatibility

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

The above changes apply to non-administrators.

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

### Action method

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

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

## 2.1.11 Changing the WebAdmin Installation Method

---

### Incompatibility

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

### Action method

None.

## 2.2 Application Migration Incompatibility

---

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

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.2.1 Change the "elif" Statement Behavior in ecobpg

---

## Incompatibility

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

### FUJITSU Enterprise Postgres 12 or earlier

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

[Example]

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

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

### FUJITSU Enterprise Postgres 13 or later

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

[Example]

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

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

## Action method

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

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

---

### Incompatibility

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

### FUJITSU Enterprise Postgres 11 or earlier

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

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

- 1) Create a Masking policy. and
- 2) Execute a SELECT statement. and
- 3) Execute an operator or function in the SELECT statement of 2). and
- 4) The operator or function argument of 3) includes a subquery. and
- 5) The operator or function argument of 3) contains the column to be protected created in 1). and
- 6) The operator or function of 3) returns a type not listed in "Data Types for Masking" in "Operation Guide".

### FUJITSU Enterprise Postgres 12 or later

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

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

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

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

### Action method

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

- 1) Modify the Masking policy to prevent masking from being performed for the user executing the SQL.
- 2) Modify SQL to not use operators or functions that return types not listed in "Data Types for Masking" in "Operation Guide".

## 2.2.3 Removing UTL\_FILE for Oracle Database Compatibility Features

### Incompatibility

In FUJITSU Enterprise Postgres 12, remove the Oracle database compatibility UTL\_FILE.

### Action method

None.

## 2.2.4 Changing the Method of Specifying the Application Connection Switch Feature

### Incompatibility

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

### Action method

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

Specified name of the target server

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

Specified value for the target server

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



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

## 2.2.5 PostgreSQL Compatibility of Embedded SQL Applications in C and COBOL

---

### Incompatibility

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

### Action method

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

## 2.2.6 Changing Vertical Clustered Index (VCI)

---

### Incompatibility

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

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

### Action method

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

[Example]

Before: select age(column A), current\_date from table

After: select age(column A, now()), (select current\_date) from table

## 2.2.7 Changing how to Use the Features Compatible with Oracle Databases

---

### Incompatibility

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

```
CREATE EXTENSION oracle_compatible
```

## Action method

None.

## 2.3 Operation Migration Incompatibility

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

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.3.1 Changing the Value of the Category Column in the pg\_settings view

#### Incompatibility

For FUJITSU Enterprise Postgres 13, change the value of the category column in the pg\_settings view.

FUJITSU Enterprise Postgres 12 or earlier

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

| Original value    | wrong value        |
|-------------------|--------------------|
| Developer Options | Customized Options |

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

FUJITSU Enterprise Postgres 13 or later

The correct value is the category column in the pg\_settings view.

### Action method

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

## 2.3.2 Changing pgx\_stat\_lwlock of the Statistics View

### Incompatibility

In FUJITSU Enterprise Postgres 13, change the wait event name displayed in the lwlock\_name column of the statistics view pgx\_stat\_lwlock.

Wait Event Name

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

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

\*1) Events added in FUJITSU Enterprise Postgres 9.6.

\*2) Events added in FUJITSU Enterprise Postgres 10.

\*3) Events added in FUJITSU Enterprise Postgres 11.

\*4) Events added in FUJITSU Enterprise Postgres 12.

#### Action method

None.

## 2.3.3 Changing the Behavior of pgx\_rcvall

---

#### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

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

FUJITSU Enterprise Postgres 13 or later

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

#### Action method

Specify recovery objectives correctly, if necessary.

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

---

#### Incompatibility

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

#### Action method

None.

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

---

#### Incompatibility

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

FUJITSU Enterprise Postgres 11 or earlier

- Command Name  
post-promote command
- The parameter name in the server configuration file that specifies the post-promote command  
post\_promote\_command

FUJITSU Enterprise Postgres 12 or later

- Command Name  
post-switch command
- The parameter name in the server configuration file that specifies the post-promote command  
post\_switch\_command

#### Action method

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

## 2.3.6 Changing Mirroring Controller User Command Input Values

---

#### Incompatibility

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

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

#### Action method

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

## 2.3.7 Changing the Maximum Number of Connections per Server

---

#### Incompatibility

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

#### Action method

None.

## 2.3.8 Changing the Encryption Settings Using the ALTER TABLESPACE Statement

---

#### Incompatibility

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

#### Action method

None.

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

---

### Incompatibility

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

FUJITSU Enterprise Postgres 9.6 or earlier

A cluster system comprises two database servers.

FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- Parameter: heartbeat\_error\_action
- Value: fallback

## 2.3.10 Changing the Default Operation when mc\_ctl Command Options are Omitted

---

### Incompatibility

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

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

FUJITSU Enterprise Postgres 9.6 or earlier

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

FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

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

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

---

## Incompatibility

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

- Application name

FUJITSU Enterprise Postgres 9.6 or earlier

- The application name is an empty string.

FUJITSU Enterprise Postgres 10 or later

- The application name is 'mc\_agent'.

## Action method

There is no method for changing the application name.

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

## 2.3.12 Changing the Status Display of the Mirroring Controller Server

---

### Incompatibility

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

- Role of the applicable server (host\_role): standby (standby)
- Display item: DBMS process status (db\_proc\_status)
- Display content: abnormal (abnormal process name)  
The applicability for incompatibility is determined based on whether 'wal\_receiver' is included in the abnormality process name.

FUJITSU Enterprise Postgres 9.6 or earlier

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

FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- If 'wal\_sender' is included in the abnormal process name displayed in the 'abnormal' db\_proc\_status item of the 'primary' host\_role, it is determined that an abnormality has occurred in the WAL receive process.
- If 'wal\_sender' is not included in the abnormal process name displayed in the 'abnormal' db\_proc\_status item of the 'primary' host\_role, it is determined that an abnormality has not occurred in the WAL receive process.

## 2.3.13 Changing the Operation when the synchronous\_standby\_names Parameter is Changed during Database Multiplexing Operation

---

### Incompatibility

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

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

#### FUJITSU Enterprise Postgres 9.6 or earlier

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

#### FUJITSU Enterprise Postgres 10 or later

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

### Action method

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

- Parameter: `check_synchronous_standby_names_validation`
- Value: 'on'

## 2.3.14 Changing Masking Policy Definition for Unsupported Data Types

### Incompatibility

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

#### FUJITSU Enterprise Postgres 9.5

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

#### FUJITSU Enterprise Postgres 9.6 or later

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

### Action method

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

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

## 2.4 JDBC Drive Incompatibility

| Item  | Pre-migration version |     |    |    |    |    |
|---|-----------------------|-----|----|----|----|----|
|   | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing the targetServerType Value</a> | Y                     | Y   | Y  | Y  | Y  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.4.1 Changing the targetServerType Value

#### Incompatibility

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



### Action method

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

Table 2.1 Specified values for the target server

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

## 2.5 .NET Data Provider Incompatibility

| Item   | Pre-migration version |     |    |    |    |    |
|--|-----------------------|-----|----|----|----|----|
|  | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing the TargetServerType Value</a>  | Y                     | Y   | Y  | Y  | Y  | N  |
| <a href="#">Changing the Server Explorer View in Visual Studio Integration with .NET Data Provider</a> | Y                     | Y   | N  | N  | N  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist

### 2.5.1 Changing the TargetServerType Value

#### Incompatibility

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

#### Action method

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

Table 2.2 Specified values for the target server

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

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

#### Incompatibility

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

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

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

## Action method

None.

## 2.6 pgaudit Incompatibility

| Item  | Pre-migration version |     |    |    |    |    |
|---|-----------------------|-----|----|----|----|----|
|   | 9.5                   | 9.6 | 10 | 11 | 12 | 13 |
| <a href="#">Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes</a> | N                     | N   | Y  | Y  | Y  | N  |

Y: Incompatibility exists

N: Incompatibility does not exist

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

#### Incompatibility

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

FUJITSU Enterprise Postgres 12 or earlier

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

[Example]

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

FUJITSU Enterprise Postgres 13 or later

NEW, OLD values are output.

[Example]

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

**Action method**

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

## Chapter 3 Program Updates

For program fix information, see "Program Updates".

# Index

---

[C]

Compatibility Information.....3

[F]

Features Added in 13.....1

Features Added in 13 SP1.....1

[P]

Program Updates.....20