FUJITSU

**Fujitsu
Enterprise Postgres 16 SP1**

Release Notes

Linux

Preface

Purpose of this document

This document provides release information for Fujitsu Enterprise Postgres.

Structure of this document

This document is structured as follows:

Chapter 1 New Features and Improvements

Explains the new features and improvements in this version.

Chapter 2 Compatibility Information

Provides information regarding compatibility.

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Issue date and version

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Chapter 1 New Features and Improvements

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

Table 1.1 New features and improvements

Version and level	Classification	Feature
16 SP1	OSS	PostgreSQL Rebase
		OSS Updates Provided
	Security	Policy-based Login Security
16	OSS	PostgreSQL Rebase
		OSS Updates Provided
	Security	User Management Using an LDAP Server
		Scalable Audit Log Feature
	Performance	Fixed Statistics

1.1 Features Added in 16 SP1

This section explains new features and improvements in Fujitsu Enterprise Postgres 16 SP1.

1.1.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL Rebase

- OSS Updates Provided

1.1.1.1 PostgreSQL Rebase

The PostgreSQL version that Fujitsu Enterprise Postgres is based on is 16.4.

1.1.1.2 OSS Updates Provided

The OSS provided by Fujitsu Enterprise Postgres has been updated.

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

1.1.2 Security

This section explains the new features and improvements related to security:

- Policy-based Login Security

1.1.2.1 Policy-based Login Security

The following functions have been added.

- Managing Dormant Users

- Gradual Password Rollover Time

See

....

Refer to "Policy-based Login Security" in the Operation Guide for more information.

....

1.2 Features Added in 16

This section explains new features and improvements in Fujitsu Enterprise Postgres 16.

1.2.1 OSS

This section explains the new feature related to OSS:

- PostgreSQL Rebase

- OSS Updates Provided

1.2.1.1 PostgreSQL Rebase

The PostgreSQL version that Fujitsu Enterprise Postgres is based on is 16.2.

1.2.1.2 OSS Updates Provided

The OSS provided by Fujitsu Enterprise Postgres has been updated.

See

....

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

....

1.2.2 Security

This section explains the new features and improvements related to security:

- User Management Using an LDAP Server

- Scalable Audit Log Feature

1.2.2.1 User Management Using an LDAP Server

Using ldap2pg allows LDAP and Fujitsu Enterprise Postgres user synchronization without requiring the server administrator to be aware of the Fujitsu Enterprise Postgres user registration status.

See

....

Refer to "ldap2pg" in the Installation Guide for Client for details.

....

1.2.2.2 Scalable Audit Log Feature

By using the scalable audit log feature, you can now capture audit logs without performance degradation, even for systems with high application multiplicity and large amounts of audit logs.

See

....

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

....

1.2.3 Performance

This section describes new features related to Performance.

- Fixed Statistics

1.2.3.1 Fixed Statistics

The height of a Btree index can now also be fixed for statistics.

This allows all statistics used in SQL execution plans to be fixed.

See

Refer to "Fixing the Height of a Btree Index" in the Operation Guide.

Chapter 2 Compatibility Information

This chapter explains incompatible items and actions required when migrating from an earlier version to Fujitsu Enterprise Postgres 16 SP1. Check compatibility before migrating and take the appropriate action.

2.1 Installation/Setup Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Modifying the Installation of pgBackRest	N	N	N	N	N	N	N	Y	Y	N
How max_wal_senders is calculated	Y	Y	Y	Y	Y	Y	Y	N	N	N
How max_worker_processes is calculated	Y	Y	Y	Y	Y	Y	Y	N	N	N
Removing Old llvm Support for JIT compilation	N	N	N	Y	Y	Y	N	N	N	N
Removing Operating System Support	Y	Y	Y	N	N	N	N	N	N	N
Changing kernel parameter settings when an instance is created with WebAdmin	Y	Y	Y	N	N	N	N	N	N	N
Removing Operating System Support	Y	Y	N	N	N	N	N	N	N	N
Changing the way OSS is set up	Y	N	N	N	N	N	N	N	N	N
Modifying Pgpool-II Installation Handling	Y	N	N	N	N	N	N	N	N	N
Changing Core and Log File Paths when Instance is Created with WebAdmin	Y	N	N	N	N	N	N	N	N	N
Renaming WebAdmin Services	Y	N	N	N	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.1.1 Modifying the Installation of pgBackRest

Incompatibility

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

Action method

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

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

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

2.1.2 How max_wal_senders is calculated

Incompatibility

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

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

Action method

If necessary add a value for the max_wal_senders parameter.

2.1.3 How max_worker_processes is calculated

Incompatibility

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

Default value to use : 1

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

Action method

If necessary add a value for the max_worker_processes parameter.

2.1.4 Removing Old llvm Support for JIT compilation

Incompatibility

In Fujitsu Enterprise Postgres 15, the following llvm which JIT compilation can use have been removed.

- llvm version 9
- llvm version 10

Action method

None.

2.1.5 Removing Operating System Support

Incompatibility

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

- RHEL7.7 and later minor version
- RHEL8.1

Action method

None.

2.1.6 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 SP1 or earlier

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

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

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

FUJITSU Enterprise Postgres 13 or later

Kernel Parameters	Value	Calculated Value
SHMMAX	Do not change value	-
SHMALL	Do not change value	-

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

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

Action method

None.

2.1.7 Removing Operating System Support

Incompatibility

In FUJITSU Enterprise Postgres 12 SP1 or later, the following operating systems have been removed.

- SLES 12 SP4

Action method

None.

2.1.8 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.

2.1.9 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.

2.1.10 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

  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.

2.1.11 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

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

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

FUJITSU Enterprise Postgres 12 or later

fsep_xSPz_WA_64_WebAdmin_Port1

fsep_xSPz_WA_64_WebAdmin_Port2

Action method

None.

2.2 Application Migration Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changing the OID of the Data Type (NCHAR type) that Handles National Characters	Y	Y	Y	Y	Y	Y	N	N	N	N
Changing the display result when data masking is applied to NaN, infinity, -infinity	Y	Y	Y	Y	N	N	N	N	N	N
Changing the Valid Range of Identifiers Defined by the DECLARE STATEMENT statement	Y	Y	Y	Y	N	N	N	N	N	N
Changing Precompile Results	Y	Y	Y	Y	N	N	N	N	N	N
Changing the Trigger Replacement Process	Y	Y	Y	Y	N	N	N	N	N	N
Removing Java Support	Y	Y	Y	N	N	N	N	N	N	N
Changed to Error when Running an Operator or Function that Returns non Data Types for Masking Type	Y	N	N	N	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatible

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

Action method

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

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

Incompatibility

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

FUJITSU Enterprise Postgres 13 or earlier

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

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

FUJITSU Enterprise Postgres 14 or later

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

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

Action method

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

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

Incompatibility

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

FUJITSU Enterprise Postgres 13 or earlier

The valid range is now per process.

FUJITSU Enterprise Postgres 14 or later

The valid range is now per file.

Action method

None.

2.2.4 Changing Precompile Results

Incompatibility

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

Action method

Rebuild the application.

2.2.5 Changing the Trigger Replacement Process

Incompatibility

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

FUJITSU Enterprise Postgres 13 or earlier

You can replace a constraint trigger.

[Example]

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

FUJITSU Enterprise Postgres 14 or later

It does not support replacing a constraint trigger.

[Example]

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

Action method

None.

2.2.6 Removing Java Support

Incompatibility

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

- Java SE 6

Also, the JDBC driver file 'postgresql-jdbc4.jar' for JDK 6 or JRE 6 isn't installed.

Action method

None.

2.2.7 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

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:

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".

2.3 Operation Migration Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Deprecation of Some Encryption Algorithms in pgcrypto	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Deprecation of Certificates Signed Using SHA1	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Abolition of Message Numbers	Y	Y	Y	Y	Y	Y	N	N	N	N
Adding the key_name Column to the View pgx_tde_master_key	N	N	N	N	N	Y	N	N	N	N
Changing the Output of the Status Mode of the cm_ctl Command	Y	Y	Y	Y	N	N	N	N	N	N
Rename column "master_pid" in pgx_loader_state to "leader_pid"	Y	Y	Y	Y	N	N	N	N	N	N
Adding a Message to Output when the Database Server watchdog detects that the Connection Manager is down	N	Y	N	Y	Y	Y	Y	N	N	N
Change the Error Information when the Connection Manager re-executes SQL on the Failed Connection	N	N	Y	N	N	N	N	N	N	N

	Pre-migration version									
Item	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changing the Value of the Category Column in the pg_settings view	Y	Y	Y	N	N	N	N	N	N	N
Changing pgx_stat_lwlock of the Statistics View	Y	Y	Y	N	N	N	N	N	N	N
Changing the Behavior of pgx_rcvall	Y	Y	Y	N	N	N	N	N	N	N
Mirroring Controller no longer retries to monitor database processes when they are detected as down	Y	N	N	N	N	N	N	N	N	N
Changing the Name and Parameter Name of the Mirroring Controller Post-Promote Command	Y	N	N	N	N	N	N	N	N	N
Changing Mirroring Controller User Command Input Values	Y	N	N	N	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.3.1 Deprecation of Some Encryption Algorithms in pgcrypto

Incompatibility

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

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

- BF

- CAST5

- DES-ECB

- DES-CBC

- MD4

- Whirlpool

Action method

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

2.3.2 Deprecation of Certificates Signed Using SHA1

Incompatibility

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

Action method

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

2.3.3 Abolition of Message Numbers

Incompatibility

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

Message numbers are output for messages output by Mirroring Controller.

For FUJITSU Enterprise Postgres 14 SP1 or earlier

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

[example]

```
3D000: 2017-07-10 19:41:05 JST[13899]: [1-1] user=fepuser,db=fep,remote=127.0.0.1(51902)
app=[unknown] FATAL: database "fep" does not exist (10571)
```

For Fujitsu Enterprise Postgres 15

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

[example]

```
3D000: 2023-04-10 19:41:05 JST [13899]: [1-1] user = fepuser,db = fep,remote = 127.0.0.1(51902)
app = [unknown] FATAL: database "fep" does not exist
```

Action method

None.

2.3.4 Adding the key_name Column to the View pgx_tde_master_key

Incompatibility

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

Action method

None.

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

Incompatibility

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

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

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

Correct the following in PH21029.

- Add ':' to 'application_information' to output application information
  Output "application_information:"

- Add the header "pid" output to "application_information"
  Outputs "pid" whose header information is missing.

- Changes the number of digits in the numeric portion of connected_time
  Change the display start position of the date and time connected to the conmgr process to correct the gap between the start position of the header and the numeric part. (5 digits backward)

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

- Add ":" to the display of "application_information"

- Display the header "pid" in "application_information"

- Change the output start position of the "connected_time" header of "application_information"

- Change the start of the date and time output of "connected_time" in "application_information" to 5 digits later.

FUJITSU Enterprise Postgres 13 or earlier

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

FUJITSU Enterprise Postgres 14

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

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

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

Action method

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

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

Incompatibility

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

Action method

None.

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

Incompatibility

When using the Connection Manager, if the database server watchdog detects that the Connection Manager is down, it will output a message to the database server.

Incompatibilities may occur if:

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

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

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

FUJITSU Enterprise Postgres 12, 13, 13SP1, 14, 14SP1, 15

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

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

FUJITSU Enterprise Postgres 12 SP1, 15SP1 or later

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

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

Action method

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

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

Incompatibility

In FUJITSU Enterprise Postgres 12 SP1 allows an application using the Connection Manager to change the error information when attempting to execute SQL again on a connection that the Connection Manager has determined to be in error due to a database error.

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

Incompatibilities may occur if the following conditions are met:

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

-libpq (C Library)

-ECPG (Embedded SQL in C)

2) You are using the Connection Manager. and

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

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

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

FUJITSU Enterprise Postgres 12, 13 or later

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

FUJITSU Enterprise Postgres 12 SP1

> The following error information is returned:
>
> - For libpq (C Library): CONNECTION_BAD (PQstatus () return value)
>
> - For ECPG (Embedded SQL in C): 57P02 (SQLSTATE return value)

Action method

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

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

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

Incompatibility

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

FUJITSU Enterprise Postgres 12 SP1 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.

2.3.10 Changing pgx_stat_lwlock of the Statistics View

Incompatibility

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

Wait Event Name

FUJITSU Enterprise Postgres 12 SP1 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 (*1)	ParallelHashJoin
parallel_query_dsa (*1)	ParallelQueryDSA

FUJITSU Enterprise Postgres 12 SP1 or earlier	FUJITSU Enterprise Postgres 13
session_dsa (*1)	PerSessionDSA
session_record_table (*1)	PerSessionRecordType
session_typmod_table (*1)	PerSessionRecordTypmod
shared_tuplestore (*1)	SharedTupleStore
tbm (*1)	SharedTidBitmap
parallel_append (*1)	ParallelAppend
serializable_xact (*2)	PerXactPredicateList
shared_mcxt (*2)	SharedMcxt
meta_cache_map (*2)	MetaCacheMap
global_metacache (*2)	GlobalCatcache
cached_buf_tranche_id (*2)	CachedBufTranche

*1）Events added in FUJITSU Enterprise Postgres 11.

*2）Events added in FUJITSU Enterprise Postgres 12.

Action method

None.

2.3.11 Changing the Behavior of pgx_rcvall

Incompatibility

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

FUJITSU Enterprise Postgres 12 SP1 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.

2.3.12 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.

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

Incompatibility

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

FUJITSU Enterprise Postgres 11

- 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.

2.3.14 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.

2.4 JDBC Driver Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changing the targetServerType Value	Y	Y	Y	N	N	N	N	N	N	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 SP1 or earlier	FUJITSU Enterprise Postgres 13
Primary Server	master	primary
Standby Server	slave	secondary
Prefer Standby Server	preferSlave	preferSecondary
Any	any	any

2.5 ODBC Driver Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Cannot specify prefer-read for target_session_attrs	Y	Y	Y	Y	Y	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.5.1 Cannot specify prefer-read for target_session_attrs

Incompatibility

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

Action method

Select prefer-standby.

2.6 C Library (libpq) Migration Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changing when "prefer-read" is Specified for the target_session_attrs Parameter	Y	Y	Y	Y	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

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

 - Primary server (default_transaction_read_only = ON)

 - Standby server

FUJITSU Enterprise Postgres 13 or earlier

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

FUJITSU Enterprise Postgres 14 or later

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

Action method

None.

2.7 oracle_fdw Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changing the Oracle Client Version	Y	N	N	N	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.7.1 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.

2.8 pgaudit Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Repairing Unwanted Output in the Audit Log	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Changing to Output Extra NEW and OLD Values in the Audit Log when the Trigger Function Executes	Y	Y	Y	N	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.8.1 Repairing Unwanted Output in the Audit Log

Incompatibility

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

Fujitsu Enterprise Postgres 15 SP2 or earlier

Some audit logs contain unwanted content at the end.

[Example]

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

Fujitsu Enterprise Postgres 16

Prevent unwanted from being output to the audit log.

[Example]

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

Action method

None.

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

Incompatibility

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

FUJITSU Enterprise Postgres 12 SP1 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.

2.9 pg_dbms_stats Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Change in Execution Plan due to Fixed Height of Btree index	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Incompatibility of Import Features with Fixed Height of Btree index	Y	Y	Y	Y	Y	Y	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

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

- dbms_stats.lock_*

- dbms_stats.restore_*

- dbms_stats.import_*

Action method

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

- pg_dbms_stats.use_tree_height

- pg_dbms_stats.lock_tree_height

2.9.2 Incompatibility of Import Features with Fixed Height of Btree index

Incompatibility

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

Action method

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

2.10 WebAdmin Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Linux server behavior changes for login authentication	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Changing the default value of the item 'Number of digits for floating values' which is set in the section 'SQL options'	N	Y	Y	Y	Y	Y	Y	Y	Y	N
Cannot specify prefer-read for target_session_attrs	Y	Y	Y	Y	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.10.1 Linux server behavior changes for login authentication

Incompatibility

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

As a result, the following events may occur:

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

Action method

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

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

/opt/fsepv<x>webadmin/log

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

Incompatibility

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

Fujitsu Enterprise Postgres 15 SP2 or earlier

0

Fujitsu Enterprise Postgres 16 or later

1

Action method

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

2.10.3 Cannot specify prefer-read for target_session_attrs

Incompatibility

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

Action method

Specify prefer-standby.

2.11 Connection Manager Incompatibility

Item	Pre-migration version								
	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Behavior change when "read-write" is specified for the target_session_attrs parameter	Y	Y	Y	N	N	N	N	N	N

Y: Incompatibility exists

N: Incompatibility does not exist

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

Incompatibility

FUJITSU Enterprise Postgres 13 or earlier

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

FUJITSU Enterprise Postgres 14 or later

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

Action method

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

2.12 Confidentiality Management Incompatibility

Item	Pre-migration version									
	11	12	12 SP1	13	14	14 SP1	15	15 SP1	15 SP2	16
Changes due to Changes in the pg_dump Specification	N	N	N	N	N	N	Y	Y	Y	N
Changing Permission Settings by Changing the CREATEROLE Permission	N	N	N	N	N	N	Y	Y	Y	N
Change due to Restriction of CREATEROLE Privilege	N	N	N	N	N	N	Y	Y	Y	N

Y: Incompatibility exists

N: Incompatibility does not exist

2.12.1 Changes due to Changes in the pg_dump Specification

Incompatibility

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

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

Action method

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

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

2.12.2 Changing Permission Settings by Changing the CREATEROLE Permission

Incompatibility

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

Action method

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

[Example]

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

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

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

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

2.12.3 Change due to Restriction of CREATEROLE Privilege

Incompatibility

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

Action method

Take one of the following actions:

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

- Grant ADMIN OPTION permission on the role to the sensitive management role before setting the managed role to the sensitive group.

[Example]

You want to grant only the ADMIN OPTION privilege for role "user _role1" to the confidentiality management role "manager_role".

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

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

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

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