Fujitsu Enterprise Postgres 15

Community Edition - User's Guide

Windows/Linux

FUJITSU

Preface

Purpose of this document

This document describes how to install and set up "Fujitsu Enterprise Postgres" for "Fujitsu Enterprise Postgres Community Edition" (hereafter referred to as "Fujitsu Enterprise Postgres") users.

Intended readers

This document is intended for those who install Fujitsu Enterprise Postgres.

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

- PostgreSQL

- SQL

- Linux

- Windows

Structure of this document

This document is structured as follows:

Chapter 1 OSS Provided with Fujitsu Enterprise Postgres Community Edition

    Lists open source software that is provided with Fujitsu Enterprise Postgres Community Edition

Chapter 2 Overview of Installation

    Provides an overview and the types of installation

Chapter 3 Installation and Uninstallation

    Describes how to install and uninstall Fujitsu Enterprise Postgres

Chapter 4 Server Setup

    Describes the setup to be performed after installation

Appendix A Operating Environment

    Describes the operating environment required to use Fujitsu Enterprise Postgres

Appendix B Client Setup

    Describes the setup to be performed after installation

Appendix C Uninstall (middleware)

    Describes Uninstall (middleware)

Appendix D Uninstall (middleware) Messages

    Describes the messages output by Uninstall (middleware)

Notational conventions in this document

Abbreviations of manual titles

The following table lists the abbreviation of the title of manual for Fujitsu Enterprise Postgres as it appears in the manuals.

Manual title	Abbreviation in Fujitsu Enterprise Postgres manuals
PostgreSQL 15.0 Documentation	PostgreSQL Documentation

Notational conventions in the manuals

Manual titles and product names in the manual are abbreviated.

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

Abbreviation of product names

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

Formal name	Abbreviation
Red Hat(R) Enterprise Linux(R) 7, Red Hat(R) Enterprise Linux(R) 8, SUSE Linux Enterprise Server 12 and SUSE Linux Enterprise Server 15	Linux
Red Hat(R) Enterprise Linux(R) 7	RHEL7
Red Hat(R) Enterprise Linux(R) 8	RHEL8
Red Hat(R) Enterprise Linux(R) 9	RHEL9
SUSE Linux Enterprise Server 12	SLES 12
SUSE Linux Enterprise Server 15	SLES 15
Windows(R) 10 Home, Windows(R) 10 Education, Windows(R) 10 Pro and Windows(R) 10 Enterprise	Windows(R) 10
Windows(R) 11 Home, Windows(R) 11 Education, Windows(R) 11 Pro and Windows(R) 11 Enterprise	Windows(R) 11
Microsoft(R) Windows Server(R) 2016 Datacenter, Microsoft(R) Windows Server(R) 2016 Standard and Microsoft(R) Windows Server(R) 2016 Essentials	Windows Server(R) 2016
Microsoft(R) Windows Server(R) 2019 Datacenter, Microsoft(R) Windows Server(R) 2019 Standard and Microsoft(R) Windows Server(R) 2019 Essentials	Windows Server(R) 2019
Microsoft(R) Windows Server(R) 2022 Datacenter, Microsoft(R) Windows Server(R) 2022 Standard and Microsoft(R) Windows Server(R) 2022 Essentials	Windows Server(R) 2022
Microsoft(R) Windows Server(R) 2016 Datacenter, Microsoft(R) Windows Server(R) 2016 Standard, Microsoft(R) Windows Server(R) 2016 Essentials, Microsoft(R) Windows Server(R) 2019 Datacenter, Microsoft(R) Windows Server(R) 2019 Standard, Microsoft(R) Windows Server(R) 2019 Essentials, Microsoft(R) Windows Server(R) 2022 Datacenter, Microsoft(R) Windows Server(R) 2022 Standard and Microsoft(R) Windows Server(R) 2022 Essentials	Windows(R)
Microsoft(R) Edge	Edge
Java Naming and Directory Interface	JNDI
Java(TM) 2 SDK, Standard Edition, Java(TM) 2 Platform, Enterprise Edition, Java(TM) Platform, Standard Edition and Java(TM) Development Kit	JDK
Java(TM) 2 Runtime Environment, Standard Edition and Java(TM) Runtime Environment	JRE
Microsoft(R) Visual Basic(R) for Applications	VBA

Formal name	Abbreviation
Microsoft(R) Visual Basic	Visual Basic
Microsoft(R) Visual Basic.NET	Visual Basic.NET
Microsoft(R) Visual Studio	Visual Studio
Microsoft(R) Visual Studio.NET	Visual Studio.NET
Microsoft .NET Framework	.NET Framework or .NET
Fujitsu Enterprise Postgres Community Edition (64bit)	CE or Fujitsu Enterprise Postgres Community Edition
Fujitsu Enterprise Postgres Advanced Edition (64bit)	AE or Fujitsu Enterprise Postgres Advanced Edition
Fujitsu Enterprise Postgres Standard Edition (64bit)	SE or Fujitsu Enterprise Postgres Standard Edition

Fujitsu Enterprise Postgres conventions

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

Feature	Name used in manuals
Fujitsu Enterprise Postgres Community Edition (64bit)	64-bit product

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

Feature	Name used in manuals
Fujitsu Enterprise Postgres Client (64bit)	64-bit product
Fujitsu Enterprise Postgres Client (32bit)	32-bit product

Platform-specific information

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

Linux
Indicates content concerning Linux.

Windows(R)
Indicates content concerning Windows(R).

Symbol convention

The symbols shown below are used in the manuals.

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

Notes about manuals

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

- Images in figures

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

- Explanatory examples

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

- Window and usage examples

  Examples of windows and usage in manuals may describe examples when used in English environment.

- UNIX release version number

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

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Issue date and version

```
Edition 1.0: April 2023
```

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Contents

Chapter 1 OSS Provided with Fujitsu Enterprise Postgres Community Edition

Fujitsu Enterprise Postgres Community Edition comprises PostgreSQL and open source software (hereafter referred to as "OSS") for building solutions using PostgreSQL.

The table below lists OSS and APIs provided with Fujitsu Enterprise Postgres Community Edition.

Category	OSS name	Version and level	Platform		Description
			Linux	Windows	
DBMS	PostgreSQL	15.0	Y	Y	Database management system
API	PostgreSQL JDBC driver	42.5.0	Y	Y	JDBC driver
	psqlODBC	13.02.0000	Y	Y	ODBC driver
	Npgsql	6.0.7	N	Y	.NET data provider

Y: Supported

N: Not supported

Chapter 2 Overview of Installation

This chapter provides an overview of Fujitsu Enterprise Postgres installation.

2.1 Features that can be Installed

Fujitsu Enterprise Postgres provides server and client features. The server and client features can be installed from the server program DVD on the machine where the database environment is to be built. Only client features can be installed from the client DVD.

Features provided by the client package

Fujitsu Enterprise Postgres provides features to enable access to the database from a variety of platforms and languages, as the connection environment for the client and the database server.

Fujitsu Enterprise Postgres Client Package must be installed on the client system to use these features.

The following table shows the relationship between the platforms and the features provided by the client package.

Platform	JDBC	ODBC	.NET Data Provider	C language (libpq)	Embedded SQL (ECPG) in C language
Windows	Y	Y	Y	Y	Y
Linux	Y	Y		Y	Y

2.2 Installation Types

The following installation types are available for Fujitsu Enterprise Postgres:

- New installation

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

- Reinstallation

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

- Multi-version installation (server only)

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

2.3 Installation Procedure

The following installation procedures are available for Fujitsu Enterprise Postgres.

- Installation in interactive mode

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

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

  - New installation

  - Reinstallation

  - Multi-version installation

P Point

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

Chapter 3 Installation and Uninstallation

This chapter explains each of the installation and the uninstallation procedures of Fujitsu Enterprise Postgres.

P Point

Note that "<x>" in paths indicates the product version.

See

- Refer to "Appendix A Operating Environment" for information on the operating environment.

3.1 Pre-installation Tasks

Check the system environment below before installing Fujitsu Enterprise Postgres.

Executable Users

Installation and uninstallation is performed by one of the following users.

- superuser

  On the system, run the following command to become superuser.

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

- System Administrator

  Check the OS documentation for system administrators.

Note

When you execute a command as a system administrator, there are multiple commands that require superuser privileges.

Check the OS documentation before setting. Specify all in the command field.

Check the installed product and determine the installation method

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

Example

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

The products already installed are displayed in the "Currently installed products" list.

After checking, type "q" and press Enter to exit Uninstall (middleware).

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

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

- Reinstallation

- Multi-version installation

Remove the installed Npgsql/ODBC

This task is required for the Windows client.

If Npgsql or ODBC is already installed on the system, remove it. If the Npgsql or ODBC provided with the Windows client is already installed, uninstall the Windows client. Then install Fujitsu Enterprise Postgres Community Edition.

Install JRE 8

On SLES, install JRE 8 and set the JAVA_HOME environment variable.

Remove applied updates

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

Note

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

- Performing reinstallation

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

1. Display the applied updates

   Execute the following command to display the applied updates:

Example

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

Example

```
C:\>uam showup
```

2. Remove the updates

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

Example

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

Note

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

Example

```
C:\>uam remove -i update-number
```

Confirm service

The Windows Installer service must be running.

Switching between install mode and execute mode

In Windows Server(R) 2016, Windows Server(R) 2019 or Windows Server(R) 2022, if the remote desktop service is installed in application server mode, it is necessary to switch to install mode by executing the command shown below before installation. Also, after the installation is completed, execute the command shown below to switch back to execute mode.

[Before the installation]

```
CHANGE USER /INSTALL
```

[After the installation]

```
CHANGE USER /EXECUTE
```

3.2 Linux Server

3.2.1 Installation in Interactive Mode

Install according to the following procedure:

P Point
. . . .

The following characters can be used as input values:

Alphanumeric characters, hyphens, commas and forward slashes
. . . .

1. Stop applications and programs

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

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product

- Instance

2. Run the installation

Mount the server program DVD, and then execute the command below.

Example

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

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

3. Select the product for installation

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

Information
. . . .

If the selected product has been installed, a window for selecting reinstallation or multi-version installation is displayed for each product, in accordance with the products that are already installed.
. . . .

4. Check the settings

The window for checking the installation information is displayed.
If there is no problem with the settings, type "y" and press Enter to start the installation.
To change the settings, type "c" and press Enter.

Note however, this option is not displayed if there is no information that can be modified.

If the user types "c", then the window mentioned in the next step is displayed.

5. Enter the installation directory

If the installation method is one of the following, the window prompting for the installation directory will be displayed for each product.

- New installation

- Multi-version installation

Enter the directory and press Enter.

6. Check the changed settings

The changed settings are displayed.
If there is no problem with the settings, type "y" and press Enter.
To change the settings again, type "c" and press Enter.

7. Finish the installation

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

```
Installed successfully.
```

P Point

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

3.2.2 Uninstallation in Interactive Mode

This section explains how to uninstall Fujitsu Enterprise Postgres.

Uninstall according to the following procedure:

Note

On SLES, before uninstalling the product, install JRE 8 and set the JAVA_HOME environment variable.

See

Refer to "3.4.2 Uninstallation in Interactive Mode" when uninstalling the Fujitsu Enterprise Postgres client feature.

Information

If an error occurs while the product is being uninstalled, refer to "Appendix D Uninstall (middleware) Messages" and take the required action.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product

- Instance

  Execute the pg_ctl command in stop mode.

```
$ /opt/fsepv<x>server64/bin/pg_ctl stop -D /database/inst1
```

2. Start Uninstall (middleware)

Execute the following command:

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

3. Select the software

Type the number for the product to be uninstalled, and press Enter.

4. Start the uninstallation

To start the uninstallation, type "y" and press Enter.

To display the list of products again, type "b" and press Enter.

5. Finish the uninstallation

Upon successful completion, the message below is displayed.

The installation directory may remain after uninstallation. If it is not required, delete it.

```
Uninstallation of "productName" has completed successfully.
```

3.3 Windows Server

P Point

....

- The installation must be performed by a user with administrator privileges (a user ID that belongs to the Administrators group).

- Stop all applications before starting the installation.

- If the [After Installation] window is displayed when running the installation program, perform the installation steps until the [Finish Admin Install] window is displayed.

....

Information

....

- If installation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed. Click [This program installed correctly] and continue operation.

- If Npgsql or ODBC is already installed on the system, the Fujitsu Enterprise Postgres Community Edition installer will notify about such software and the installation process will not proceed. To install the client products, click [Cancel] to exit the installer. Then uninstall the software before installing Fujitsu Enterprise Postgres Community Edition. If you want to continue installing the server product only, click [Back], and then select and install only the server product.

....

3.3.1 Installation in Interactive Mode

The installation procedure is described below.

1. Stop applications and programs

When reinstalling the product, all applications and programs that use the product must be stopped.

Before starting the installation, stop the following:

- Applications that use the product

- Instance

2. Inserting the DVD

Insert the Fujitsu Enterprise Postgres server program DVD into the drive.

3. Run the installation

The installation menu will be displayed. Click [Installation].

Follow the on-screen instructions to complete the remaining steps for installation.

🅿 Point

- If the Autorun feature of Windows is disabled, or a remote desktop service (terminal service) is used, the installation program is not automatically started. Execute the following file using [Run] or Windows Explorer.

```
Z:\autorun.exe
```

Z: The drive into which the DVD is inserted.

- It is necessary to specify a local disk as the installation destination of Fujitsu Enterprise Postgres.

4. Check if installation is complete

From [All Programs] or [All apps], click [Fujitsu] >> [Uninstall (middleware)]. If the following have been added under [Software Name], installation is complete:

- Fujitsu Enterprise Postgres Community Edition(64bit)

- Fujitsu Enterprise Postgres Community Edition Client(64bit)

3.3.2 Uninstallation in Interactive Mode

This section explains how to uninstall Fujitsu Enterprise Postgres.

📘 Information

If uninstallation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed. Click [This program uninstalled correctly] and continue operation.

Uninstallation procedure

The uninstallation procedure is described below.

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product

2. Stop instances

Stop all instances that are using the product to be uninstalled.

Stopping of instances should be performed by the appropriate instance administrator.

Use the following procedure to stop a service:

a. Display the [Services] window

In Windows, select [Administrative Tools], and then click [Services].

b. Stop the service

Select the instance name that you wish to stop from the services list, and click [Stop Service]. If you stop a service while applications and commands are running, Fujitsu Enterprise Postgres will force those applications and commands to close and will stop normally.

You can also stop a service by specifying the service name in the net stop command or sc stop command.

3. Unregister Windows services

Perform this step if the instance was created with the initdb command.

Unregister the instance registered as a Windows service.

Use the unregister mode of the pg_ctl command to specify the registered service name and unregister the instance as a Windows service.

4. Delete registrations related to the event log

If you are outputting to the event log, a DLL registration has been performed.

To prevent unnecessary issues from occurring, you should delete this registration. Refer to "Server Setup and Operation", "Registering Event Log on Windows" in the PostgreSQL Documentation for details.

The following is an example showing deletion of the DLL registration for a 64-bit product under the default event source name.

```
> regsvr32 /u "c:\Program Files\Fujitsu\fsepv<x>server64\lib\pgevent.dll"
```

If using multiple instances

DLL registration is performed so that you can output messages corresponding to the event source name assigned by the user, allowing you to identify messages output to the event log by instance.

Since it is necessary to delete the DLL registration for each instance, delete the DLL registration by event source name.

The following is an example showing deletion of the DLL of a 64-bit product registered under the event source name "Enterprise Postgres inst1".

```
> regsvr32 /u /i:"Enterprise Postgres inst1" "C:\Program Files\Fujitsu
\fsepv<x>server64\lib\pgevent.dll"
```

If installing multiple versions

> If the instances you created using this package have been set to output error logs to the event log, use the DLL path name that you took note of previously as explained in "4.1.1 Preparing for Output to the Event Log" to reregister the default event source name.

🛑 Note

. . . .

Ensure to delete DLLs before the uninstallation. If you perform the uninstallation without doing so, you may not be able to delete the DLLs at a later time.

. . . .

5. Start Uninstall (middleware)

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

6. Select the software

Select the product to be uninstalled from [Software Name], and then click [Remove].

7. Start the uninstallation

Click [Uninstall].

8. Finish the uninstallation

The uninstallation completion window will be displayed. Click [Finish].

The installation folder may remain after uninstallation. If it is not required, delete it.

9. Exit Uninstall (middleware)

Click [Close].

3.4 Linux Client

This section explains how to install and uninstall the Linux client.

3.4.1 Installation in Interactive Mode

Install according to the following procedure:

📘 Point

. . . .

The following characters can be used as input values:

Alphanumeric characters, hyphens, commas and forward slashes

. . . .

1. Stop applications and programs

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

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product

2. Run the installation

Mount the client program DVD, and then execute the command below.

Example

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

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

3. Select the product to install

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

Information
. . . .

If the selected product has been installed, a window for selecting reinstallation is displayed for each product, in accordance with the products that are already installed.
. . . .

4. Check the settings

The window for checking the installation information is displayed.
If there is no problem with the settings, type "y" and press Enter to start the installation.
To change the settings, type "c" and press Enter.

Note however, this option is not displayed if there is no information that can be modified.

If the user types "c", then the window mentioned in the next step is displayed.

5. Enter the installation directory

If the installation method is one of the following, the window for entering the installation directory is displayed for each product:

- New installation

Enter the directory and press Enter.

6. Check the changed settings

The changed settings are displayed.
If there is no problem with the settings, type "y" and press Enter.
To change the settings again, enter "c" and press Enter.

7. Finish the installation

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

```
Installed successfully.
```

Point
. . . .

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

3.4.2 Uninstallation in Interactive Mode

This section explains how to uninstall the Linux client.

Before uninstalling the product:

- Close the product program and all applications that are using it.

- On SLES, install JRE 8 and set the JAVA_HOME environment variable.

....

Uninstallation procedure

Uninstall according to the following procedure:

If an error occurs while the product is being uninstalled, refer to "Appendix D Uninstall (middleware) Messages" and take the required action.

....

1. Stop applications and the program

Before starting the uninstallation, stop the following:

- Applications that use the product

2. Start Uninstall (middleware)

Execute the following command:

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

3. Select the product

Enter the number for the product to be uninstalled, and press Enter.

4. Start the uninstallation

To start the uninstallation, type "y" and press Enter.

To display the list of products again, type "b" and press Enter.

5. Finish the uninstallation

If uninstallation is successful, the message below is displayed.

The installation directory may remain after uninstallation. If it is not required, delete it.

```
Uninstallation of "productName" has completed successfully.
```

3.5 Windows Client

This section explains how to install and uninstall the Windows client.

3.5.1 Pre-installation Considerations

This section describes points that the user must take into account prior to installation.

- If the [After Installation] window is displayed when running the installation program, perform the installation steps until the [Finish Admin Install] window is displayed.

Information

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- If installation or uninstallation is suspended or processing terminates abnormally, the [Program Compatibility Assistant] dialog box may be displayed.
  If this happens, click [This program installed correctly] or [This program uninstalled correctly] and continue operation.

- If Npgsql or ODBC is already installed on the system, the Fujitsu Enterprise Postgres Community Edition installer will notify about such software and the installation process will not proceed. Click [Cancel] to exit the installer. Then uninstall the software or the Windows client before installing Fujitsu Enterprise Postgres Community Edition.

....

3.5.2 Installation in Interactive Mode

The installation procedure is described below.

1. Stop applications and programs

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

- Reinstallation

Before starting the installation, stop the following:

- Applications that use the product

2. Insert the DVD

Insert the client program DVD into the DVD drive.

3. Run the installation

The installation menu is displayed. Click [Installation].

Follow the on-screen instructions to complete the remaining steps for installation.

3.5.3 Uninstallation in Interactive Mode

This section explains how to uninstall the Windows client.

Point

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- Before uninstalling the product, close the product program and all applications that are using it.

- Log in using an account that has administrator privileges and then execute the command, or switch to an account that has administrator privileges and then uninstall the product.

....

Uninstallation procedure

The uninstallation procedure is described below.

Information

....

If an error occurs while the product is being uninstalled, refer to "Appendix D Uninstall (middleware) Messages" and take the required action.

....

1. Stop applications and programs

Before starting the uninstallation, stop the following:

- Applications that use the product

2. Start Uninstall (middleware)

In Windows, click [All Programs] or [All apps], then [Fujitsu], and then [Uninstall (middleware)].

3. Select the software

Select the product to be uninstalled from [Software Name], and then click [Remove].

4. Start the uninstallation

Click [Uninstall].

5. Finish the uninstallation

The uninstallation completion window is displayed. Click [Finish].

The installation folder may remain after uninstallation. If it is not required, delete it.

6. Exit Uninstall (middleware)

Click [Close].

See
. . . .

If setting up .NET Data Provider, uninstall Npgsql.

Refer to "B.2.3.3 Uninstallation" for details.
. . . .

Chapter 4 Server Setup

This chapter explains how to set up Fujitsu Enterprise Postgres.

4.1 Preparations for Setup

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

4.1.1 Preparing for Output to the Event Log

This section provides an explanation on the preparation to be carried out if you are outputting error logs to the event log.

If outputting error logs to the event log, you should register an event source name beforehand.

If you do not register an event source name, the message content output to the event log may be incomplete.

Due to the default event source name "Fujitsu Enterprise Postgres Server" being output to the event log when using the following commands, you should register this default event source name beforehand:

- pg_ctl command

The following is an example in which the DLL of a 64-bit product is registered under the default event source name:

```
> regsvr32  "c:\Program Files\Fujitsu\fsepv<x>server64\lib\pgevent.dll"
```

If using multiple instances

You can output messages corresponding to the event source name assigned by the user, so that messages output to the event log can be identified by instance.

The following is an example in which the DLL of a 64-bit product is registered under the event source name "Fujitsu Enterprise Postgres inst1":

```
> regsvr32 /n /i:"Fujitsu Enterprise Postgres inst1" "c:\Program Files\Fujitsu
\fsepv<x>server64\lib\pgevent.dll"
```

You will need to edit the parameters for each instance, therefore, after creating an instance, configure the settings.

If installing multiple versions

If Fujitsu Enterprise Postgres is already installed on the same machine, search for the key below in Registry Editor, and make a note of the path of the registered DLL. Afterwards, register a new DLL under the default event source name.

Use the DLL path that you made a note of in the above step when re-registering the default event source name during an uninstall.

```
PostgreSQL
```

See
....
Refer to "Registering Event Log on Windows" in "Server Setup and Operation" in the PostgreSQL Documentation for information on how to register event source names.
....

Appendix A Operating Environment

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

A.1 Linux

A.1.1 Required Operating System

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

Feature	Operating system
Linux server	- RHEL7.4 or later - RHEL8.2 or later - RHEL9.0 or later - SLES 12 SP 5 - SLES 15 SP3 or later
Linux client	- RHEL7.4 or later - RHEL8.2 or later - RHEL9.0 or later - SLES 12 SP 5 - SLES 15 SP3 or later

📝 Note
. . . .

- The sepgsql contrib module of PostgreSQL can be used in RHEL7 or later.

- JRE 8 is required in order to install Fujitsu Enterprise Postgres on SLES.
. . . .

📖 Information
. . . .

- The following packages are required for operations on RHEL7.

| Package name | Feature | | Remarks |
	Linux server	Linux client	
alsa-lib	Y	N	-
audit-libs	Y	N	-
glibc	Y	Y	-
glibc.i686	Y	Y	-
libgcc	Y	Y	-
libicu	Y	N	Provides collation support. Install 50.x.
libselinux	Y	N	Required for sepgsql.
libstdc++	Y	Y	-

Package name	Feature		Remarks
	Linux server	Linux client	
libtool-ltdl	Y	Y	Required when using ODBC drivers.
libzstd	Y	Y	
llvm	Y	N	Version 10.0.x of llvm is required to run SQL with runtime compilation (just-in-time compilation). Install the package that contains libLLVM-10.so. For example, the "llvm-toolset-10.0-llvm-libs" published in Red Hat Developer Tools and Red Hat Software Collections includes libLLVM-10.so. Fujitsu Enterprise Postgres uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
lz4	Y	N	
ncurses-libs	Y	Y	-
net-tools	Y	N	-
nss-softokn-freebl	Y	Y	-
pam	Y	N	Required when using PAM authentication.
perl-libs	Y	N	Required when using PL/Perl. Install 5.16.
python3	Y	N	Required when using PL/Python based on Python 3. Install 3.6.x.
redhat-lsb	Y	Y	-
tcl	Y	N	Required when using PL/Tcl. Install 8.5.
unixODBC	N	Y	Required when using ODBC drivers.
unzip	Y	Y	-
xz-libs	Y	Y	-
zlib	Y	Y	-

Y: Required
N: Not required

- The following packages are required for operations on RHEL8.

Package name	Feature		Remarks
	Linux server	Linux client	
alsa-lib	Y	N	-

Package name	Feature		Remarks
	Linux server	Linux client	
audit-libs	Y	N	-
glibc	Y	Y	-
glibc.i686	Y	Y	-
libgcc	Y	Y	-
libicu	Y	N	Provides collation support. Install 60.x.
libnsl2	Y	Y	-
libselinux	Y	N	Required for sepgsql.
libstdc++	Y	Y	-
libtool-ltdl	Y	Y	Required when using ODBC drivers.
libzstd	Y	Y	
llvm	Y	N	Version 13.0.x of llvm is required to run SQL with runtime compilation (just-in-time compilation). Install the "llvm-libs" exposed by Application Streams. Fujitsu Enterprise Postgres uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
lz4-libs	Y	N	
ncurses-libs	Y	Y	-
net-tools	Y	N	-
nss-softokn-freebl	Y	Y	-
pam	Y	N	Required when using PAM authentication.
perl-libs	Y	N	Required when using PL/Perl. Install 5.26.
python3	Y	N	Required when using PL/Python based on Python 3. Install 3.6.x.
redhat-lsb	Y	Y	-
tcl	Y	N	Required when using PL/Tcl. Install 8.6.
unixODBC	N	Y	Required when using ODBC drivers.
unzip	Y	Y	-
xz-libs	Y	Y	-
zlib	Y	Y	-

Y: Required
N: Not required

- The following packages are required for operations on RHEL9.

Package name	Feature		Remarks
	Linux server	Linux client	
alsa-lib	Y	N	-
audit-libs	Y	N	-
glibc	Y	Y	-
glibc.i686	Y	Y	-
libnsl2	Y	Y	-
libicu	Y	N	
libgcc	Y	Y	-
libselinux	Y	N	Required for sepgsql.
libstdc++	Y	Y	-
libtool-ltdl	Y	Y	Required when using ODBC drivers.
libzstd	Y	Y	
llvm	Y	N	llvm version 13.0 .x is required to run SQL using just-in-time compilation. Install the package that contains libLLVM -13 .so. For example, version 13.0 .x of "llvm-libs " published with Application Streams includes libLLVM -13 .so. Fujitsu Enterprise Postgres is configured to use runtime compilation by default. If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf. If you turn off the jit parameter, you do not need to install llvm. Failure to install llvm without turning off the jit parameter can result in errors during SQL execution. For more information about runtime compilation, see "Just-in-Time Compilation (JIT) " in the PostgreSQL Documentation.
lz4-libs	Y	N	-
ncurses-libs	Y	Y	-
net-tools	Y	N	-
nss-softokn-freebl	Y	Y	-
pam	Y	N	Required when using PAM authentication.
perl-libs	Y	N	Required when using PL/Perl. Install 5.32.
python3	Y	N	Required when using PL/Python based on Python 3. Install 3.9.x .

Package name	Feature		Remarks
	Linux server	Linux client	
tcl	Y	N	Required when using PL/Tcl. Install 8.6.
unixODBC	N	Y	Required when using ODBC drivers.
unzip	Y	Y	-
xz-libs	Y	Y	-
zlib	Y	N	-

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

Package name	Feature		Remarks
	Linux server	Linux client	
JRE 8	Y	Y	The following JREs are available: - Oracle JRE Use update 31 or later of the 64-bit version. - OpenJDK Past the Java TCK (Technology Compatibility Kit)
libicu	Y	N	Provides collation support. Install 52.
libzstd1	Y	Y	
llvm	Y	N	Install version 7.0.x of llvm to run SQL with runtime compilation (just-in-time compilation) and add the directory where the shared library libLLVM.so.7 is located to the environment variable LD_LIBRARY_PATH. Fujitsu Enterprise Postgres 12 uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
pam	Y	N	Required when using PAM authentication.
python3	Y	N	Required when using PL/Python based on Python 3. Install 3.6.x.
unixODBC	N	Y	Required when using ODBC drivers

Y: Required
N: Not required

- The following packages are required for operations on SLES 15.

Package name	Feature		Remarks
	Linux server	Linux client	
JRE 8	Y	Y	The following JREs are available: - Oracle JRE Use update 31 or later of the 64-bit version. - OpenJDK Past the Java TCK (Technology Compatibility Kit)
libicu	Y	N	Provides collation support. Install 52.
libzstd1	Y	Y	
llvm	Y	N	Install version 7.0.x of llvm to run SQL with runtime compilation (just-in-time compilation) and add the directory where the shared library libLLVM.so.7 is located to the environment variable LD_LIBRARY_PATH. Fujitsu Enterprise Postgres 12 uses runtime compilation by default.If you do not want to use runtime compilation, turn off the jit parameter in postgresql.conf.You do not need to install llvm if you turn off the jit parameter. Failure to install llvm without turning off the jit parameter may result in an error when executing SQL.For more information about runtime compilation, see "Just-in-Time Compilation (JIT)" in "PostgreSQL Documentation".
pam	Y	N	Required when using PAM authentication.
python3	Y	N	Required when using PL/Python based on Python 3. Install 3.6.x.
unixODBC	N	Y	Required when using ODBC drivers

Y: Required
N: Not required

A.1.2 Related Software

Linux server

The following table lists client that can be connected to the Fujitsu Enterprise Postgres server feature.

Table A.1 Connectable client

OS	Product name
Windows Linux	Fujitsu Software Enterprise Postgres Community Edition Client 15 or later

The connection from a client product of a different version to this server function depends on the compatibility of each function included in the client product with PostgreSQL, so some functions may not be available.

Linux client

The following table lists the software required to use the Linux client.

Table A.2 Related software

No.	Software name	Version
1	C compiler (*1)	-
2	JDK or JRE	Java SE 8 or later (*2)

*1: Only operations using the C compiler provided with the operating system are guaranteed.

*2: Check the JDK/JRE support status of the PostgreSQL JDBC driver, and use a JDK/JRE version supported by the PostgreSQL JDBC driver.

Point

The following JDKs or JREs are available:

- Oracle JDK or JRE

- An OpenJDK that has passed the Java TCK (Technology Compatibility Kit)

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

Table A.3 Connectable servers

OS	Product name
Windows Linux	Fujitsu Software Enterprise Postgres Community Edition 10 or later, up to 15

Note

Connecting this client to a server product of a different version depends on compatibility with PostgreSQL on which the server product is based, so some features may not be available.

A.1.3 Excluded Software

This section describes excluded software.

Linux server

Fujitsu Enterprise Postgres

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

- The product version (indicated by "x" in "x SPz") of the product to be installed is the same as that of the installed product

- The editions are different

Other products

There are no exclusive products.

Linux client

Fujitsu Enterprise Postgres

Cannot coexist with the following clients:

- Same version of SE or AE client

- Different version of CE client

Other products

There are no exclusive products.

A.1.4 Required Patches

There are no required patches.

A.1.5 Hardware Environment

The following hardware is required to use Fujitsu Enterprise Postgres.

Memory

- Linux server

At least 512 MB of memory is required.

- Linux client

At least 54 MB of memory is required.

A.1.6 Disk Space Required for Installation

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

Disk space required for installation (Linux Server)

Table A.4 RHEL

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	283 (*1) +1 (*2)
Installation destination of the server	150
Installation destination of the client (64-bit)	100

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

*2: Required for the installation of FJQSS.

Table A.5 SLES

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1) +1 (*2)
/opt	2 (*1) +1 (*2)
Installation destination of the server	140

Directory	Required disk space (Unit: MB)
Installation destination of the client (64-bit)	90

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

*2: Required for the installation of FJQSS.

Disk space required for installation (Linux Client)

Table A.6 RHEL

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1)
/opt	283 (*1)
Installation destination of the client (64-bit)	100

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

Table A.7 SLES

Directory	Required disk space (Unit: MB)
/etc	1 + 1 (*1)
/var	1 + 2 (*1)
/opt	2 (*1)
Installation destination of the client (64-bit)	90

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

A.1.7 Supported System Environment

This section describes the supported system environment.

A.1.7.1 File System

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

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

The recommended file system is "ext4".

A.2 Windows

A.2.1 Required Operating System

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

Windows server

Table A.8 Operating systems

Operating system
- Microsoft(R) Windows Server(R) 2016 Datacenter

Operating system
- Microsoft(R) Windows Server(R) 2016 Standard - Microsoft(R) Windows Server(R) 2016 Essentials
- Microsoft(R) Windows Server(R) 2019 Datacenter - Microsoft(R) Windows Server(R) 2019 Standard - Microsoft(R) Windows Server(R) 2019 Essentials
- Microsoft(R) Windows Server(R) 2022 Datacenter - Microsoft(R) Windows Server(R) 2022 Standard - Microsoft(R) Windows Server(R) 2022 Essentials

Note

- The following components of Windows Server(R) 2016, Windows Server(R) 2019 and Windows Server(R) 2022 are not supported:

  - Server Core

  - Nano Server

  - Windows Server Container

- The TCP/IP protocol must be installed.

Windows client

Table A.9 Operating systems

Operating system
- Windows 10 Home - Windows 10 Education - Windows 10 Pro - Windows 10 Enterprise
- Windows 11 Home - Windows 11 Education - Windows 11 Pro - Windows 11 Enterprise
- Microsoft Windows Server 2016 Datacenter - Microsoft Windows Server 2016 Standard - Microsoft Windows Server 2016 Essentials
- Microsoft Windows Server 2019 Datacenter - Microsoft Windows Server 2019 Standard - Microsoft Windows Server 2019 Essentials
- Microsoft Windows Server 2022 Datacenter - Microsoft Windows Server 2022 Standard - Microsoft Windows Server 2022 Essentials

Note: If Windows is 32 bit, only the Windows client (32 bit) can be installed. If Windows is 64 bit, only the Windows client (64 bit) can be installed.

A.2.2 Related Software

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

Windows server

Table A.10 Related software

No.	Software name	Version	Remarks
1	Visual Studio	2015 2017 2019 2022	
2	.NET Framework	.NET 6.0 .NET 5.0 .NET Core 3.1 .NET Standard 2.0 .NET Standard 2.1	
3	Perl	5.26	Required when using PL/Perl.
4	Python	3.9.x	Required when using PL/Python based on Python 3.
5	Tcl	8.6	Required when using PL/Tcl.

📌 Note

. . . .

The following program is installed during installation of Fujitsu Enterprise Postgres:

- Microsoft Visual C++ 2015-2019 Redistributable Package version 14.24.28127

   Do not uninstall the above programs as they are required for running Fujitsu Enterprise Postgres.

. . . .

The following table lists client that can be connected to the Fujitsu Enterprise Postgres server feature.

Table A.11 Connectable client

OS	Product name
Windows Linux	Fujitsu Software Enterprise Postgres Community Edition Client 15 or later

📌 Note

. . . .

The connection from a client product of a different version to this server function depends on the compatibility of each function included in the client product with PostgreSQL, so some functions may not be available.

. . . .

Windows client

The following table lists the software compatible (that can operate) with the Windows client.

Before using any of these, confirm that the OS supports the software.

Table A.12 Related software

No.	Software name	Version
1	Visual Studio	2015 2017 2019 2022
2	.NET Framework	.NET 6.0 .NET 5.0 .NET Core 3.1 .NET Standard 2.0 .NET Standard 2.1
3	C compiler (*1)	-
4	JDK or JRE	Java SE 8 or later (*2)

*1: Only operations using the C compiler provided with the operating system are guaranteed.

*2: Check the JDK/JRE support status of the PostgreSQL JDBC driver, and use a JDK/JRE version supported by the PostgreSQL JDBC driver.

Point

The following JDKs or JREs are available:

- Oracle JDK or JRE

- An OpenJDK that has passed the Java TCK (Technology Compatibility Kit)

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

Table A.13 Connectable servers

OS	Product name
Windows Linux	Fujitsu Software Enterprise Postgres Community Edition 10 or later , up to 15

Note

Connecting this client to a server product of a different version depends on compatibility with PostgreSQL on which the server product is based, so some features may not be available.

A.2.3 Excluded Software

This section describes excluded software.

Windows server

Fujitsu Enterprise Postgres

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

- The product version (indicated by "x" in "x SPz") of the product to be installed is the same as that of the installed product

- The editions are different

Other products

There are no exclusive products.

Windows client

Fujitsu Enterprise Postgres

Fujitsu Enterprise Postgres

Cannot coexist with the following clients:

- Same version of SE or AE client

- Different version of CE client

Other products

There are no exclusive products.

A.2.4 Required Patches

No Required Patches.

A.2.5 Hardware Environment

The following hardware is required to use Fujitsu Enterprise Postgres.

Memory

- Windows server

256 MB or more is recommended (at least 128 MB is required).

- Windows client

At least 70 MB of memory is required.

A.2.6 Disk Space Required for Installation

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

Windows server

Table A.14 Disk space required for installation

Directory	Required disk space (Unit: MB)
Windows system drive	291
Installation destination of the Server	270
Installation destination of the Client (64 bit)	120

Windows client

The disk space shown below is required for new installation of the Windows client.

Windows client (32-bit) installation destination:

110 MB

Windows client (64-bit) installation destination:

120MB

System folder:

273 MB

A.2.7　Supported System Environment

This section describes the supported system environment.

A.2.7.1 File System

You can install Fujitsu Enterprise Postgres only if the system folder is an NTFS volume.

Appendix B Client Setup

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

B.1 Configuring Environment Variables

Configure the following environment variables when using client commands.

B.1.1 Windows

PATH environment variable

Add "*installationFolder*\bin".

PGLOCALEDIR environment variable

Add "*installationFolder*\share\locale".

Examples of environment variable configurations are shown below.

Example

```
> SET PATH=%ProgramFiles%\Fujitsu\fsepclient32\bin;%PATH%
> SET PGLOCALEDIR=%ProgramFiles%\Fujitsu\fsepclient32\share\locale
```

B.1.2 Linux

PATH environment variable

Add "*installationDirectory*/bin".

MANPATH environment variable

Add "*installationDirectory*/share/man".

PGLOCALEDIR environment variable

Add "*installationDirectory*/share/locale".

Examples of environment variable configurations are shown below.

Example

Note that "*<x>*" indicates the product version.

```
$ PATH=/opt/fsepv<x>client64/bin:$PATH ; export PATH
$ MANPATH=/opt/fsepv<x>client64/share/man:$MANPATH ; export MANPATH
$ PGLOCALEDIR=/opt/fsepv<x>client64/share/locale ; export PGLOCALEDIR
```

B.2 Setting Up Drivers

This section describes how to set up the drivers provided with Fujitsu Enterprise Postgres Community Edition.

B.2.1 JDBC Driver

This section describes how to use JDBC drivers. Refer to the OSS documentation for information on how to encrypt the communication data and how to connect to the database.

B.2.1.1 Development Environment

This section describes application development using JDBC drivers and the runtime environment.

B.2.1.1.1 Combining with JDK or JRE

Refer to the following for information on combining with JDK or JRE where JDBC drivers can operate:

- Windows
  "Table A.12 Related software"

- Linux
  "Table A.2 Related software"

B.2.1.2 Setup

This section describes the environment settings required to use JDBC drivers.

B.2.1.2.1 Environment settings

Configuration of the CLASSPATH environment variable is required as part of the runtime environment for JDBC drivers.

The name of the JDBC driver file is as follows:

```
postgresql-jdbc42.jar
```

It doesn't matter if you are using JDK 8, JRE 8, JDK 11, JRE 11, JDK 17 or JRE 17.

The examples below show how to set the CLASSPATH environment variable.

Note that "<*x*>" indicates the product version.

- Linux

  - Setting example (TC shell)

    ```
    setenv CLASSPATH /opt/fsepv<x>client64/jdbc/lib/postgresql-jdbc42.jar:${CLASSPATH}
    ```

  - Setting example (bash)

    ```
    CLASSPATH=/opt/fsepv<x>client64/jdbc/lib/postgresql-jdbc42.jar:$CLASSPATH;export
    CLASSPATH
    ```

- Windows (32-bit)

  - Setting example

    ```
    set CLASSPATH=C:\Program Files\Fujitsu\fsepv<x>client32\jdbc\lib\postgresql-
    jdbc42.jar;%CLASSPATH%
    ```

- Windows (64-bit)

  - Setting example (when Fujitsu Enterprise Postgres Client 64-bit is installed)

    ```
    set CLASSPATH=C:\Program Files\Fujitsu\fsepv<x>client64\jdbc\lib\postgresql-
    jdbc42.jar;%CLASSPATH%
    ```

B.2.1.2.2 Message language and encoding system used by applications settings

If the JDBC driver is used, it will automatically set the encoding system on the client to UTF-8, so there is no need to configure this.

See
. . . .

Refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the PostgreSQL Documentation for information on encoding systems.
. . . .

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Set language in the "user.language" system property.

Example

....

Example of running a Java command with system property specified

```
java -Duser.language=en TestClass1
```

....

B.2.2 ODBC Driver

This section describes how to use ODBC drivers.

B.2.2.1 Development Environment

Applications using ODBC drivers can be developed using ODBC interface compatible applications, such as Access, Excel, and Visual Basic.

Refer to the manuals for the programming languages corresponding to the ODBC interface for information about the environment for development.

Fujitsu Enterprise Postgres supports ODBC 3.5.

B.2.2.2 Setup

You need to set up PsqlODBC, which is an ODBC driver, in order to use applications that use ODBC drivers with Fujitsu Enterprise Postgres. PsqlODBC is included in the Fujitsu Enterprise Postgres client package.

The following describes how to register the ODBC drivers and the ODBC data source.

B.2.2.2.1 Registering ODBC drivers

When using the ODBC driver on Linux platforms, register the ODBC driver using the following procedure:

1. Install the ODBC driver manager (unixODBC)

Information

....

- Fujitsu Enterprise Postgres supports unixODBC Version 2.3 or later.

  You can download unixODBC from the following site:

  http://www.unixodbc.org/

- To execute unixODBC, you must first install libtool 2.2.6 or later.

  You can download libtool from the following website:

  http://www.gnu.org/software/libtool/

  [Note]

- ODBC driver operation is supported.

- unixODBC operation is not supported.

....

2. Register the ODBC drivers

   Edit the ODBC driver manager (unixODBC) odbcinst.ini file.

[location of the odbcinst.ini file]

```
unixOdbcInstallDir/etc/odbcinst.ini
```

Set the following content:

Definition name	Description	Setting value

[Driver name]	ODBC driver name	Set the name of the ODBC driver.
		
		Select the two strings below that correspond to the application type. Concatenate the strings with no spaces, enclose in "[ ]", and then specify this as the driver name.
		
		📘 **Note**
		
		The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string.
		
		- Application architecture
		
		"FujitsuEnterprisePostgres*<fujitsuEnterprisePostgresClientVers>*x64"
		
		- Encoding system used by the application
		
		  - In Unicode (only UTF-8 can be used)
		
		    "unicode"
		
		  - Other than Unicode
		
		    "ansi"
		
		Example: Where the encoding system used by the application is Unicode:
		
		"[FujitsuEnterprisePostgres*<fujitsuEnterprisePostgresClientVers>*x64unicode]"

Description	Description of the ODBC driver	Specify a supplementary description for the current data source. Any description may be set.

Driver64	Path of the ODBC driver (64-bit)	Set the path of the ODBC driver (64-bit).
		
		- If the encoding system is Unicode:
		
		`fujitsuEnterprisePostgresClientInstallDir/odbc/lib/psqlodbcw.so`
		
		- If the encoding system is other than Unicode:
		
		`fujitsuEnterprisePostgresClientInstallDir/odbc/lib/psqlodbca.so`

Definition name	Description	Setting value
FileUsage	Use of the data source file	Specify 1.
Threading	Level of atomicity secured for connection pooling	Specify 2.

Example

Note that "<x>" indicates the product version.

```
[Fujitsu Enterprise Postgres15x64unicode]
Description = Fujitsu Enterprise Postgres 15 x64 unicode driver
Driver64    = /opt/fsepv<x>client64/odbc/lib/psqlodbcw.so
FileUsage   = 1
Threading   = 2
```

B.2.2.2.2 Registering ODBC data sources(for Windows(R))

This section describes how to register ODBC data sources.

There are the following two ways to register ODBC data sources on Windows(R).

Registering using GUI

This section describes how to start the [ODBC Data Source Administrator] and register ODBC data sources.

Use the following procedure to register ODBC data sources:

1. Start the [ODBC Data Source Administrator].

    Select [Start] >> [Control Panel] >> [Administrative Tools] >> [ODBC Data Sources (32-bit)] (*1) or [ODBC Data Sources (64-bit)] (*1).

    *1: In certain Windows(R) versions, this may be [Data Sources (ODBC)].

2. When only the current user is to use the ODBC data source, select [User DSN]. When all users using the same computer are to use the ODBC data source, select [System DSN].

3. Click [Add].

4. Select one of the following drivers from the list of available ODBC drivers displayed in [Create New Data Source], and then click [Finish].

    - PostgreSQL Unicode
      Select this driver if using Unicode as the application encoding system.

    - PostgreSQL ANSI
      Select this driver if using other than Unicode as the application encoding system.

5. The [PostgreSQL ANSI ODBC Driver (psqlODBC) Setup] window is displayed. Enter or select the required items, then click [Save].

Set the following content:

Definition name	Setting value
Data Source	Specify the data source name to be registered in the ODBC driver manager. The application will select the name specified here and connect with the PostgreSQL database. This parameter cannot be omitted. Specify the following characters up to 32 bytes. - National characters - Alphanumerics - "_", "<", ">", "+", "`", "|", "~", """ " "&" , """, "#" , "$" , "%" , "-", "^", ":", "/" , "."
Description	Specify a supplementary description for the current data source. Specify characters up to 255 bytes. - National characters - Alphanumerics
Database	Specify the database name to be connected.
SSLMode	Specify to encrypt communications. The default is "disable". The setting values for SSLMode are as follows: - disable: Connect without SSL - allow: Connect without SSL, and if it fails, connect using SSL - prefer: Connect using SSL, and if it fails, connect without SSL - require: Connect always using SSL - verify-ca: Connect using SSL, and use a certificate issued by a trusted CA (*1) - verify-full: Connect using SSL, and use a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)
Server	Specify the host name of the database server to connect to, using up to 18 bytes. This parameter cannot be omitted.
Port	Specify the port number to be used for remote access. The default value is "5432".
Username(*2)	Specify the user that will access the database.
Password(*2)	Specify the password for the user that will access the database.

*1: If specifying either "verify-ca" or "verify-full", use the system environment variable PGSSLROOTCERT of your operating system to specify the CA certificate file as shown below.

Example:

```
Variable name: PGSSLROOTCERT
Variable value: cACertificateFile
```

*2: In consideration of security, specify the Username and the Password by the application.

Registering using commands

This section describes how to use commands to register ODBC data sources.

Use the following tools from Microsoft to register ODBC data sources.

- ODBCConf.exe

- Add-OdbcDsn

Refer to the Microsoft Developer Network (MSDN) Library for information on how to use these tools.

When using ODBCConf.exe

ODBCConf.exe is a tool supported on all Windows(R) platforms.

Specification format

```
ODBCConf.exe /A { dataSourceType "odbcDriverName" "optionName=value[|
optionName=value...]"} [/Lv fileName]
```

Refer to the Microsoft MSDN library for information on the format and parameters.

Description

Set the following content:

Definition name	Setting value
Data source type	Specify the data source type. - "CONFIGSYSDSN": A system data source is created. This requires user admin rights. The data source can be used by all users of the same computer. - "CONFIGDSN": A user data source is created. The data source can be used by the current user only. **P Point** • When CONFIGSYSDSN is specified as the data source type, it is necessary to execute the command in the command prompt in administrator mode. •
ODBC driver name	Specify an ODBC driver name that has already been registered on the system. Specify one of the following. - "PostgreSQL Unicode" Specify this driver name if using Unicode as the application encoding system. - "PostgreSQL ANSI" Specify this driver name if using other than Unicode as the application encoding system.
Option name	The following items must be set: - "DSN": Specify the data source name. - "Servername": Specify the host name for the database server. - "Port": Specify the port number for connection to the database - "Database": Specify the database name. Specify the following values as required: - "UID": User ID - "Password": Password

Definition name	Setting value
	- "SSLMode": Specify to encrypt communications. The default is "disable". Refer to the SSLMode explanation in the table under step 5 of "Registering using GUI" for information on how to configure SSLMode.
File Name	You can output process information to a file when creating a data source. This operand can be omitted.

Example

. . . .

```
ODBCConf.exe /A {CONFIGSYSDSN "PostgreSQL Unicode(x64)" "DSN=odbcconf1|Servername=sv1|
Port=5432|Database=db01|SSLMode=verify-ca"} /Lv log.txt
```

. . . .

Point

. . . .

In consideration of security, specify the UID and the Password by the application.

. . . .

When using Add-OdbcDsn

Add-OdbcDsn is used in the PowerShell command interface.

Specification format

```
Add-OdbcDsn dataSourceName -DriverName "odbcDriverName" -DsnType dataSourceType -
Platform oSArchitecture -SetPropertyValue @("optionName=value"
[,"optionName=value"...])
```

Refer to the Microsoft MSDN library for information on the format and parameters.

Description

Set the following content:

Definition name	Setting value
Data source name	Specify any name for the data source name.

ODBC driver name	Specify an ODBC driver name that has already been registered on the system. Specify one of the following.
	
	- "PostgreSQL Unicode"
	  Specify this driver name if using Unicode as the application encoding system.
	
	- "PostgreSQL ANSI"
	  Specify this driver name if using other than Unicode as the application encoding system.

Data source type	Specify the data source type. - "System": A system data source is created. Requires user admin rights. The data source can be used by all users of the same computer. - "User": A user data source is created. The data source can be used by the current user only.

Definition name	Setting value
	P Point . . . . When System is specified as the data source type, it is necessary to execute the command in the administrator mode of the command prompt. . . . .

OS architecture	Specify the OS architecture of the system.
	
	  - "32-bit": 32-bit system
	
	  - "64-bit": 64-bit system

Option name	The following items must be set: - "Servername": Specify the host name for the database server. - "Port": Specify the port number for connection to the database - "Database": Specify the database name. Specify the following values as required: - "SSLMode": Specify to encrypt communications. The default is "disable". Refer to the SSLMode explanation in the table under step 5 of "Registering using GUI" for information on how to configure SSLMode. **P** Point . . . . When using Add-OdbcDsn, the strings "UID" and "Password" cannot be set as option names. These can only be used when using ODBCConf.exe. . . . .

📝 **Example**
. . . .

```
Add-OdbcDsn odbcps1 -DriverName "PostgreSQL Unicode" -DsnType System -Platform 32-bit -
SetPropertyValue @("Servername=sv1", "Port=5432", "Database=db01", "SSLMode=verify-ca")
```
. . . .

L   ### B.2.2.2.3 Registering ODBC data sources(for Linux)

This section describes how to register ODBC data sources on Linux.

1. Register data sources

   Edit the odbc.ini definition file for the data source.

📘 **Information**
. . . .

Edit the file in the installation directory for the ODBC driver manager (unixODBC)

```
unixOdbcInstallDir/etc/odbc.ini
```

Or

Create a new file in the HOME directory

```
~/.odbc.ini
```
. . . .

P Point

....

If *unixOdbcInstallDir* is edited, these will be used as the shared settings for all users that log into the system. If created in the HOME directory (~/), the settings are used only by the single user.

....

Set the following content:

Definition name	Setting value
[Data source name]	Set the name for the ODBC data source.
Description	Set a description for the ODBC data source. Any description may be set.

Driver	Set the following as the name of the ODBC driver. Do not change this value.
	
	 Select the two strings below that correspond to the application type. Concatenate the strings with no spaces and then specify this as the driver name.
	
	 Note
	 ....
	 The placeholders shown below are enclosed in angle brackets '<>' to avoid confusion with literal text. Do not include the angle brackets in the string.
	 ....
	
	 - Application architecture
	    "Fujitsu Enterprise Postgres*\<fujitsuEnterprisePostgresClientVers\>*x64"
	 - Encoding system used by the application
	    - In Unicode (only UTF-8 can be used)
	     "unicode"
	    - Other than Unicode
	     "ansi"
	
	 Example: Where the encoding system used by the application is Unicode:
	 "Fujitsu Enterprise Postgres*\<fujitsuEnterprisePostgresClientVers\>*x64unicode"

Database	Specify the database name to be connected.
Servername	Specify the host name for the database server.
Username	Specify the user ID that will connect with the database.
Password	Specify the password for the user that will connect to the database.
Port	Specify the port number for the database server. The default is "5432".
SSLMode	Specify the communication encryption method. The setting values for SSLMode are as follows: - disable: Connect without SSL - allow: Connect without SSL, and if it fails, connect using SSL - prefer: Connect using SSL, and if it fails, connect without SSL - require: Connect always using SSL - verify-ca: Connect using SSL, and use a certificate issued by a trusted CA (*1) - verify-full: Connect using SSL, and use a certificate issued by a trusted CA to verify if the server host name matches the certificate (*1)

Definition name	Setting value
ReadOnly	Specify whether to set the database as read-only. - 1: Set read-only - 0: Do not set read-only

*1: If specifying either "verify-ca" or "verify-full", use the environment variable PGSSLROOTCERT to specify the CA certificate file as shown below.

Example

```
export PGSSLROOTCERT=cACertificateFileStorageDir/root.crt
```

Example:

```
[MyDataSource]
Description    = Fujitsu Enterprise Postgres
Driver         = Fujitsu Enterprise Postgres15x64ansi
Database       = db01
Servername     = sv1
Port           = 5432
ReadOnly       = 0
```

P Point
. . . .

In consideration of security, specify the UserName and the Password by the application.
. . . .

2. Configure the environment variable settings

   To execute applications that use ODBC drivers, all of the following settings must be configured in the LD_LIBRARY_PATH environment variable:

   - *unixOdbcInstallDir(*1)*/lib

   - *libtoolInstallDir(*1)*/lib

   *1: If the installation directory is not specified when unixODBC and libtool are installed, they will be installed in /usr/local.

B.2.2.2.4 Message language and encoding system used by applications settings

This section explains the language settings for the application runtime environment and the encoding settings for the application.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Messages output by an application may include text from messages sent from the database server. In the resulting text, the text of the application message will use the message locale of the application, and the text of the message sent by the database server will use the message locale of the database server. If the message locales do not match, more than one language or encoding system will be used. Moreover, if the encoding systems do not match, characters in the resulting text can be garbled.

L

   - Linux

     Set the locale for messages (LC_MESSAGES category) to match the message locale of the database server. This can be done in a few different ways, such as using environment variables. Refer to the relevant manual of the operating system for information on the setlocale function.

Example of specifying "en_US.UTF-8" with the setlocale function

```
setlocale(LC_ALL,"en_US.UTF-8");
```

Specifying the locale of the LC_ALL category propagates the setting to LC_MESSAGE.

- Windows(R)

Align the locale of the operating system with the message locale of the database server.

Encoding system settings

Ensure that the encoding system that is embedded in the application and passed to the database, and the encoding system setting of the runtime environment, are the same. The encoding system cannot be converted correctly on the database server.

Use one of the following methods to set the encoding system for the application:

- Set the PGCLIENTENCODING environment variable in the runtime environment.

- Set the client_encoding keyword in the connection string.

- Use the PQsetClientEncoding function.

See

Refer to "Supported Character Sets" in "Server Administration" in the PostgreSQL Documentation for information on the strings that represent the encoding system that can be set.

For example, when using "Unicode" and "8 bit", set the string "UTF8".

Example

Setting the "PGCLIENTENCODING" environment variable

An example of setting when the encoding of the client is "UTF8" (bash)

```
> PGCLIENTENCODING=UTF8; export PGCLIENTENCODING
```

An example of setting when the encoding of the client is "UTF8"

```
> set PGCLIENTENCODING=UTF8
```

Point

Text may be garbled when outputting results to the command prompt. Review the font settings for the command prompt if this occurs.

B.2.2.3 Connecting to the Database

Refer to the manual for the programming language corresponding to the ODBC interface, i.e. Access, Excel, or Visual Basic, for example.

B.2.3 .NET Data Provider

This section describes how to configure for the purpose of creating .NET applications with Visual Studio. Refer to the OSS documentation for information on how to connect to the database.

B.2.3.1 Development Environment

.NET Data Provider can operate in the following environments:

.NET Framework environment for the development and running of applications	.NET 6.0 .NET 5.0 .NET Core 3.1 .NET Standard 2.0 .NET Standard 2.1
Integrated development environment for applications running in a .NET Framework environment	Visual Studio 2022 Visual Studio 2019 Visual Studio 2017 Visual Studio 2015

B.2.3.2 Setup

This section explains how to set up .NET Data Provider and Npgsql for Entity Framework.

B.2.3.2.1 Setting Up .NET Data Provider

The .NET Data Provider of Fujitsu Enterprise Postgres can be installed as a local NuGet package. Follow the steps below to install.

Location of NuGet package

The NuGet package are stored in the following location. "<x>" indicates the product version.

```
fujitsuEnterprisePostgresClientInstallDir\DOTNET\Npgsql.<x>.0.0.nupkg
```

Add a local package source

In Visual Studio, add a NuGet local package source if one does not exist.

1. Click [Tools] >> [Options] >> [NuGet Package Manager], and then select [Package Sources].

2. Click [+] in the upper-right corner, and then set [Name] to "Local Package Source".

3. Click [⋯] and navigate to the folder above. Select this folder, and then click [OK].

Install the NuGet package

In Visual Studio, install the NuGet package from the local package source.

1. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].

2. In the upper-right corner, select "Local Package Source" from [Package Source].

3. Once the local package source is set, all available NuGet packages in this local location will be displayed. Select "Npgsql", and then select the projects for which this package is to be installed.

4. Click [Install].

B.2.3.2.2 Setting Up .NET Data Provider Type Plugins

.NET Data Provider provide Type Plugins that enable more data type mappings (eg mapping date/time data types with Npgsql NodaTime). The plugins modify how Npgsql maps the PostgreSQL values to CLR types.

To use the type plugins, install the NuGet package provided on the Web.

B.2.3.2.3 Setting up Npgsql for Entity Framework

Npgsql for Entity Framework is installed from the web via the nuget package manager. Install Npgsql for Entity Framework that meets the following conditions:

- It has a dependency on the version of Npgsql provided by Fujitsu Enterprise Postgres

- Supported by Npgsql Community

- It is the latest microversion

B.2.3.2.4 Message language and encoding system used by applications settings

If the .NET Data Provider is used, it will automatically set the encoding system on the client to UTF-8, so there is no need to configure this.

📑 See

Refer to "Automatic Character Set Conversion Between Server and Client" in "Server Administration" in the PostgreSQL Documentation for information on encoding systems.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Set language using the "System.Globalization.CultureInfo.CreateSpecificCulture" method.

📝 Example

Code example for changing the locale in a C# application

```
System.Threading.Thread.CurrentThread.CurrentUICulture =
    System.Globalization.CultureInfo.CreateSpecificCulture("en");
```

B.2.3.3 Uninstallation

This section explains how to uninstall Npgsql.

Npgsql is installed per project. To uninstall it, follow the procedure below:

1. In Visual Studio, open a project for which Npgsql is installed.

2. Click [Tools] >> [NuGet Package Manager] >> [Manage NuGet Packages for Solution].

3. Select all the projects that have Npgsql installed, and then click [Uninstall].
   Alternatively, if the plugin packages have been removed and is no longer installed, in the solution explorer open the Dependencies/NuGet node and delete the plugins that require uninstallation.

B.2.4 C Library (libpq)

This section explains how to use C libraries.

B.2.4.1 Development Environment

Install Fujitsu Enterprise Postgres Client Package for the architecture to be developed and executed.

📑 See

Refer to the following for information on the C compiler required for C application development.

B.2.4.2 Setup

This section describes the environment settings required to use C libraries and how to encrypt data for communication.

B.2.4.2.1 Environment settings

To execute an application that uses libpq, set the environment variable as shown below.

Linux

- Required for execution of the application

  - PGLOCALEDIR
  fujitsuEnterprisePostgresClientInstallDir/share/locale

Example

Note that "*<x>*" indicates the product version.

```
> PGLOCALEDIR=/opt/fsepv<x>client64/share/locale;export PGLOCALEDIR
```

Windows (R)

- Required for compile/link

  - LIB
  fujitsuEnterprisePostgresClientInstallDir\lib

  - INCLUDE
  fujitsuEnterprisePostgresClientInstallDir\include

- Required for execution of the application

  - PATH
  fujitsuEnterprisePostgresClientInstallDir\lib

  - PGLOCALEDIR
  fujitsuEnterprisePostgresClientInstallDir\share\locale

Example

When the 64-bit version client package is installed on a 64-bit operating system.

Note that "*<x>*" indicates the product version.

```
> SET PATH=%ProgramFiles%\Fujitsu\fsepv<x>client64\lib;%PATH%
> SET LIB=%ProgramFiles%\Fujitsu\fsepv<x>client64\lib;%LIB%
> SET INCLUDE=%ProgramFiles%\Fujitsu\fsepv<x>client64\include;%INCLUDE%
> SET PGLOCALEDIR=%ProgramFiles%\Fujitsu\fsepv<x>client64\share\locale
```

B.2.4.2.2 Message language and encoding system used by applications settings

This section explains the language settings for the application runtime environment and the encoding settings for the application.

Language settings

You must match the language settings for the application runtime environment with the message locale settings of the database server.

Messages output by an application may include text from messages sent from the database server. In the resulting text, the text of the application message will use the message locale of the application, and the text of the message sent by the database server will use the message locale of the database server. If the message locales do not match, more than one language or encoding system will be used. Moreover, if the encoding systems do not match, characters in the resulting text can be garbled.

- Linux

  Set the locale for messages (LC_MESSAGES category) to match the message locale of the database server. This can be done in a few different ways, such as using environment variables. Refer to the relevant manual of the operating system for information on the setlocale function.

  ### 📖 Example

  Example of specifying "en_US.UTF-8" with the setlocale function

  ```
  setlocale(LC_ALL,"en_US.UTF-8");
  ```

  Specifying the locale of the LC_ALL category propagates the setting to LC_MESSAGE.

- Windows(R)

  Align the locale of the operating system with the message locale of the database server.

Encoding system settings

Ensure that the encoding system that is embedded in the application and passed to the database, and the encoding system setting of the runtime environment, are the same. The encoding system cannot be converted correctly on the database server.

Use one of the following methods to set the encoding system for the application:

- Set the PGCLIENTENCODING environment variable in the runtime environment.

- Set the client_encoding keyword in the connection string.

- Use the PQsetClientEncoding function.

📖 See

Refer to "Supported Character Sets" in "Server Administration" in the PostgreSQL Documentation for information on the strings that represent the encoding system that can be set.

For example, when using "Unicode" and "8 bit", set the string "UTF8".

📖 Point

Text may be garbled when outputting results to the command prompt. Review the font settings for the command prompt if this occurs.

B.2.4.2.3 Settings for encrypting communication data

Set in one of the following ways when performing remote access using communication data encryption:

When setting from outside with environment variables

Specify "require", "verify-ca", or "verify-full" in the PGSSLMODE environment variable.

In addition, the parameters for the PGSSLROOTCERT and PGSSLCRL environment variables need to be set to prevent spoofing of the database server.

See

Refer to "Environment Variables" in "Client Interfaces" in the PostgreSQL Documentation for information on environment variables.

When specifying in the connection URI

Specify "require", "verify-ca", or "verify-full" in the "sslmode" parameter of the connection URI.

In addition, the parameters for the sslcert, sslkey, sslrootcert, and sslcrl need to be set to prevent spoofing of the database server.

See

Refer to "Secure TCP/IP Connections with SSL" in "Server Administration" in the PostgreSQL Documentation for information on encrypting communication data.

B.2.4.3 Connecting with the Database

Point

Use the connection service file to specify the connection destination. In the connection service file, a name (service name) is defined as a set, comprising information such as connection destination information and various types of tuning information set for connections. By using the service name defined in the connection service file when connecting to databases, it is no longer necessary to modify applications when the connection information changes.

Refer to "Client Interfaces", "The Connection Service File" in the PostgreSQL Documentation for details.

See

Refer to "Database Connection Control Functions" in "Client Interfaces" in the PostgreSQL Documentation.

B.2.5 Embedded SQL in C

This section describes how to use embedded SQL in C. Refer to the OSS documentation for information on how to connect to the database.

B.2.5.1 Development Environment

Install Fujitsu Enterprise Postgres Client Package for the architecture to be developed and executed.

See

Refer to the following for information on the C compiler required for C application development.

- Windows
  "Table A.12 Related software"

- Linux
  "Table A.2 Related software"

B.2.5.2 Setup

B.2.5.2.1 Environment settings

When using embedded SQL in C, the same environment settings as when using the C library (libpq) are required.

Refer to "B.2.4.2.1 Environment settings" in "C Library (libpq)" for information on the environment settings for the library for C.

Additionally, set the following path for the precompiler ecpg:

Linux

```
fujitsuEnterprisePostgresClientInstallDir/bin
```

Windows(R)

```
fujitsuEnterprisePostgresClientInstallDir\bin
```

B.2.5.2.2 Message language and encoding system used by applications settings

The message language and the encoding System Settings Used by Applications settings are the same as when using the library for C.

However, in embedded SQL, the PQsetClientEncoding function cannot be used in the encoding system settings. In embedded SQL, use the SET command to specify the encoding system in client_encoding.

Refer to "B.2.4.2.2 Message language and encoding system used by applications settings" in "C Library (libpq)" for information on the settings for the library for C.

B.2.5.2.3 Settings for encrypting communication data

When encrypting the communication data, the same environment settings as when using the C library (libpq) are required.

Refer to "B.2.4.2.3 Settings for encrypting communication data" in "C Library (libpq)" for information on the environment settings for the C library.

B.3 How to Build and Run an Application that Uses Shared Libraries

This section describes the following supplementary items regarding the use of shared libraries when developing applications with Fujitsu Enterprise Postgres.

- Setting DT_RUNPATH for the application

- Direct linking of indirectly used libraries to applications

B.3.1 Setting DT_RUNPATH for Applications

Searching for libraries used by applications

If your application uses Fujitsu Enterprise Postgres shared libraries such as libpq and ecpg, you need to load those libraries when you run your application.

When loading a library, it searches the machine for the library.

Library Search allows you to specify the path to search.

To specify the path, you can use the DT_RUNPATH attribute recorded in the application or library, or the environment variable LD_LIBRARY_PATH.

In general, use of the DT_RUNPATH attribute is recommended. This is because the environment variable LD_LIBRARY_PATH may affect the execution of applications other than the corresponding application.

The following explains when to use DT_RUNPATH.

Build so that the path in the operating environment that stores the library to be used is set in the DT_RUNPATH attribute of the application.

For example, when using libpq or ecpg, set "<*Fujitsu Enterprise Postgres client feature installation directory in operating environment*>/lib". (Note 1)

For how to set the DT_RUNPATH attribute, refer to the documentation of your compiler or linker.

There are the following three types of paths to be set and how to operate them. Please select the one suitable for each operation, and set and operate.

(1) Specify an absolute path

    Set "<absolute path of the directory where the library is stored>/lib".

(2) Specify a relative path (Note 1)

    Set "<relative path from the application of the directory that stores the library>/lib".

(3) Specify an arbitrary path and using a symbolic link

    Set "(any path)". Also, create a symbolic link to the directory that stores the library at any path location.
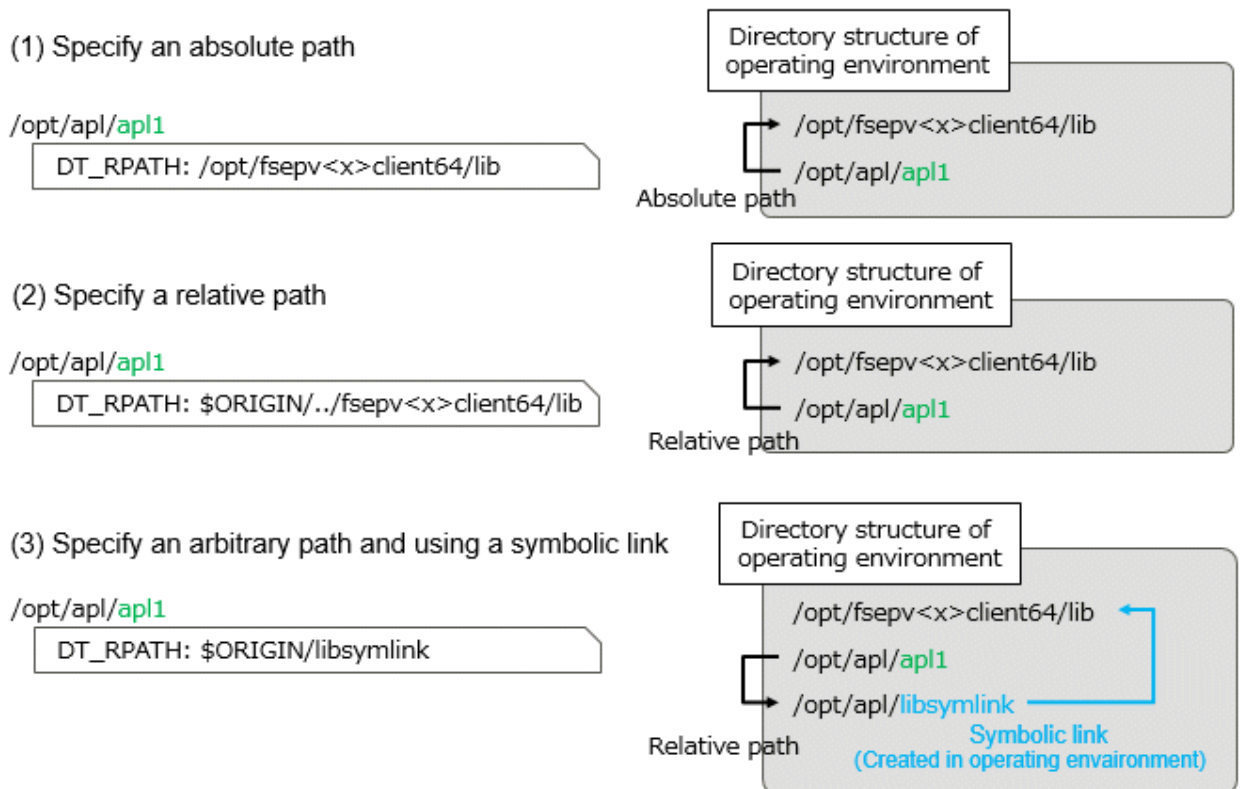
Note 1:

    For example, if you are building an application with gcc, add "-Wl,-rpath,<*Fujitsu Enterprise Postgres installation directory in the operating environment*/lib>,--enable-new-dtags" as gcc options, DT_RUNPATH can be set.

When DT_RUNPATH cannot be set

If none of the above settings work, you can find the shared libraries your application needs by setting the environment variable LD_LIBRARY_PATH to the path to the directory that stores the libraries when you run your application.

However, if you set LD_LIBRARY_PATH and execute commands or programs other than the applicable application, please be aware that they may result in run-time errors or unexpected behavior.

B.3.2 Direct Linking of Indirectly Used Libraries to Applications

Note

∙∙

This content is complicated, and the possibility that it corresponds to this content in many applications is considered to be low.

Use this as a reference only when the application cannot be executed unexpectedly during a test, etc., when creating the application (as explained below, libF3 fails to load, or a runtime error occurs due to conflicts with other libraries).

∙∙

For applications that use the libraries bundled with Fujitsu Enterprise Postgres, for example, if libF1, libF2, and libF3 have the following dependencies with other applications and libraries as shown below, libF3 can be directly Please specify in the build option to link.

If you do not link directly, specify the path where libF3 is stored in LD_LIBRARY_PATH when running the application.
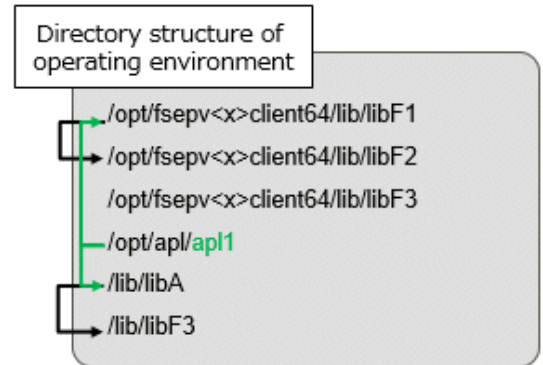
Otherwise, an error may occur during application execution.

Example

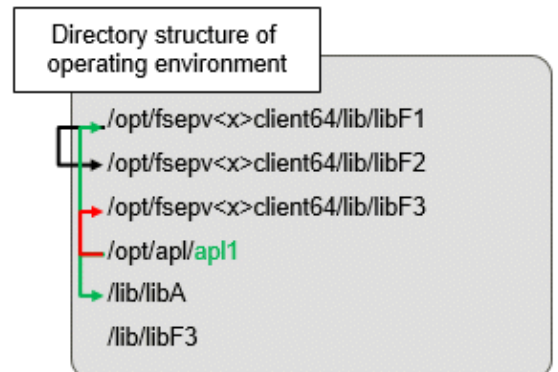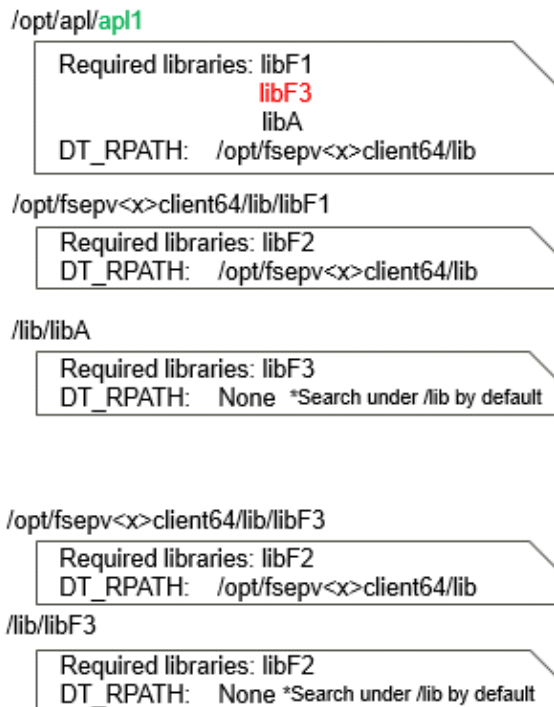The assumptions for this example are:

- There are the following dependencies between the application and the library.

  - apl1->libF1->libF2 (apl1 requires libF1 and libF1 requires libF2)

  - apl1->libA->libF3->libF2 (apl1 requires libA, libA requires libF3, libF3 requires libF2)

- libF1, libF2, and libF3 are libraries bundled with Fujitsu Enterprise Postgres.

When libF3 is not linked directly to apl1

/opt/apl/apl1
```
Required libraries: libF1
                    libA
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/opt/fsepv<x>client64/lib/libF1
```
Required libraries: libF2
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/lib/libA
```
Required libraries: libF3
DT_RPATH:   None *Search under /lib by default
```

/opt/fsepv<x>client64/lib/libF3
```
Required libraries: libF2
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/lib/libF3
```
Required libraries: libF2
DT_RPATH:   None *Search under /lib by default
```

Directory structure of operating environment
- /opt/fsepv<x>client64/lib/libF1
- /opt/fsepv<x>client64/lib/libF2
- /opt/fsepv<x>client64/lib/libF3
- /opt/apl/apl1
- /lib/libA
- /lib/libF3

/lib/libF3 does not exist, or
/lib/libF3 and /opt/fsepv<x>client64/lib/libF2 conflict
(A symbol referenced by libF3 is not defined in libF2)

When libF3 is directly linked to apl1

/opt/apl/apl1
```
Required libraries: libF1
                    libF3
                    libA
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/opt/fsepv<x>client64/lib/libF1
```
Required libraries: libF2
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/lib/libA
```
Required libraries: libF3
DT_RPATH:   None *Search under /lib by default
```

/opt/fsepv<x>client64/lib/libF3
```
Required libraries: libF2
DT_RPATH:   /opt/fsepv<x>client64/lib
```

/lib/libF3
```
Required libraries: libF2
DT_RPATH:   None *Search under /lib by default
```

Directory structure of operating environment
- /opt/fsepv<x>client64/lib/libF1
- /opt/fsepv<x>client64/lib/libF2
- /opt/fsepv<x>client64/lib/libF3
- /opt/apl/apl1
- /lib/libA
- /lib/libF3

/opt/fsepv<x>client64/lib/libF3 and
/opt/fsepv<x>client64/lib/libF2 does not conflict

Generally, when loading libraries, if some libA requires libB and libB requires libC, only the DT_RUNPATH value set in libA is used to search libB, and only the DT_RUNPATH value set in libB is used to search libC.

In the figure above "When libF3 is not linked directly to apl1", the search for libF1 uses the DT_RUNPATH value set in apl1. The search for libF2 uses the DT_RUNPATH value set for libF1. Since "*Fujitsu Enterprise Postgres installation directory*/lib" is set in each DT_RUNPATH, libF1 and libF2 bundled with Fujitsu Enterprise Postgres can be found and loaded when searching for libF1 and libF2. .

However, searching for libF3 fails to load libF3 shipped with Fujitsu Enterprise Postgres. This is because the search for libF3 uses the DT_RUNPATH value set for libA, but libA does not have a DT_RUNPATH value.

Therefore, either libF3 cannot be found and loading of libF3 fails, or even if an unexpected libF3 is found in the machine and loaded, there is a conflict between libF2 bundled with Fujitsu Enterprise Postgres conflicts and can result in run-time errors. (The conflict here is that a symbol referenced in libF3 is not defined in libF2.)

By directly linking libF3 to the application, as shown in the figure above "When libF3 is directly linked to apl1", it is possible to use the DT_RUNPATH of the application and load the libF3 bundled with Fujitsu Enterprise Postgres. can. Alternatively, you can load libF3 shipped with Fujitsu Enterprise Postgres by setting LD_LIBRARY_PATH.

Appendix C Uninstall (middleware)

C.1 Features that are Installed

[Windows]

Feature	Package name	Component name	Remarks	Selectively installed?
Common tool	FJSVcir	CIRuntime Application	Controls the installation and uninstallation of Fujitsu middleware products. Manages the installation information of Fujitsu middleware products and includes a management function for viewing installation information and launching the uninstaller of each product. ("Uninstall (middleware)")	No

[Linux]

Feature	Package name	Component name	Remarks	Selectively installed?
Common tool	FJSVcir	CIRuntime Application	Controls the installation and uninstallation of Fujitsu middleware products. Manages the installation information of Fujitsu middleware products and includes a management function for viewing installation information and launching the uninstaller of each product. ("Uninstall (middleware)")	No

C.2 Notes

C.2.1 Notes on Uninstall (middleware)

"Uninstall (middleware)" is a tool used by Fujitsu middleware products. It performs information management for middleware products, and also, launching the uninstaller for removing these products from the installed systems.

Note

....

- To uninstall Fujitsu Enterprise Postgres, uninstall from "Uninstall (middleware)".

- This tool manages information about other Fujitsu middleware products as well as Fujitsu Enterprise Postgres. For this reason, do not uninstall it unless absolutely necessary. If you have accidentally uninstalled this tool, re-install it as described below.

  [Windows]

  1. Log on to the machine to be installed using a user name belonging to the Administrators group, or switch to an account with administrator privileges.

  2. Insert the server program DVD into the drive device.

  3. Execute the installation command.

     ```
     z:\CIR\Windows\cirinst.exe
     ```

     In the example above, *z* is the drive into which the DVD is inserted.

[Linux]

1. Log in as a superuser to the installation target machine, or switch to a user with administrative privileges.

2. Insert the product media in the drive.

3. Execute the installation command.

   [Linux]

   ```
   # /media/dvd/CIR/Linux/cirinst.sh
   ```

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

- If you uninstall this tool as described below.

  1. Check that there are no Fujitsu middleware products installed in the system.
     You can check this by using "Uninstall (middleware)", which is launched by the command below.

     [Windows]

     Select [All Programs] > [Fujitsu] > [Uninstall (middleware)]

     [Linux]

     ```
     /opt/FJSVcir/cir/bin/cimanager.sh -c
     ```

     -c: CUI

  2. If no Fujitsu middleware products have been installed, then issue the command below.

     [Windows]

     ```
     %SystemDrive%\FujitsuF4CR\bin\cirremove.exe
     ```

     [Linux]

     ```
     # /opt/FJSVcir/bin/cirremove.sh
     ```

  3. At the uninstallation confirmation prompt, enter "y".

     ```
     This software is a common tool of Fujitsu products.Are you sure you want to remove
     it?[y/n]:
     ```

     Uninstallation will start.

Appendix D Uninstall (middleware) Messages

D.1   Messages output by FJSVcir

FSP_FJSVCIR_CIRINST: ERROR: 101: CIRINST101: Administrator privilege is required.

Description

The user does not have administrator privileges.

Action method

Login with administrator privileges and run the command again.

FSP_FJSVCIR_CIRINST: ERROR: 102: CIRINST102: Failed to create *%s*

Parameters

%s: Directory name

Description

Failed to create a directory during the installation.

Action method

Creating the directory might have failed for some reason. Run the installer again, or run cirinst command again. If the problem persists, check the system log.

FSP_FJSVCIR_CIRINST: ERROR: 103: CIRINST103: It is required at least *%d*MB

Parameters

%d: Disk spaces

Description

Insufficient disk space.

Action method

Confirm that the system has sufficient disk spaces.

[Windows] FSP_FJSVCIR_CIRINST: ERROR: 104: CIRINST104: Failed to copy CIR files.

[Linux] FSP_FJSVCIR_CIRINST: ERROR: 104: CIRINST104: Failed to copy CIR installer files.

Description

Failed to copy files required for the installation.

Action method

Copying the files failed for some reason. Run the installer again, or run cirinst command again. If the problem persists, check the system log.

FSP_FJSVCIR_CIRINST: ERROR: 105: CIRINST105: Failed to copy JRE.

Description

Failed to copy JRE required for installation.

Action method

Copying the files failed for some reason. Run the installer again, or run cirinst command again. If the problem persists, check the system log.

FSP_FJSVCIR_CIRINST: ERROR: 106: CIRINST106: Failed to copy CIR

Description

Failed to copy files during the installation.

Action method

Copying the files failed for some reason. Run the installer again, or run cirinst command again. If the problem persists, check the system log.

FSP_FJSVCIR_CIRINST: ERROR: 107: CIRINST107: invalid option.

Description

An invalid option was specified.

Action method

Specify a valid option. [-c]: CUI

FSP_FJSVCIR_CIRINST: ERROR: 108: CIRINST108: JRE which should be deployed is not bundled.

Description

An appropriate JRE for this system is not bundled.

Action method

Confirm that the product supports the platform.

FSP_FJSVCIR_CIRINST: ERROR: 109: CIRINST109: Unsupported OS.

Description

Unsupported operating system.

Action method

Confirm that the product supports the operating system.

L ### FSP_FJSVCIR_CIRINST: ERROR: 185: CIRINST185: lsb_release was not found. Please install the package below.
- redhat-lsb

Description

lsb_release command was not found.

Action method

Add redhat-lsb package and then execute install again.

L ### FSP_FJSVCIR_CIRINST: ERROR: 186: CIRINST186: lsb_release was not found.

Description

lsb_release command was not found.

Action method

Add the relevant package and then execute install again.

FSP_FJSVCIR_CIRINST: ERROR: 201: CIRINST201: Administrator privilege is required.

Description

The user does not have administrator privileges.

Action method

Login with administrator privileges and run the command again.

FSP_FJSVCIR_CIRINST: ERROR: 203: CIRINST203: Failed to delete files.

Description

Failed to delete FJSVcir files.

Action method

Deleting the files failed for some reason. Run cirremove command again. If the problem persists, check the system log.

FSP_FJSVCIR_CIRINST: ERROR: 205: CIRINST205: invalid option.

Description

Invalid option is specified.

Action method

No option is supported. Retry without any options.

Specified installation parameters file was not found.

Description

Specified installation parameters file was not found. (silent mode)

Action method

Specify the installation parameters file.

It failed to install.See log for details

Description

An error occurred during install. (silent mode)

Action method

Collect the files stored in the following directories.

[UNIX]

/var/opt/FJSVcir/cir/logs/cirlog0.log.0

[Windows]

%ProgramData%\Fujitsu\FujitsuF4CR\cir\logs\cirlog0.log.0

Parameters are invalid.Please specifiy valid parameters.

Description

Invalid option is specified. (silent mode)

Action method

Specify a valid option.

Internal data is broken.

Description

Internal data used by this product is corrupt.

Action method

Collect the files stored in the following directories and contact Fujitsu technical support:

/var/opt/FJSVCIR/cir/

/etc/opt/FJSVCIR/cir/CIR.properties

%ProgramData%\Fujitsu\FujitsuF4CR\cir\

D.2   Messages output by Uninstall (middleware)

It has already been running in another process.

Description

An attempt was made to start Uninstall (middleware) more than once. Alternatively, an attempt was made to start Uninstall (middleware) while the installer was starting.

Action method

End any Uninstall (middleware) that have already started. Alternatively, start Uninstall (middleware) after the installer has ended.

Specified option is invalid.

Description

An invalid option was specified.

Action method

Specify valid options and run the command again.

Please enter a valid option.

Description

An invalid character was entered. Valid characters are y, n, or item numbers.

Action method

Enter a valid character.

Failed to uninstall of the following software packages:

Description

Failed to uninstall the software listed in this message.

Action method

Confirm the information shown after this message and take the appropriate action.

Unable to uninstall the software as it is referred from more than one software.

Description

Failed to uninstall the software because it is used by other software.

Action method

No specific action is required.

Unable to uninstall the software as the software is mandatory.

Description

Failed to uninstall the software because it is required by another program.

Action method

No specific action is required.

Internal data is broken.

Description

Internal data used by this product is corrupt.

Action method

Collect the files stored in the following directories and contact Fujitsu technical support:

[UNIX]

/var/opt/FJSVCIR/cir/

/etc/opt/FJSVCIR/cir/CIR.properties

[Windows]

%ProgramData%\Fujitsu\FujitsuF4CR\cir\

Unable to uninstall the software you were about to uninstall as the existence of the software is a precondition for the operation of another software.

Description

Failed to uninstall the software because it is required by another program.

Action method

No specific action is required.

The program terminated abnormally.

Description

The program has terminated abnormally.

Action method

Collect the files stored in the following directories and contact Fujitsu technical support:

[UNIX]

/var/opt/FJSVCIR/cir/

/etc/opt/FJSVCIR/cir/CIR.properties

[Windows]

%ProgramData%\Fujitsu\FujitsuF4CR\cir\

An unexpected error has occurred during uninstall.

Description

An error occurred during uninstall.

Action method

Collect the files stored in the following directories and contact Fujitsu technical support:

/var/opt/FJSVCIR/cir/

/etc/opt/FJSVCIR/cir/CIR.properties

%ProgramData%\Fujitsu\FujitsuF4CR\cir\

It failed to uninstall.See log for details.

Description

An error occurred during uninstall. (silent mode)

Action method

Collect the files stored in the following directories.

[UNIX]

/var/opt/FJSVcir/cir/logs/cirlog0.log.0

[Windows]

%ProgramData%\Fujitsu\FujitsuF4CR\cir\logs\cirlog0.log.0

Failed to initialize the temp directory.

Description

Can not start Uninstall (middleware) because failed to initialize the temp directory.

Action method

Run Uninstall (middleware) again. If the problem persists, check whether other processes have accessed the files in the following directories.

[UNIX]

/var/opt/FJSVcir/cir/temp/meta_db

[Windows]

%ProgramData%\Fujitsu\FujitsuF4CR\cir\temp\meta_db

[Notice]Need to restart for uninstall completion.

Description

Uninstallation was completed. (silent mode)

Action method

Restart the system.

Index