

PostGIS Build Instructions

Product Name	Fujitsu Enterprise Postgres
Edition	Advanced Edition 16 Advanced Edition with Cryptographic Module 16
Target OS	Linux x64 (RHEL8/RHEL9/SLES15)
PostGIS Version	3.4.2

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Purpose of this document

This document describes how to use PostGIS in Fujitsu Enterprise Postgres.

Abbreviation of Product Names

The following tables list abbreviations of the titles as they appear in this documents.

Formal name	Abbreviation
Red Hat(R) Enterprise Linux(R) 8, Red Hat(R) Enterprise Linux(R) 9, SUSE Linux Enterprise Server 15	Linux
Red Hat(R) Enterprise Linux(R) 8	RHEL8
Red Hat(R) Enterprise Linux(R) 9	RHEL9
SUSE Linux Enterprise Server 15	SLES 15
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

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1 Overview of PostGIS Usage

To use PostGIS, customers must download and build the specified open source software (OSS). After you build PostGIS, you can apply it to your production environment to enable PostGIS. This guide walks you through the process of downloading, building, and setting up OSS.

1.1 Conditions of Use

Follow this guide to deploy PostGIS.

PostGIS and the OSS you build are not part of the Fujitsu Enterprise Postgres media. No hotfix is provided.

Please note that we cannot support you if you do not follow this manual or if any of the following apply.

- If you downloaded the OSS specified in "2.2 Required Software" and then modified the content to build it.
- If you modified and used the PostGIS build script described in the instructions.
- You have used a version of the "2.2 Required Software" OSS other than the version specified in this document.
- Used with a combination other than the version of OSS corresponding to the "2.3 Required Patch" fix number.

1.2 Limited Support

The OSS to be built (including PostGIS) is not included in the Fujitsu Enterprise Postgres program, and no fixes are provided for it.

Therefore, you must refer to the PostGIS build instructions and download the required OSS.

The PostGIS build instructions will be updated once a version with new fixes is released by the community and verified by Fujitsu.

A revision of the PostGIS build instructions is notified when an urgent fix is needed for server functionality. By following the updated PostGIS build instructions, you can take advantage of the version with the new fixes.

1.3 Regarding the use of PostGIS

In order to use PostGIS in accordance with this manual, the server function of Fujitsu Enterprise Postgres is required.

In case where an upgrade is necessary due to the application of a urgent fix, or due to a version upgrade of PostGIS, it will be necessary to rebuild PostGIS.

2 Operating environment

2.1 Required Operating System

Please refer to the "Required Operating System" section of the "Installation and Setup Guide for Server" for the required operating system to use PostGIS with Fujitsu Enterprise Postgres.

You also need the server functionality of the Fujitsu Enterprise Postgres products listed in "About PostGIS available in Fujitsu Enterprise Postgres 16".

An Internet connection is required to perform the build procedure.

- RHEL8 requires the packages listed in the following table.
If the version is not specified, select one of the versions provided by the OS.

Package name	Required for Build	Required for Execution	Remarks
clang	○		Install this if you want to run SQL against the PostGIS extension using just-in-time compilation.
llvm	○	○	Install it if you want to run SQL against the PostGIS extension using just-in-time compilation. Use the version specified in "2.1 Required Operating System" in the manual "Installation and Setup Guide for Server".
make	○		
cmake	○		
gcc	○		
gcc-c++	○		
eigen3-devel	○		Required for cgal builds.
expat	○	○	Required for running gdal.

Package name	Required for Build	Required for Execution	Remarks
expat-devel	○		Required for gdal build
boost	○	○	Required to build and run cgal, sfcgal.
boost-devel	○		Required for cgal builds.
ant	○		Required for gdal build
giflib	○	○	Required for running gdal.
giflib-devel	○		Required for gdal build
gmp	○	○	Required to build and run cgal, sfcgal.
gmp-devel	○		Required for cgal builds.
mpfr	○	○	Required to build and run cgal, sfcgal.
mpfr-devel	○		Required for sfcgal builds.
sqlite	○	○	Required for proj execution.
sqlite-devel	○		Required for building proj.
libtiff	○	○	Required for building and running proj.
libtiff-devel	○		Required for building proj.
libjpeg-turbo	○	○	Required for running gdal.
libjpeg-turbo-devel	○		Required for gdal build
libwebp	○	○	Required for running gdal.
libwebp-devel	○		Required for gdal build
poppler	○	○	Required for running gdal.
poppler-devel	○		Required for gdal build
libxml2	○	○	Required to run PostGIS.
libxml2-devel	○		Required for building PostGIS.
json-c	○	○	Required to run PostGIS.
json-c-devel	○		Required for building PostGIS.
protobuf-c	○	○	Required to run PostGIS.
protobuf-c-devel	○		Required for building PostGIS.

Package name	Required for Build	Required for Execution	Remarks
CUnit	○		Required for PostGIS regression testing.
CUnit-devel	○		Required for PostGIS regression testing.
pcre2	○	○	Required to run PostGIS.
pcre2-devel	○		Required to build PostGIS.
unixODBC	○	○	Required for running gdal.
unixODBC-devel	○		Required for gdal build
libzstd	○	○	Required to run gdal
libzstd-devel	○		Required for gdal build
xz-libs	○	○	Required to run gdal
xz-devel	○		Required for gdal build
zlib	○	○	Required to run gdal
zlib-devel	○		Required to run gdal
swig	○		
sed	○		Used in scripts.
Python3	○	○	Install 3.6.x.
Perl	○		Install 5.26.
JRE	○	○	Install JRE 8 or later.
JDK	○		Install the same JDK version as the JRE.

- RHEL9 requires the packages listed in the following table.
If the version is not specified, select one of the versions provided by the OS.

Package name	Required for Build	Required for Execution	Remarks
clang	○		Install this if you want to run SQL against the PostGIS extension using just-in-time compilation.

Package name	Required for Build	Required for Execution	Remarks
llvm	○	○	Install it if you want to run SQL against the PostGIS extension using just-in-time compilation. Use the version specified in "2.1 Required Operating System" in the Installation and Setup Guide for Server.
make	○		
cmake	○		
gcc	○		
gcc-c++	○		
eigen3-devel	○		Required for cgal builds.
boost	○	○	Required to build and run cgal, sfcgal.
boost-devel	○		Required for sfcgal builds.
ant	○		Required for gdal builds.
expat	○	○	Required to run gdal
expat-devel	○		Required for gdal build
giflib	○	○	Required to run gdal
giflib-devel	○		Required for gdal build
gmp	○	○	Required to build and run cgal, sfcgal.
gmp-devel	○		Required for sfcgal builds.
mpfr	○	○	Required to build and run cgal, sfcgal.
mpfr-devel	○		Required for sfcgal builds.
sqlite	○	○	Required for proj execution.
sqlite-devel	○		Required for building proj.
libtiff	○	○	Required for building and running proj.
libtiff-devel	○		Required for building proj.
libjpeg-turbo	○	○	Required to run gdal

Package name	Required for Build	Required for Execution	Remarks
libjpeg-turbo-devel	○		Required for gdal build
libwebp	○	○	Required to run gdal
libwebp-devel	○		Required for gdal build
poppler	○	○	Required to run gdal
poppler-devel	○		Required for gdal build
libxml2	○	○	Required to run PostGIS.
libxml2-devel	○		Required for building PostGIS.
json-c	○	○	Required to run PostGIS.
json-c-devel	○		Required for building PostGIS.
protobuf-c	○	○	Required to run PostGIS.
protobuf-c-devel	○		Required for building PostGIS.
CUnit	○		Required for PostGIS regression testing.
CUnit-devel	○		Required for PostGIS regression testing.
pcre2	○	○	Required to run PostGIS.
pcre2-devel	○		Required for building PostGIS.
unixODBC	○	○	Required for running gdal.
unixODBC-devel	○		Required for gdal build
libzstd	○	○	Required to run gdal
libzstd-devel	○		Required for gdal build
lz4	○	○	Required to run gdal
lz4-devel	○		Required for gdal build
xz-libs	○	○	Required to run gdal
xz-devel	○		Required for gdal build
zlib	○	○	Required to run gdal
zlib-devel	○		Required to run gdal
swig	○		
sed	○		Used in scripts.
Python3	○	○	Install 3.9.x.
python3-devel	○		Install 3.9.x.
python3-pytest	○		Required for testing gdal.

Package name	Required for Build	Required for Execution	Remarks
python3-pip	○		Required to install additional python3 modules
pytest-env	○		Required for testing gdal. (*1)
filelock	○		Required for testing gdal. (*1)
pytest-benchmark	○		Required for testing gdal. (*1)
Perl	○		Install 5.32.
JRE	○	○	Install JRE 8 or later.
JDK	○		Install the same JDK version as the JRE.

*1: Install using python3 pip. The following is an example.

```
python3 -m pip install pytest-env
```

- SLES15 requires the packages listed in the following table.
If the version is not specified, select one of the versions provided by the OS.

Package name	Required for Build	Required for Execution	Remarks
clang	○		Install this if you want to run SQL against the PostGIS extension using just-in-time compilation.
llvm	○	○	Install it if you want to run SQL against the PostGIS extension using just-in-time compilation. Use the version specified in "2.1 Required Operating System" in the Installation and Setup Guide for Server.
make	○		
cmake	○		
gcc	○		
gcc-c++	○		
eigen3-devel	○		Required for cgal builds.
libboost*	○	○	Required to build and run cgal, sfcgal.

Package name	Required for Build	Required for Execution	Remaks
libboost*devel	○		Required for sfcgal builds.
ant	○		Required for gdal build
expat	○	○	Required to run gdal
libexpat-devel	○		Required for gdal build
libgif7	○	○	Required to run gdal
giflib-devel	○		Required for gdal build
libgmp10	○	○	Required to build and run cgal, sfcgal.
gmp-devel	○		Required for sfcgal builds.
libmpfr6	○	○	Required to build and run cgal, sfcgal.
mpfr-devel	○		Required for sfcgal builds.
sqlite3	○	○	Required for proj execution.
sqlite3-devel	○		Required for building proj.
libtiff5	○	○	Required for building and running proj.
libtiff-devel	○		Required for building proj.
libturbojpeg0	○	○	Required to run gdal
libjpeg	○	○	Required to run gdal
libjpeg-devel	○		Required for gdal build
libwebp	○	○	Required to run gdal
libwebp-devel	○		Required for gdal build
libpoppler	○	○	Required to run gdal
libpoppler-devel	○		Required for gdal build
libxml2	○	○	Required to run PostGIS.
libxml2-devel	○		Required for building PostGIS.
libjson-c	○	○	Required to run PostGIS.
libjson-c-devel	○		Required for building PostGIS.
protobuf-c	○	○	Required to run PostGIS.
protobuf-c-devel	○		Required for building PostGIS.

Package name	Required for Build	Required for Execution	Remarks
libcunit1	○		Required for PostGIS regression testing.
cunit-devel	○		Required for PostGIS regression testing.
libpcre2	○	○	Required to run PostGIS.
pcre2-devel	○		Required for building PostGIS.
libzstd-devel	○	○	Required for gdal build
libzstd1	○	○	Required to run gdal
liblzma5	○	○	Required to run gdal
liblz4-1	○	○	Required to run gdal
liblz4-devel	○		Required for gdal build
zlib-devel	○		Required for gdal build
swig	○		
sed	○		Used in scripts.
Python3	○	○	Install 3.6.x.
Perl	○		Install 5.26.
JRE	○	○	Install JRE 8.
JDK	○		Install the same version of JDK 8 as the JRE.

2.2 Required Software

If you use PostGIS according to this document, the following OSS is required. Use of OSS is subject to applicable terms of use (license terms) and is at your own risk.

The downloadable URL may change after this document is provided. If you are unable to download the software, please contact SupportDesk.

The PostGIS build instructions in this document fix the combination of OSS versions. This combination is called an OSS group. Depending on the fix you applied to the Fujitsu Enterprise Postgres server feature, different OSS groups are available. See also "2.3 Required Patches".

OSS group	OSS Name	Version	URL
FEP16_ossgroup_01	CGAL	5.3.2	https://github.com/CGAL/cgal/archive/refs/tags/v5.3.2.tar.gz
	SFCGAL	1.4.1	https://gitlab.com/sfcgal/SFCGAL/-/archive/v1.4.1/SFCGAL-v1.4.1.tar.gz
	GEOS	3.12.1	https://github.com/libgeos/geos/archive/refs/tags/3.12.1.tar.gz
	GDAL	3.8.0	https://github.com/OSGeo/gdal/archive/refs/tags/v3.8.0.tar.gz
	PROJ	9.3.0	https://github.com/OSGeo/PROJ/archive/refs/tags/9.3.0.tar.gz
	PostGIS	3.4.2	https://download.osgeo.org/postgis/source/postgis-3.4.2.tar.gz

2.3 Required Patches

If you use PostGIS according to this document, you must apply the urgent fixes to the Fujitsu Enterprise Postgres server functionality to your build environment and to your PostGIS production environment.

Please refer to "About PostGIS Available in Fujitsu Enterprise Postgres 16" to find the OSS group corresponding to the urgent fix number. This document can be found in the "Appendix B OSS Supported by Fujitsu Enterprise Postgres" section of the Fujitsu Enterprise Postgres manual, "General Description". Please refer to the OSS group you have confirmed from the table in "2.2 Required Software" and download the corresponding version of OSS. If the urgent fix corresponding to the OSS group has not been applied, you will not be able to use PostGIS. If there are multiple OSS groups corresponding to the fix number, the OSS group with the larger ending number corresponds to a newer version of OSS.

2.4 Disk space requirements for builds

The build environment also requires the Fujitsu Enterprise Postgres server feature to be installed. This is because it includes the header files and libraries needed for the build.

For information about disk space requirements for installing the Fujitsu Enterprise Postgres server feature, see "Disk Space Requirements for Installation" in the Fujitsu Enterprise Postgres Installation and Setup Guide for Server.

The following additional disk space is required in addition to the disk space required for the Fujitsu Enterprise Postgres server feature:

- Build environment : 5GB
- Operating Environment : 200MB (PostGIS Module Size)

2.5 About OSS Downloaded Automatically at Build Time

When building PostGIS, depending on the package configuration of the OS, the OSS listed in the table below may be automatically downloaded as an extension of the OSS build. Because downloads require an Internet connection, if your environment requires proxy settings for Internet connectivity, set the HTTP_PROXY and HTTPS_PROXY environment variables before building.

If your operating system provides the following OSS packages, you can replace them by installing the specified version or higher. Also, if less than the specified version is installed, the build will fail, so upgrade the package to the specified version or higher. If you are unable to upgrade, delete the package and set up the build environment to provide Internet connectivity.

OSS Name	Version	License
google test	1.10 and higher	BSD-3-Clause license

3 Build Procedure

3.1 Preparing the build environment

Prepare your environment to build PostGIS. This document assumes that the environment in which PostGIS is built and the environment in which it is run are separate, but they can be the same.

For the build environment, refer to "2.1 Required Operating System" in the Installation and Setup Guide for Server of the Fujitsu Enterprise Postgres manual to install the packages required to run the Fujitsu Enterprise Postgres server function.

Then, refer to "2.1 Required Operating System" in this manual to install the packages required to build PostGIS.

Install the Fujitsu Enterprise Postgres server functionality in your build environment. Then refer to "2.3 Required Patches" to apply the urgent fix required for the build to your build environment.

As described in "2.5 About OSS automatically downloaded at build time," when building PostGIS, depending on the package configuration of the OS, OSS may be automatically downloaded as an extension of the OSS build.

Because the download requires an Internet connection, if your environment requires proxy settings for Internet connectivity, set the HTTP_PROXY and HTTPS_PROXY environment variables before building.

3.2 Preparing Build Scripts

Publish the build instructions The file downloaded from the site contains a compressed version of the build script (postgis-work.tar.gz).

Place postgis-work.tar.gz in any directory of your build environment and unzip it.

Example:

```
$ tar zxvf postgis-work.tar.gz
```

When you unzip the build script, the following files/directories are generated:

directory/file name	about
postgis-work	Build working directory
postgis-work/SRC	OSS source location directory
postgis-work/SRC/cgal	CGAL Source Destination Directory
postgis-work/SRC/sfcal	SFCGAL Source Destination Directory
postgis-work/SRC/geos	GEOS source destination directory
postgis-work/SRC/gdal	GDAL source destination directory
postgis-work/SRC/proj	PROJ Source Destination Directory
postgis-work/SRC/postgis	PostGIS Source Destination Directory
postgis-work/postgis_build.sh	Build Script
postgis-work/postgis_test.sh	Test Script

3.3 Downloading OSS

See "2.2 Required Software" to download the OSS source code required to build PostGIS.

This example assumes that you downloaded it under postgis-work/SRC, which was deployed in "3.2 Preparing the Build Scripts".

Unzip the downloaded OSS source code directly under each of the OSS destination directories listed in the "3.2 Preparing Build Scripts" table.

Example :

```
$ cd postgis-work/SRC
$ tar zxf postgis-3.4.2.tar.gz -C postgis --strip-components 1
```

Note:

In the above example, by specifying "--strip-components 1", files located in the second level and below are being extracted to the directory specified by the "-C" option during the source code unpacking.

3.4 Running Build Scripts

After you have deployed all of the OSS source code that you want to build, run the build script. Run one of the following build scripts and verify that all OSS builds output OK:

If you are using run-time compilation with the Fujitsu Enterprise Postgres Server feature and want to speed up querying resources that contain PostGIS

extensions, build with run-time compilation:

- Using Runtime Compilation with PostGIS

```
$ ./postgis_build.sh
```

- If you do not want to use runtime compilation with PostGIS

```
$ ./postgis_build.sh --without-llvm
```

If NG is output, check the log in the output path, resolve the cause of the NG error, and then retry the operation.

3.5 Running the test script

When the build is complete, run each OSS test.

Test in the environment you built.

1. Verifying the Installation Location

If the installation of the Fujitsu Enterprise Postgres Server feature still contains PostGIS files that were previously set up, remove the PostGIS files from the installation. This is to ensure a clean environment before copying the pre-built PostGIS to the destination.

Perform this operation as an OS superuser.

```
$ su -  
Password:*****  
# rm -f /opt/fsepv<x>server64/filesCopiedDuringSetup
```

You can view the PostGIS files that were previously set up by running the following command:

```
$ cat /opt/fsepv<x>server64/share/postgis-files.txt
```

2. What to Do Before Running a Test

Before running the tests, copy the pre-built PostGIS to the installation of the Fujitsu Enterprise Postgres server feature.

Perform this operation as an OS superuser.

```
$ su -
```

```
Password: ****
```

```
# cp -r OUT/postgis/* /opt/fsepv<x>server64/
```

Create and start an instance of the database as a general user.

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata init
```

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata -l logfile start
```

Note:

The default port number for the database instance you created is 27500. If your build environment is running a database instance that uses 27500 other ports, stop the instance or change the port number of the test instance.

To change the port number of a database instance, modify the port parameter in postgresql.conf to a port number that is not available elsewhere. Then restart the instance.

Example:

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata -l logfile restart
```

3. Running Test Scripts

Test your OSS build.

To test all of your OSS builds: If NG is output, check the log in the output path, resolve the cause of the NG error, and then retry the operation.

```
$ ./postgis_test.sh
```

When the test is complete, stop the database instance.

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

4. Saving Built PostGIS

Preserve the pre-built PostGIS as it will be needed for reinstallation, upgrades, and support queries.

4 Setup Procedure

4.1 Preparing Before Setup

Move the pre-built PostGIS that you performed in “3 Build Procedure” to the environment where you will be running PostGIS.

1. Compresses artifacts built in the build environment.

Example :

```
$ cd postgis-work
$ tar zcvf postgis.tar.gz OUT/postgis
```

2. Transfer files that have been compressed, for example, using SFTP, to an environment that uses PostGIS.

3. In a PostGIS production environment, extract the pre-built PostGIS compressed files to a directory of your choice.

```
$ tar zxvf postgis.tar.gz
```

4.2 Setup

1. Copy the PostGIS you built to the location where you want to install the Fujitsu Enterprise Postgres server feature. There is no need to stop Fujitsu Enterprise Postgres, because the PostGIS libraries are not referenced by Fujitsu Enterprise Postgres at this time.

Perform this operation as an OS superuser.

```
$ su -
Password: *****
# cp -r OUT/postgis/* /opt/fsepv<x>server64
```

2. About the postgresql.conf Configuration

To allow PostGIS to read GDAL data files, set postgresql.conf to:

```
postgis.gdal_datapath = '/opt/fsepv<x>server64/share/gdal'
```

3. Restart Fujitsu Enterprise Postgres for the parameters to take effect.

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata -l logfile restart
```

4. Execute CREATE EXTENSION on the database using PostGIS.

Execute the following command using the psql command:

```
CREATE EXTENSION postgis;  
CREATE EXTENSION postgis_raster;  
CREATE EXTENSION postgis_sfcgal;  
CREATE EXTENSION fuzzystrmatch;  
CREATE EXTENSION address_standardizer;  
CREATE EXTENSION address_standardizer_data_us;  
CREATE EXTENSION postgis_tiger_geocoder;  
CREATE EXTENSION postgis_topology;
```

4.3 Unsetup

1. Execute DROP EXTENSION on the database with PostGIS applied.

Note that fuzzystrmatch is a PostgreSQL extension. If you are using fuzzystrmatch for purposes other than PostGIS, do not delete it.

```
DROP EXTENSION postgis_topology;  
DROP EXTENSION postgis_tiger_geocoder;  
DROP EXTENSION address_standardizer_data_us;  
DROP EXTENSION address_standardizer;  
DROP EXTENSION fuzzystrmatch;  
DROP EXTENSION postgis_sfcgal;  
DROP EXTENSION postgis_raster;  
DROP EXTENSION postgis;
```

2. As a superuser, execute the following command:

You do not need to stop Fujitsu Enterprise Postgres because the PostGIS libraries are no longer referenced by Fujitsu Enterprise Postgres.

```
$ su -  
Password:*****  
# rm -f /opt/fsepv<x>server64/filesCopiedDuringSetup
```

You can use the following command to check the files copied during setup.

```
# cat /opt/fsepv<x>server64/share/postgis-files.txt
```

3. Set parameters in postgresql.conf file

Delete or comment out the parameters of postgis.gdal_datapath.

4. Restart Fujitsu Enterprise Postgres to reflect the changed parameters.

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata -l logfile restart
```

5 Upgrade Procedure

5.1 Applying corrections to server functions in PostGIS operation

Follow the instructions for PostGIS in the Fix README, if any.

If there is no special description, do the following:

1. Obtain the PostGIS build instructions for the urgent fix you want to apply.
Please verify that the OSS group number supported by the urgent fix you are trying to apply has not changed for PostGIS. If it has changed, you will need to build PostGIS anew using the latest procedure manual. To check the OSS group number supported by the emergency fix, please refer to the latest "About PostGIS Available in Fujitsu Enterprise Postgres 16".
You can find the build instructions in Appendix B, "OSS Supported by Fujitsu Enterprise Postgres," in the "General Description" section of the Fujitsu Enterprise Postgres manual.
2. Refer to the instructions you obtained in step 1 and compare the OSS group number that corresponds to the urgent fix number you are applying with the OSS group number in PostGIS that you previously set up.
 - Same OSS group number
Prepare a previously built PostGIS module.
 - When the OSS group number is different
You must download OSS with the OSS group number corresponding to the urgent fix you are applying and build PostGIS anew.
Follow steps 2.1 and 2.2 below to complete the build.
 - 2.1. Apply the fix you are applying to your production environment to the server functionality in your build environment.
 - 2.2. Follow the build instructions to build PostGIS. See "3. Build Instructions" for details.
3. Stop the database instance in the production environment.

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


4. Delete old PostGIS files in the production environment.

In a PostGIS production environment, delete the old PostGIS files that were set up on the Fujitsu Enterprise Postgres server.

Execute the following command as an OS superuser:

```
$ su -  
Password:*****  
# rm -f /opt/fsepv<x>server64/filesCopiedDuringSetup
```

You can use the following command to check the files copied during setup.

```
# cat /opt/fsepv<x>server64/share/postgis-files.txt
```

5. Applies a fix to the functionality of the Fujitsu Enterprise Postgres server in production.

6. In a production environment, copy the PostGIS module provided in step 2 to the installation of the Fujitsu Enterprise Postgres server feature.

Perform this operation as an OS superuser..

```
$ su -  
Password: *****  
# cp -r OUT/postgis/* /opt/fsepv<x>server64
```

7. Start the database instance in the production environment.

```
$ /opt/fsepv<x>server64/bin/pg_ctl -D pgdata -l logfile start
```

8. If the OSS group number is different in Step2, upgrade PostGIS.

On a PostGIS-equipped database, execute the following SQL command, such as psql:

```
SELECT postgis_extensions_upgrade();  
ALTER EXTENSION address_standardizer UPDATE;  
ALTER EXTENSION address_standardizer_data_us UPDATE;
```

5.2 Upgrading Fujitsu Enterprise Postgres server in PostGIS operation

Before you upgrade the server by following these steps, review the “Notes on Upgrading Database Instance” in the “Operation Guide”. The following instructions upgrade the server functionality of Fujitsu Enterprise Postgres <y> running PostGIS to the new version <x>.

1. Installing PostGIS

Follow the Fujitsu Enterprise Postgres <x> build instructions to build PostGIS, and then copy the PostGIS to the installation location of the Fujitsu Enterprise Postgres <x> server feature.

2. Upgrade Fujitsu Enterprise Postgres server following the official document of PostgreSQL

3. Setting postgresql.conf

Add setting below to postgresql.conf to load data files for GDAL.

```
postgis.gdal_datapath = '/opt/fsepv<x>server64/share/gdal'
```

4. Upgrading PostGIS

On a PostGIS-equipped database, execute the following SQL using command, such as psql:

```
SELECT postgis_extensions_upgrade();  
ALTER EXTENSION address_standardizer UPDATE;  
ALTER EXTENSION address_standardizer_data_us UPDATE;
```

Note:

We strongly recommend you take backup database before upgrade.

When you use pg_upgrade, please execute SQL, “SELECT postgis_extensions_upgrade();” even if each OSS version set up in Fujitsu Enterprise Postgres <y> is the same as the one built with Fujitsu Enterprise Postgres <x>. This is because extensions prefixed with “postgis” have the version of Fujitsu Enterprise Postgres that was used to build them, and it is necessary to update that value to the new version.

6 Using PostGIS

6.1 Use of geospatial data and other resources

The geospatial data and other resources available in PostGIS may be obtained from the Internet or elsewhere, but it is your responsibility to obtain and use these resources in accordance with their terms of use (license terms).

6.2 Files to copy during PostGIS setup

The list of files to copy during PostGIS setup is finalized after PostGIS is built. In the build working directory, see the following files:

```
postgis-work/OUT/postgis/share/postgis-files.txt
```

To see the list of files you plan to copy in "4.2 Setup", see the following files:

```
OUT/postgis/share/postgis-files.txt
```

If you want to see a list of files that you copied after you set up PostGIS, see the following files:

```
/opt/fsepv<x>server64/share/postgis-files.txt
```

6.3 About Features Not Available in Fujitsu Enterprise Postgres

PostGIS is not available in combination with the following features of Fujitsu Enterprise Postgres:. For information about the data types added in PostGIS, see the PostGIS documentation at <https://postgis.net/>.

- Data masking
Data types added in PostGIS do not take advantage of the data masking feature.
- In-memory feature
Data types added in PostGIS cannot be specified as target columns of CREATE INDEX when creating a VCI.

6.4 Unsupported features

The following features are not supported:

- shp2pgsql-gui

shp2pgsql-gui is not available. Use shp2pgsql.

- Raster Drivers

The following drivers are not available as features:. Consider using another raster driver. You can refer to the raster drivers available with the following commands:

gdalinfo --formats

ShortName
BAG
BASISU
DAAS
DDS
ECW
EEDAI
EXR
FITS
GeoRaster
GTA
HDF4
HDF5
HEIF
JP2ECW
JP2KAK
JP2LURA
JP2MrSID
JP2OpenJPEG
JPEGXL
JPIPKAK
KEA
KTX2
MrSID
netCDF
NGW
OGCAPI
PLMosaic

ShortName
RDB
Drivers using libhdf5, including S102
Spatialite
TileDB
WCS
WMS
WMTS
Zarr does not support compression using libblosc

- Vector Drivers

The following driver features are not available:. Consider using other vector drivers. You can see the vector drivers available with the following commands:

ogrinfo --formats

ShortName
AmigoCloud
Arrow
CARTO
CSW
DGNv8
DWG
EEDA
Elasticsearch
GMLAS
HANA
IDB
INTERLIS 1
INTERLIS 2
LIBKML
MongoDBv3
MySQL
NAS
netCDF
NGW

ShortName
OAPIF
OCI
OGDI
Parquet
PLScenes
SOSI
TileDB
WFS
XLS

- Virtual file system

The following virtual file systems are not available:. Use a local file or another virtual file system. For more information about virtual file systems, see the OSS Community page at <https://gdal.org/>.

Name
/vsizip/
/vsi7z/
/vsirar/
/vsicurl/
/vsi3/
/vsigs/
/vsiaz/
/vsioss/
/vsiswift/
/vsicurl_streaming/
/vsi3_streaming/
/vsigs_streaming/
/vsiaz_streaming/
/vsiadls/
/vsioss_streaming/
/vsiswift_streaming/
/vsihdfs/
/vsiwebhdfs/

/vsicrypt/

- gdal/proj communication functions
Internet resources cannot be specified directly, for example by raster2pgsql.
Download the file to your local environment before using it.
- python bindings
Not available on RHEL8, SLES15.
- C# bindings
Not available.

7 Reference

7.1 postgis_build.sh

- Name

postgis_build.sh – Build Script

- Summary

postgis_build.sh [-t ossname|--target=ossname] [--without-llvm]

postgis_build.sh -h|--help

- Options

-t ossname

--target=ossname

Specify this to build only the target OSS. If this option is not specified, all OSS will be built.

The possible OSS names for ossname are:

cgal,sfcgal,proj,geos,gdal,postgis

If you build with this option, you must build in the OSS order listed above.

For example, if you get an error building proj, you can't build geos or later.

You cannot specify this option more than once.

--without-llvm

Specify if you do not want to use runtime compilation in PostGIS.

If you use just-in-time compilation to execute SQL against a PostGIS extension, do not specify this option.

-h

--help

Displays usage

- Diagnosis

0 : Normal end

Not 0 : Abnormal end

7.2 postgis_test.sh

- Name

postgis_test.sh – Test Script

- Summary
 - `postgis_test.sh [-t ossname|--target=ossname]`
 - `postgis_test.sh -h|--help`
- Options
 - `-t ossname`
 - `--target=ossname`
 - Specify this to test only the target OSS. If this option is not specified, all OSS will be tested.
 - The possible OSS names for `ossname` are:
 - `cgal,sfcgal,proj,geos,gdal,postgis`
 - `-h`
 - `--help`
 - Display Usage
- Diagnosis
 - 0 : Normal End
 - Not 0 : Abnormal End

Appendix A. Troubleshooting

A.1. Error during execution of postgis_build.sh

This section describes examples of problems that can occur during postgis_build.sh execution, and how to handle them.

- Command not found error during build
[Error Message Example]
make[3]: /usr/bin/clang: There is no such file or directory
[Solution]
This error may occur if the packages required for the build are not installed.
In this example, make sure that the clang package is installed.
- Failed to find OSS file to build at start of build
[Error Message Example]
CMake Error: The source directory "/postgis-work/BUILD/cgal" does not appear to contain CMakeLists.txt.
[Solution]
This error can occur if you have not correctly deployed the OSS source code to the directory specified in the build instructions.
In this example, the /postgres-work/BUILD/cgal directory does not contain CmakeLists.txt. Make sure the CGAL source code is unpacked in the /postgres-work/BUILD/cgal directory.
It can also occur if the OSS source code is not properly deployed directly under each OSS destination directory.
If the BUILD/cgal/cgal-<version> directory was created, you may have forgotten to add "--strip-components1" when unpacking with the tar command.
- File not found error on build for other built OSS
[Error Message Example]
configure: error: the user-specified gdal-config file /postgis-work/OUT/gdal/bin/gdal-config does not exist
[Solution]
When building OSS, it will result in a build-time error if the OSS build for other dependent builds is not complete.

In this case, gdal-config could not be found. Make sure you have completed the GDAL build before you build PostGIS.

A.2. Error during execution of postgis_test.sh

This section describes examples of problems that can occur during postgis_test.sh execution, and how to handle them.

- Extension not found error while testing PostGIS

[Error Message Example]

ERROR: extension "postgis" is not available

[Solution]

This occurs if you have not copied the pre-built PostGIS to the installation of the Fujitsu Enterprise Postgres server facility before running the test script.

Before testing, copy the pre-built PostGIS to the location where the Fujitsu Enterprise Postgres server feature is installed.

- Unable to connect to database error while testing PostGIS

[Error Message Example]

psql: error: connection to server on socket "/tmp/.s.PGSQL.27500" failed:
No such file or directory

Is the server running locally and accepting connections on that socket?

[Solution]

The database instance is not running. Before running the PostGIS test, make sure that the database instance is up and running.