



OpenCities Map
CONNECT Edition

PostgreSQL with the PostGIS extension in OpenCities Map

How-To Guide

[Abstract](#)

Tips and tricks to improve your operating efficiencies using PostgreSQL with the PostGIS extension in OpenCities Map

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PostgreSQL and PostGIS with OpenCities Map


How-to guide.

PostgreSQL is popular open source object-relational database management system used in GIS organizations and the PostGIS is spatial extension for PostgreSQL.


The PostGIS extension adds spatial capabilities to PostgreSQL, for example: measuring areas, surfaces, distances, 3D measurements and geometry data types. OpenCities Map supports these functions to provide spatial analysis and to maintain 2D and 3D data models.

The information in this article can be used to optimize and maintain PostgreSQL database for better usage with OpenCities Map.

1.0 How to check PostgreSQL and PostGIS Version.

- You can confirm PostgreSQL version by utilizing the default parameter show_version.
 - Run this parameter in either the pgAdmin.
 - Open pgAdmin and select any existing database then right-click and select the Query tool option.
 - In the Query Editor, enter SQL query: SHOW server_version;
 - Press F5 or select the Execute button. 
 - The results will be shown in the Data Output tab located at the bottom of the application. For example:

	server_version
	text
1	10.9

- You can confirm PostGIS version by utilizing the parameter SELECT PostGIS_version();
 - Run this parameter in the pgAdmin.
 - Open pgAdmin and select any existing database then right-click and select the Query tool option.
 - In the Query Editor, enter SQL query: SELECT PostGIS_version();
 - Press F5 or select the Execute button. 
 - The results will be shown in the Data Output tab located at the bottom of the application. For example:

Data Output	Explain	Messages	Notifications
	postgis_version		
	text		
1	2.5 USE_GEOS=1 USE_PROJ=1 USE_STATS=1		



2.0 How to generate detailed error messages in PostgreSQL.

PostgreSQL server is maintained by fine-tuning of parameters from postgresql.conf file. However, sometimes detailed information is required on the logic behind a specific query. To understand how the query has been sent or received by the application, it is necessary to generate a trace.

- Steps to setup a trace:

1. To setup a trace we will have to edit postgresql.conf file which is stored in default location: C:\Program Files\PostgreSQL\version_number\data

Note: This file can be edited in any notepad editor. Please create a copy of postgresql.conf file for backup purpose.

2. Modify parameters as below:
 - log_min_duration_statement = 25
 - log_duration = on
 - log_line_prefix = '%t [%p]: [%l-1] '
 - log_statement = 'all';
3. Restart the PostgreSQL service and try to reproduce the error or issue.
4. Detailed statement of the queries sent or received will be saved in pg_log file. It is stored in default location: C:\Program Files\PostgreSQL\version_number\data\pg_log



3.0 How to create PostgreSQL Backup and Restore database.

Backup process: PostgreSQL have multiple methods to create a database backup. We will be using 'pg_dump' method as it does not block rest of users accessing the database, regardless of assigned permissions. This method can be executed through 'pgAdmin' or 'Command Prompt' utility.

- Steps to create a database backup using 'pgAdmin'.
 1. Select a database, right-click and choose option Backup. Select parameters from General tab:
 - Filename: Select a location and assign name with file extension as dump.
For Example: D:\GIS_DATA.dump
 - Format: Custom
 2. Select 'Backup' button to complete the task.
- Steps to create a database backup using 'Command Prompt'.
 1. Open a command prompt utility as administrator, enter command: cd <path to bin folder>
For Example:
cd C:\Program Files\PostgreSQL\version number\bin
 2. Enter below command to generate dump file.
pg_dump -p [Port number] -U [Superuser] -F [output_file_format] c [Database_Name] > [path where dump file will be generated\dumpfile_name.dump]

For Example:
pg_dump -U postgres -F c GIS_DATA > D:\PostgreSQL_DUMP\GIS_DATA.dump

Note: Port number is required only if you have multiple instances of PostgreSQL server.
 3. Use enter key to start the process, type superuser password when prompted.
 4. Once the backup is generated in specified folder command prompt will return:
C:\Program Files\PostgreSQL\version_number\bin

Note:

- If path for dump file is not specified, then it will be generated in the bin folder. For example: dump file path will be C:\Program Files\PostgreSQL\10\bin
- Dump file generated in above process does not include Roles and Tablespaces.



Restore process: PostgreSQL dump file can be restored with either 'pgAdmin' or 'Command Prompt' utility. This process will utilize the 'pg_restore' method.

- Steps to restore using 'pgAdmin'.
 1. Create an empty database container, right-click to choose option Restore. Select parameters from General tab:
 - Format: Custom or tar
 - Filename: Select a dump file generated in backup process.
 2. Select 'Restore' button to complete the task.
- Steps to restore using 'Command Prompt'.
 1. Open a command prompt utility as administrator, enter command: `cd <path to bin folder>`
For Example:
`cd C:\Program Files\PostgreSQL\10\bin`
 2. Enter below command to restore dump file.
`pg_restore -p [Port number] -U [Superuser] -d [Database_name] [Dump file path\dumpfile_name.dump]`

For Example:
`pg_restore -U postgres -d test D:\PostgreSQL_DUMP\GIS_DATA.dump`

Note: Port number is required only if you have multiple instances of PostgreSQL server.
 3. Use enter key to start the process, type superuser password when prompted.
 4. Once the database is restored then command prompt will return:
`C:\Program Files\PostgreSQL\version_number\bin`



4.0 How to maintain PostgreSQL Performance:

If the table is frequently updated (update, delete), it will have redundant or dead rows. Dead rows occupy storage space and need to be scanned when table is queried. This may cause query to consume more time for data retrieval.

Use of Vacuum command will help to reclaim the space acquired by dead rows. It should be performed when NO USER is connected to database. Frequency of executing this command will depend on transaction performed on tables.

For Example:

```
vacuum verbose analyze table_name;
```

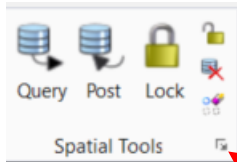
- This query can be executed through pgAdmin, parameters:
 - VACUUM: It is used to reclaim the space.
 - VERBOSE: Prints detailed activity report on vacuum command.
 - ANALYZE: Updates statistics used by query planner to determine most efficient way to execute query.
 - Please make sure to read the document of [PostgreSQL VACUUM](#).



5.0 How to improve productivity using OpenCities Map

To improve the productivity of daily tasks, you can take advantage of OpenCities Map's feature to save the connection with information related to spatial data required for project.

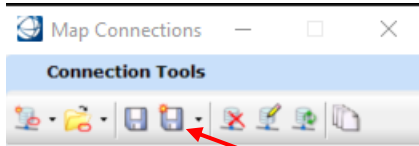
- Steps to create Map Connection.



1. Open the Map Connections dialog from the dialog launcher located in the bottom right corner of the Spatial Tools ribbon group.
2. Right-click on Connections and select option New PostGIS Connection. Enter User, Password, Host, Port and Database name.
3. Connect to database and create connection with help of below parameters:
 - Select the features to use for your map. A link will be created between the design file and database which will make the selected features available.
 - Data Streaming: Automatically queries the database as you pan the view.
 - Modify the feature level and symbology such as colour, style and weight.
 - Synchronize with Active Map.
 - A. If Enabled: Selected features will be added to the Map Manager.
 - B. If Disabled: Selected features are only added to Map Manager when queried.

- Steps to save map connection as PostGISx file.

You can save the connection parameters with 'Save as XML' option. The resulting file stores the connection information as well as the feature specifications previously defined.



1. Select Option Save As XML, new window will be prompted with option to choose Spatial Extent:
 - A. View: Current view spatial extent will be saved.
 - B. All: Spatial extent of features will be saved.
2. Once the spatial extent is selected, add data point and assign the name to save the file with extension. For Example: project1.postgisx.
3. This file can be opened with option Open PostGISx file from the Map Connections dialog.