

3D City Database (for PostgreSQL) Quick installation guide

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Overview

**Install required
software**

**Set up the
database**

**Connect to the
database via the
Importer/Exporter**

**Add additional
database schemas
(Optional)**

**Install ADE plug-ins
(Optional)**

Overview

**Install required
software**

**Set up the
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**Connect to the
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Importer/Exporter**

**Add additional
database schemas
(Optional)**

**Install ADE plug-ins
(Optional)**

Software requirements

Software required

Software install

Database setup

Further resources

- **Java 11 JDK or higher**
 - <https://www.oracle.com/java/technologies/javase/jdk11-archive-downloads.html>
- **PostgreSQL (e.g. v. 12.x) + PostGIS (e.g. v. 3.x) + PgAdmin 4 (e.g. v. 6.x)**
 - <https://www.postgresql.org/download/>
 - <https://postgis.net/install/> (generally already installed with PostgreSQL)
 - <https://www.pgadmin.org/download/> (generally already installed with PostgreSQL)
- **CityGML 3D City Database Suite**
 - <https://github.com/3dcitydb/3dcitydb-suite/releases>
- **Google Earth Pro** (optional, only if you want to export to kml/Collada)
 - <https://www.google.com/earth/versions/#download-pro>
- **NodeJS** (optional, needed only if you want to use the Web-map-client)
 - <https://nodejs.org/en/>

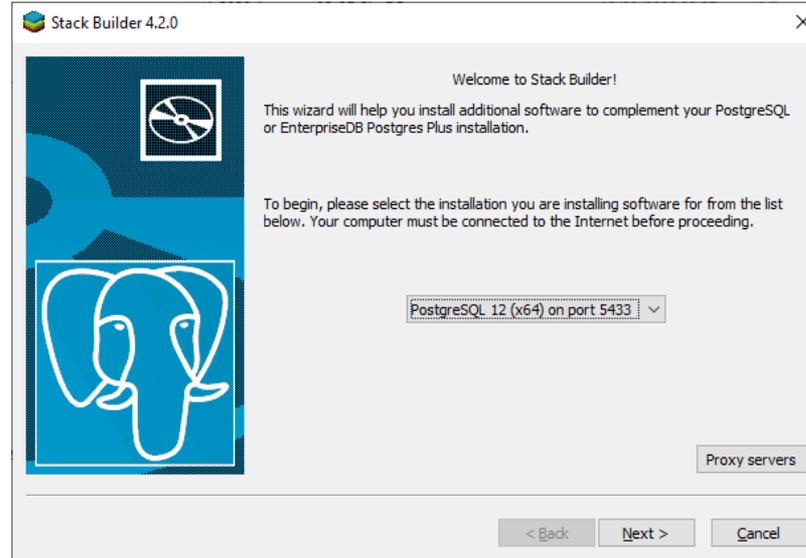
Software installation order

- 1) Install Java (if not yet installed)
- 2) Install PostgreSQL
 - Install PostGIS (generally installed together with PostgreSQL, see next slides)
 - Install PgAdmin (generally installed together with PostgreSQL, see next slides)
- 3) Install the 3DCityDB suite
 - Execute the .jar file, it will start the installation process
- 4) Install Google Earth (optional)
- 5) Install NodeJS (optional)

Software required
Software install
Database setup
Further resources

PostgreSQL

- **RECOMMENDED:** Install PostgreSQL on your computer using the automatic installer (Stack builder).



- Please take care to:
 - Properly set a **password** for your *postgres* user. The *postgres* user is the administrator of the PostgreSQL database cluster. Do not lose the password!!
 - You can generally set the default **port** of PostgreSQL to **5432**.

Software required

Software install

- Java
- **PostgreSQL**
- PgAdmin/PostGIS
- 3DCityDB
- Google Earth
- NodeJS

Database setup

Imp/Exp connection

Additional schemas

ADE plug-ins

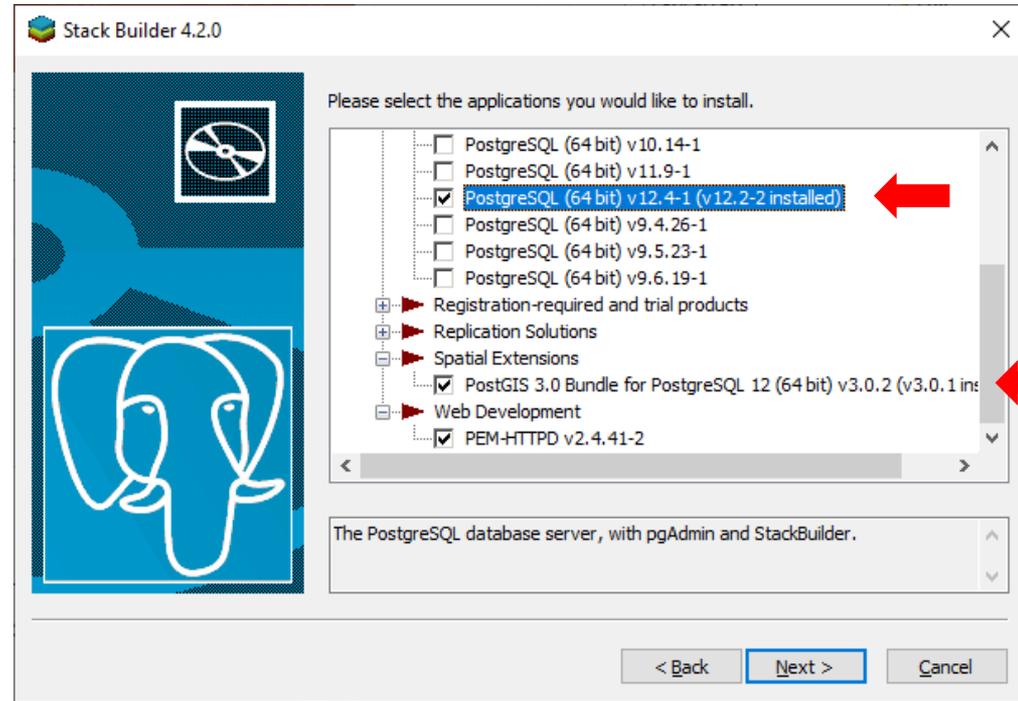
PgAdmin / PostGIS

- **PGAdmin4** is generally installed by default, no need to do anything
- The Stack builder application allows you to install also other applications, such as **PostGIS** and (optionally) a webserver (here: PEM)

Software required Software install

- Java
- PostgreSQL
- **PgAdmin/PostGIS**
- 3DCityDB
- Google Earth
- NodeJS

Database setup
Imp/Exp connection
Additional schemas
ADE plug-ins



NOTA BENE: The detailed installation guide can be found here:

<https://3dcitydb-docs.readthedocs.io/en/latest/>

In the following slides, only the main points are presented

Software required

Software install

- Java
- PostgreSQL
- PgAdmin/PostGIS
- **3DCityDB**
- Google Earth
- NodeJS

Database setup

Imp/Exp connection

Additional schemas

ADE plug-ins

1) Install the **3D City Database Suite**

- If you want to install it in the program files directory (e.g. C:\Program Files\3DCityDB-Importer-Exporter) you must make that directory writable by everybody (i.e. not only by the administrator!)
- Alternatively, you can install the 3DcityDB in any other directory where you have writing privileges
- At the end, you should have the icon of the Importer/Exporter on your desktop (or start menu)

2) Launch the Importer/Exporter just to test whether it starts correctly



Overview

Install required
software

Set up the
database

Connect to the
database via the
Importer/Exporter

Add additional
database schemas
(Optional)

Install ADE plug-ins
(Optional)

Database setup

Procedure overview

- 1) In PostgreSQL (via the PgAdmin GUI)
 - Connect to the PostgreSQL server
 - Create a new empty database that will contain your 3D city model data
 - Add the extensions for PostGIS, PostGIS-raster, etc.
 - See the next slides for details
- 2) From the 3DCityDB installation folder
 - Edit the CONNECTION_DETAILS.bat file and run the CREATEDB script to create the tables (and other objects) in the database you have created in the previous step
 - See the next slides for details
- 3) Connect to the database (e.g. via PgAdmin) just to check that you created the tables
- 4) Connect to the database from the 3DCityDB Importer/Exporter

Software required

Software install

Database setup

Imp/Exp connection

Additional schemas

ADE plug-ins

Connecting to the database

- AFTER you have successfully installed PostgreSQL, you can access the database server via PgAdmin

ALTERNATIVELY

- You do not have PostgreSQL installed on your own computer, but you know the connection parameters to connect to a remote server
- **In both cases**, you will need information about:
 - **Server name or IP address** ("localhost" if it is on your computer)
 - **Database name** (generally "postgres" if it is on your computer)
 - **Port** (generally 5432 if it is on your computer)
 - **Username, Password** (e.g. the ones created before if it is on your computer)

Software required

Software install

Database setup

• Database connection

- Database creation
- Create tables etc.
- Check via PgAdmin

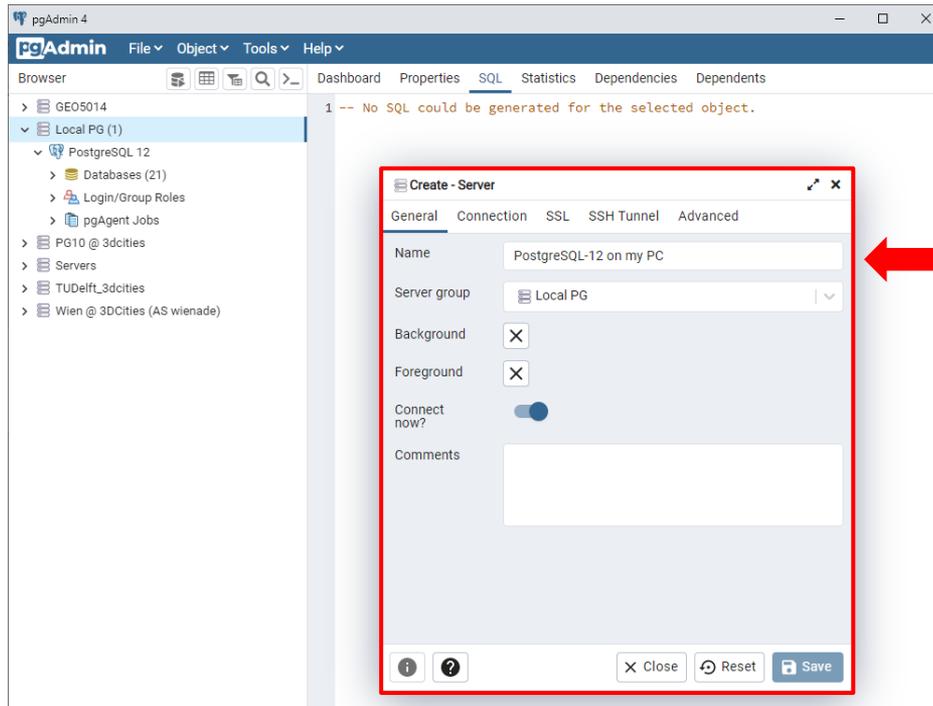
Imp/Exp connection

Additional schemas

ADE plug-ins

Connecting to the database from PgAdmin

- Create a (link to the) database server
 - You are actually creating a connection to the database server from PgAdmin
 - Click on menu Object\Create\Server **OR** right mouse-click\Create\Server and fill out the fields
 - **Please note:** this step may not be required if you already have a server connection established



In the "General" tab, you simply add a name to identify your connection

Here, FOR EXAMPLE, the string is "PostgreSQL-12 on my PC"

Software required
Software install
Database setup

• **Database connection**

- Database creation
- Create tables etc.
- Check via PgAdmin Imp/Exp connection
- Additional schemas
- ADE plug-ins

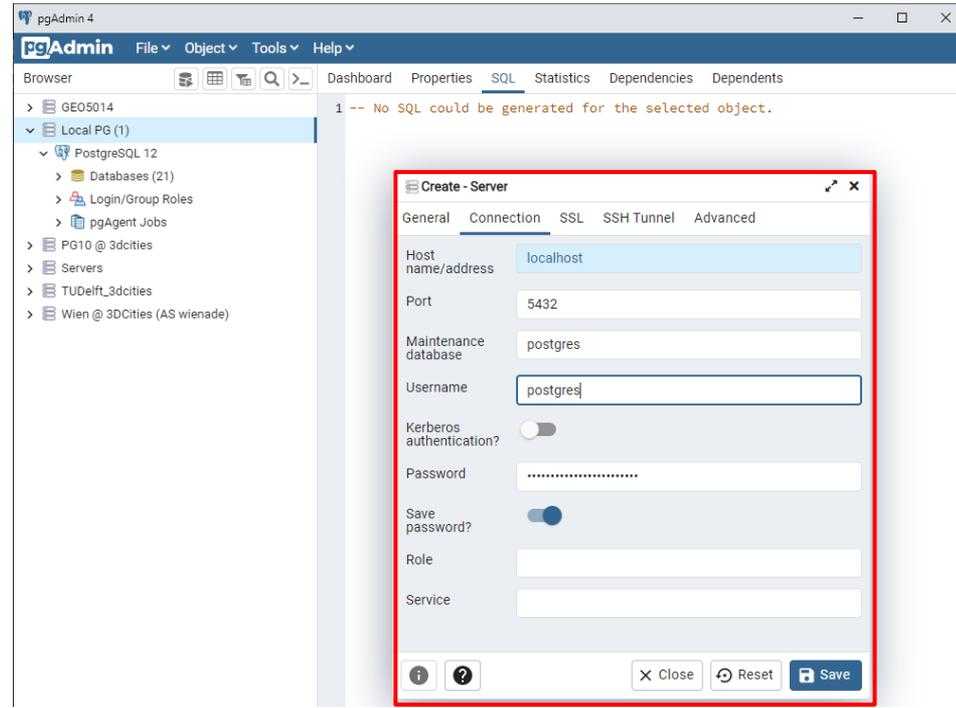
Connecting to the database from PgAdmin

- Create a (link to the) database server
 - You are actually creating a connection to the database server from PgAdmin
 - Click on menu Object\Create\Server **OR** right mouse-click\Create\Server and fill out the fields
 - **Please note:** this step may not be required if you already have a server connection established

Software required
Software install
Database setup

• Database connection

- Database creation
- Create tables etc.
- Check via PgAdmin
- Imp/Exp connection
- Additional schemas
- ADE plug-ins



In the "Connection" tab,
you add the connection
parameters

- Host name / IP address
- Port
- Database name
- Username
- Password

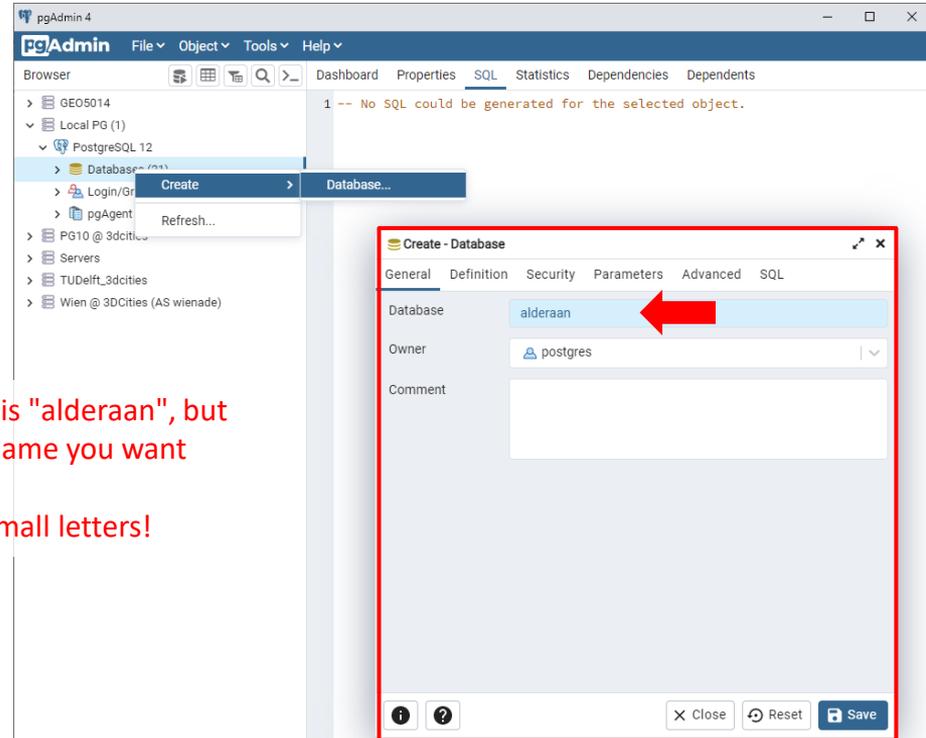
Database creation

- Once you have created a connection, you can create the database that will contain your city mode data
 - Click on menu Object\Create\Database **OR** right mouse-click\Create\Database and fill out the fields
 - Choose the name you want, ideally the name of the city

Software required
Software install

Database setup

- Database connection
- **Database creation**
- Create tables etc.
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Here, for example, it is "alderaan", but you can choose any name you want

Best if you use only small letters!

Database creation

Software required

Software install

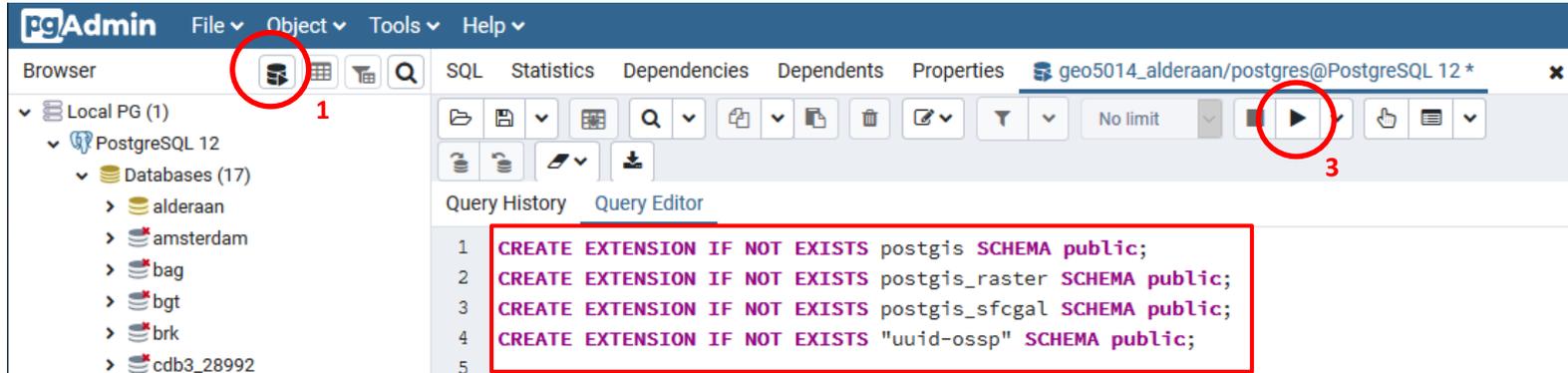
Database setup

- Database connection
- **Database creation**
- Create tables etc.
- Check via PgAdmin

Imp/Exp connection

Additional schemas

ADE plug-ins



Add PostGIS (and othe extensions) to the database you have just created

- 1) Open a SQL query window
- 2) Copy and paste the text written in the yellow box into the query window
- 3) Run the query

```
CREATE EXTENSION IF NOT EXISTS postgis SCHEMA public;  
CREATE EXTENSION IF NOT EXISTS postgis_raster SCHEMA public;  
CREATE EXTENSION IF NOT EXISTS postgis_sfcgal SCHEMA public;  
CREATE EXTENSION IF NOT EXISTS "uuid-oss" SCHEMA public;
```

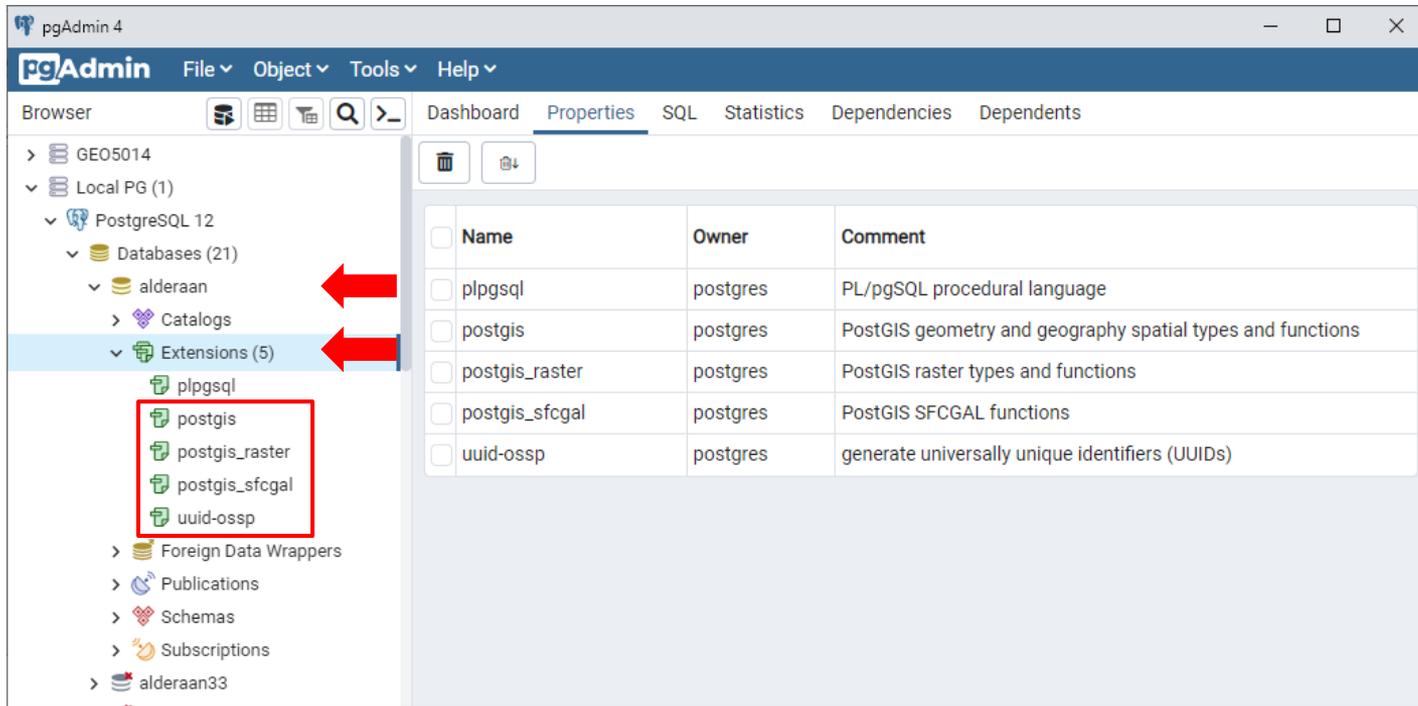
Database creation

- Check that you have correctly installed the extensions in your database
 - Open "Extensions" item in your database (e.g. "alderaan")
 - Check that the extensions are listed there (the "plpgsql" one is installed by default)

Software required
Software install

Database setup

- Database connection
- **Database creation**
- Create tables etc.
- Check via PgAdmin
- Imp/Exp connection
- Additional schemas
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The screenshot shows the pgAdmin 4 interface. In the left-hand 'Browser' pane, the tree structure is as follows: GEO5014 > Local PG (1) > PostgreSQL 12 > Databases (21) > alderaan > Extensions (5). The 'Extensions (5)' folder is highlighted in blue. Within this folder, the following extensions are listed: plpgsql, postgis, postgis_raster, postgis_sfcgal, and uuid-osp. The 'postgis' extension is highlighted with a red rectangular box. Two red arrows point from the left towards the 'alderaan' database and the 'Extensions (5)' folder. The main pane on the right shows the 'Properties' view for the selected extension, displaying a table with columns 'Name', 'Owner', and 'Comment'.

Name	Owner	Comment
plpgsql	postgres	PL/pgSQL procedural language
postgis	postgres	PostGIS geometry and geography spatial types and functions
postgis_raster	postgres	PostGIS raster types and functions
postgis_sfcgal	postgres	PostGIS SFCGAL functions
uuid-osp	postgres	generate universally unique identifiers (UUIDs)

Create tables and other database objects

NOTA BENE: The detailed installation guide can be found here:

<https://3dcitydb-docs.readthedocs.io/en/latest/first-steps/index.html>

In the following slides, only the main points are presented

- Go to the **3DCityDB installation folder** and look for the 3dcitydb\postgresql\ShellScripts directory. It should look like in the next slides
 - Open the CONNECTION_DETAILS.bat file in a text editor and insert your PostgreSQL connection details
 - Run the CREATEDB script (for Windows and Unix in the corresponding subfolders)

Software required

Software install

Database setup

- Database connection
- Database creation
- **Create tables etc.**
- Check via PgAdmin

Imp/Exp connection

Additional schemas

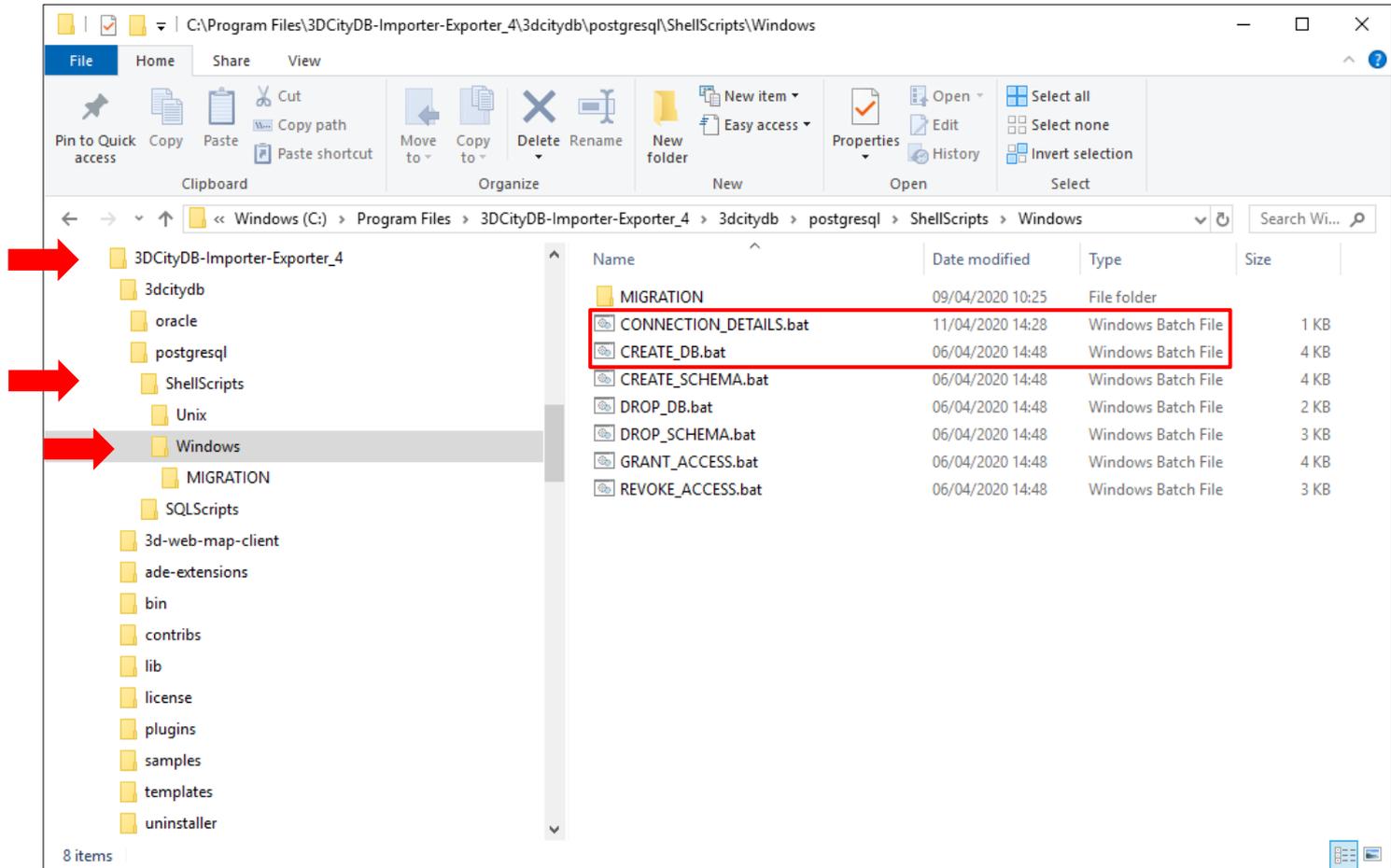
ADE plug-ins

Create tables and other database objects

Software required
Software install

Database setup

- Database connection
 - Database creation
 - **Create tables etc.**
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File Explorer window showing the directory structure for 3DCityDB-Importer-Exporter_4. The path is C:\Program Files\3DCityDB-Importer-Exporter_4\3dcitydb\postgresql\ShellScripts\Windows. The 'Windows' folder is highlighted with a red arrow. The 'CONNECTION_DETAILS.bat' and 'CREATE_DB.bat' files are highlighted with a red box.

Name	Date modified	Type	Size
MIGRATION	09/04/2020 10:25	File folder	
CONNECTION_DETAILS.bat	11/04/2020 14:28	Windows Batch File	1 KB
CREATE_DB.bat	06/04/2020 14:48	Windows Batch File	4 KB
CREATE_SCHEMA.bat	06/04/2020 14:48	Windows Batch File	4 KB
DROP_DB.bat	06/04/2020 14:48	Windows Batch File	2 KB
DROP_SCHEMA.bat	06/04/2020 14:48	Windows Batch File	3 KB
GRANT_ACCESS.bat	06/04/2020 14:48	Windows Batch File	4 KB
REVOKE_ACCESS.bat	06/04/2020 14:48	Windows Batch File	3 KB

Create tables and other database objects

Software required

Software install

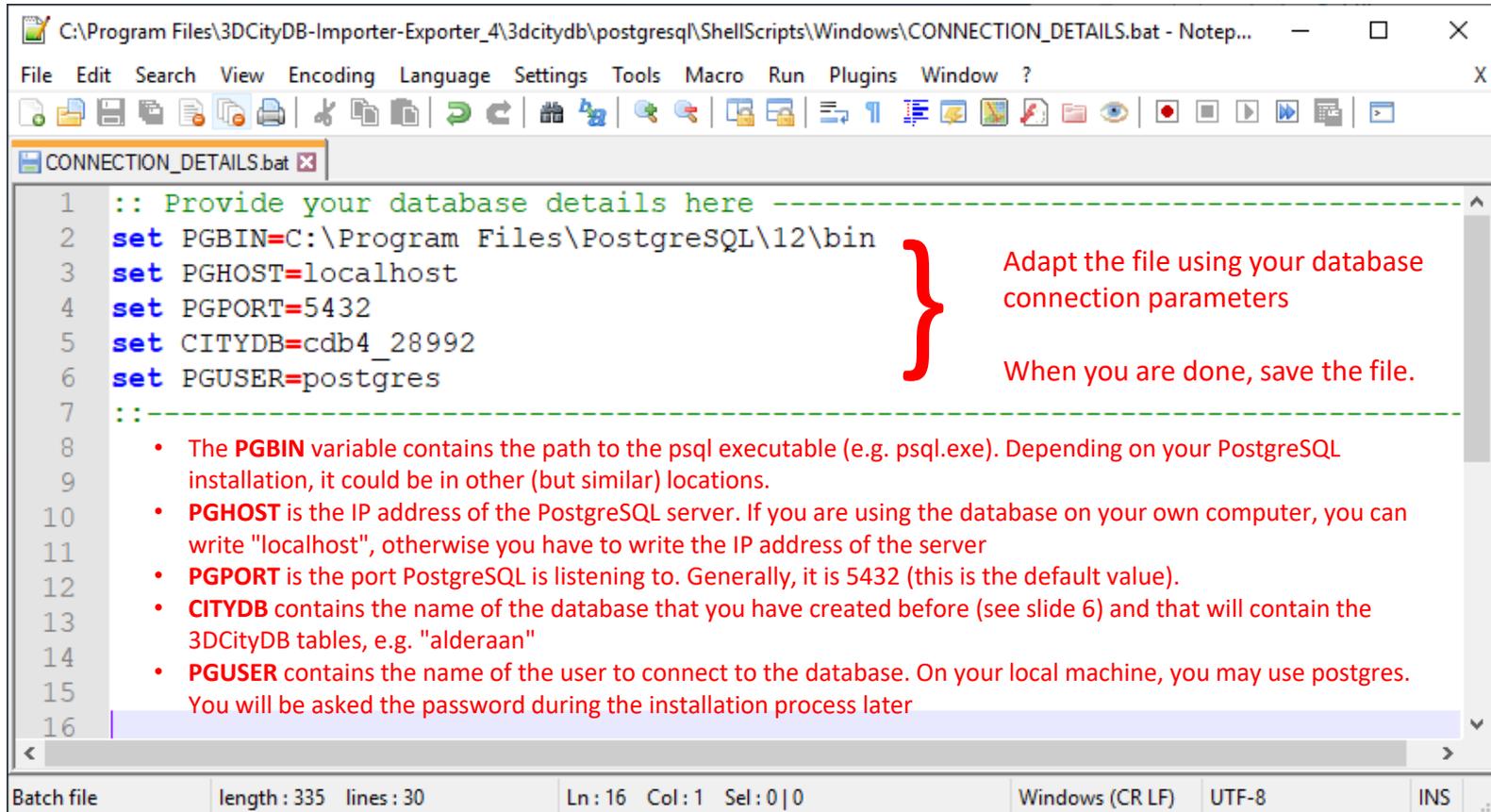
Database setup

- Database connection
- Database creation
- **Create tables etc.**
- Check via PgAdmin

Imp/Exp connection

Additional schemas

ADE plug-ins



```

1  :: Provide your database details here -----
2  set PGBIN=C:\Program Files\PostgreSQL\12\bin
3  set PGHOST=localhost
4  set PGPORT=5432
5  set CITYDB=cdb4_28992
6  set PGUSER=postgres
7  :: -----
8
9
10
11
12
13
14
15
16

```

Adapt the file using your database connection parameters

When you are done, save the file.

- The **PGBIN** variable contains the path to the psql executable (e.g. psql.exe). Depending on your PostgreSQL installation, it could be in other (but similar) locations.
- **PGHOST** is the IP address of the PostgreSQL server. If you are using the database on your own computer, you can write "localhost", otherwise you have to write the IP address of the server
- **PGPORT** is the port PostgreSQL is listening to. Generally, it is 5432 (this is the default value).
- **CITYDB** contains the name of the database that you have created before (see slide 6) and that will contain the 3DCityDB tables, e.g. "alderaan"
- **PGUSER** contains the name of the user to connect to the database. On your local machine, you may use postgres. You will be asked the password during the installation process later

Batch file length : 335 lines : 30 Ln : 16 Col : 1 Sel : 0 | 0 Windows (CR LF) UTF-8 INS

Create tables and other database objects

Find out the EPSG codes that apply to your city/region. Here some examples:

Software required

Software install

Database setup

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Additional schemas

ADE plug-ins

- **Netherlands**

- **Horizontal datum EPSG: 28992**

- **Vertical datum EPSG: 5109**

- (Will automatically create the GMLSrsName: **urn:ogc:def:crs,crs:EPSG::28992,crs:EPSG:5109**)

- **Trento (Italy)**

- **Horizontal datum EPSG: 25832**

- **Vertical datum EPSG: 5214**

- (Will automatically create the GMLSrsName: **urn:ocg:def:crs,crs:EPSG::25832,crs:EPSG::5214**)

- **Vienna (Austria)**

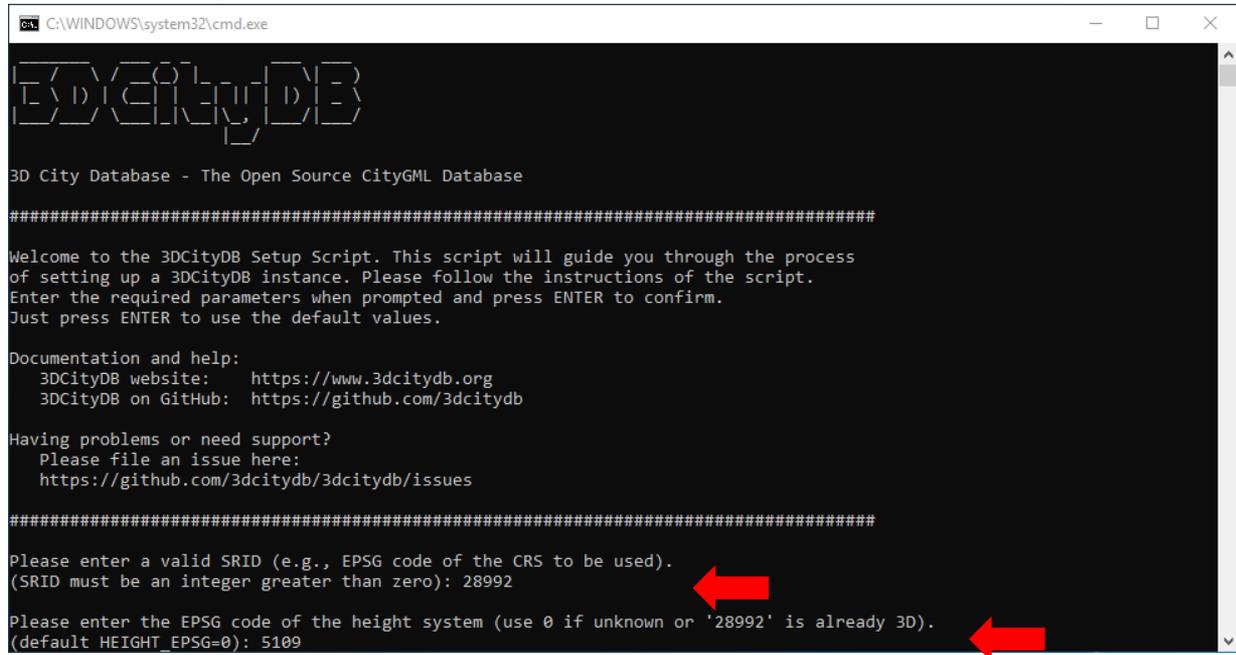
- **Horizontal datum EPSG: 31256**

- **Vertical datum EPSG: 1267**

- (Will automatically create the GMLSrsName: **urn:ocg:def:crs,crs:EPSG::31256,crs:EPSG::1267**)

Create tables and other database objects

- Run the batch file CREATE_DB and set the EPSG codes for horizontal and vertical datum, as shown in the image here



```

C:\WINDOWS\system32\cmd.exe
3DCityDB
3D City Database - The Open Source CityGML Database
#####
Welcome to the 3DCityDB Setup Script. This script will guide you through the process
of setting up a 3DCityDB instance. Please follow the instructions of the script.
Enter the required parameters when prompted and press ENTER to confirm.
Just press ENTER to use the default values.

Documentation and help:
  3DCityDB website:   https://www.3dcitydb.org
  3DCityDB on GitHub: https://github.com/3dcitydb

Having problems or need support?
  Please file an issue here:
  https://github.com/3dcitydb/3dcitydb/issues

#####
Please enter a valid SRID (e.g., EPSG code of the CRS to be used).
(SRID must be an integer greater than zero): 28992
Please enter the EPSG code of the height system (use 0 if unknown or '28992' is already 3D).
(default HEIGHT_EPSG=0): 5109
  
```

- Then press enter, the **GMLSRNAME** variable will be automatically generated (accept the proposed value) and the install script will start and install all tables etc.

Software required
 Software install
Database setup
 • Database connection
 • Database creation
 • **Create tables etc.**
 • Check via PgAdmin
 Imp/Exp connection
 Additional schemas
 ADE plug-ins

Create tables and other database objects

- Upon successful installation, you should get something like this

```
C:\WINDOWS\system32\cmd.exe
INSERT 0 1
ALTER DATABASE

3DCityDB creation complete!

Checking spatial reference system ...
  check_srid
-----
  SRID ok

Setting spatial reference system of 3DCityDB instance ...
INSERT 0 1
  change_schema_srid
-----

Done
Press any key to continue . . .
```

Software required

Software install

Database setup

- Database connection
- Database creation
- **Create tables etc.**
- Check via PgAdmin

Imp/Exp connection

Additional schemas

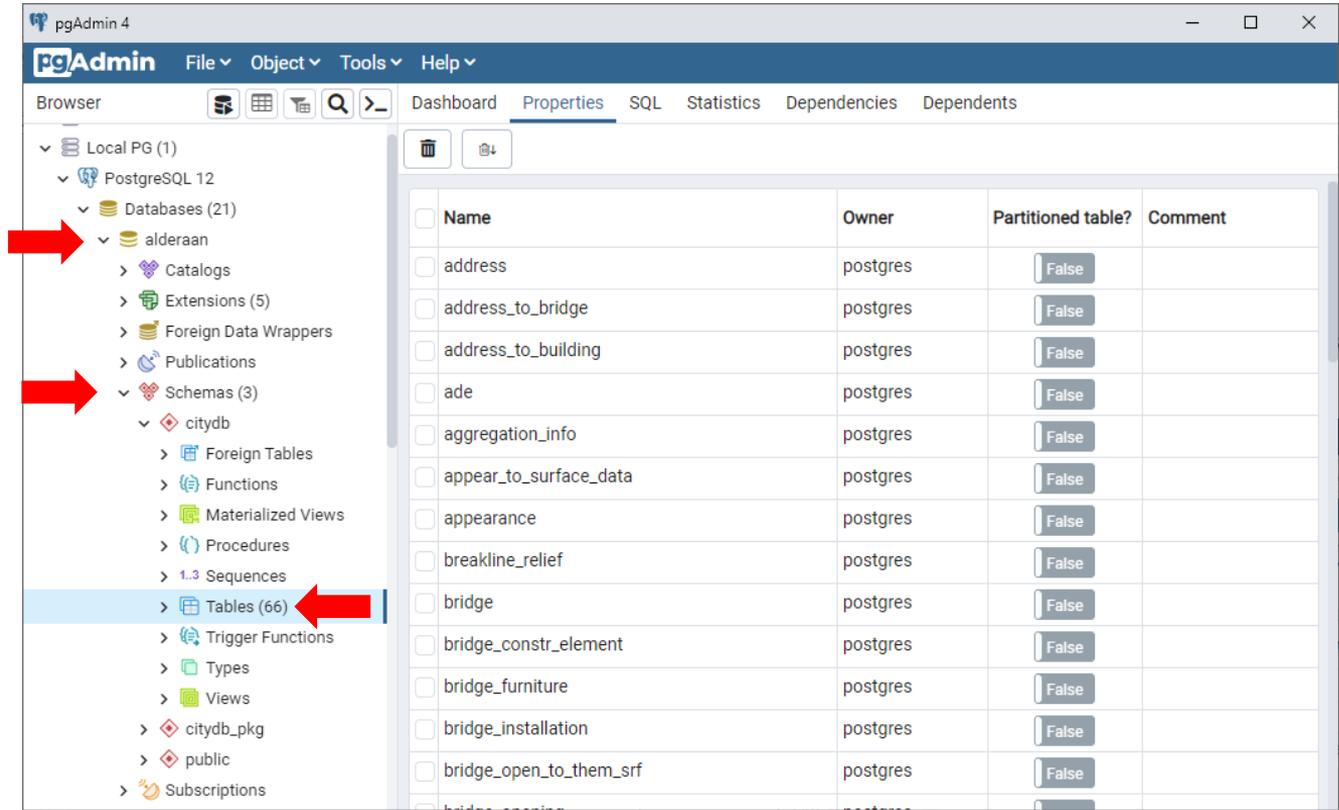
ADE plug-ins

Check via PgAdmin

- Open PgAdmin and check that the **citydb** and **citydb_pkg** schemas are there. The **citydb** schema should contain 66 tables

Software required Software install Database setup

- Database connection
 - Database creation
 - Create tables etc.
 - **Check via PgAdmin**
- Imp/Exp connection
Additional schemas
ADE plug-ins



The screenshot shows the PgAdmin 4 interface. The left sidebar displays a tree view of the database structure. A red arrow points to the 'alderaan' database, and another red arrow points to the 'citydb' schema. A third red arrow points to the 'Tables (66)' entry under the 'citydb' schema. The main pane shows the 'Properties' tab for the 'citydb' schema, displaying a table of objects with columns: Name, Owner, Partitioned table?, and Comment. The table lists various tables such as 'address', 'address_to_bridge', 'address_to_building', 'ade', 'aggregation_info', 'appear_to_surface_data', 'appearance', 'breakline_relief', 'bridge', 'bridge_constr_element', 'bridge_furniture', 'bridge_installation', 'bridge_open_to_them_srf', and 'bridge_opening'.

Name	Owner	Partitioned table?	Comment
<input type="checkbox"/> address	postgres	False	
<input type="checkbox"/> address_to_bridge	postgres	False	
<input type="checkbox"/> address_to_building	postgres	False	
<input type="checkbox"/> ade	postgres	False	
<input type="checkbox"/> aggregation_info	postgres	False	
<input type="checkbox"/> appear_to_surface_data	postgres	False	
<input type="checkbox"/> appearance	postgres	False	
<input type="checkbox"/> breakline_relief	postgres	False	
<input type="checkbox"/> bridge	postgres	False	
<input type="checkbox"/> bridge_constr_element	postgres	False	
<input type="checkbox"/> bridge_furniture	postgres	False	
<input type="checkbox"/> bridge_installation	postgres	False	
<input type="checkbox"/> bridge_open_to_them_srf	postgres	False	
<input type="checkbox"/> bridge_opening	postgres	False	

Overview

Install required
software

Set up the
database

Connect to the
database via the
Importer/Exporter

Add additional
database schemas
(Optional)

Install ADE plug-ins
(Optional)

Connecting to the database via Importer/Exporter

- AFTER you have successfully installed PostgreSQL, you can access the database server via PgAdmin

ALTERNATIVELY

- You do not have PostgreSQL installed on your own computer, but you know the connection parameters to connect to a remote server
- **In both cases**, you will need information about:
 - **Server name or IP address** ("localhost" if it is on your computer)
 - **Database name** (generally "postgres" if it is on your computer)
 - **Port** (generally 5432 if it is on your computer)
 - **Username, Password** (e.g. the ones created before if it is on your computer)

Software required

Software install

Database setup

- Database connection
- Database creation
- Create tables etc.
- Check via PgAdmin

Imp/Exp

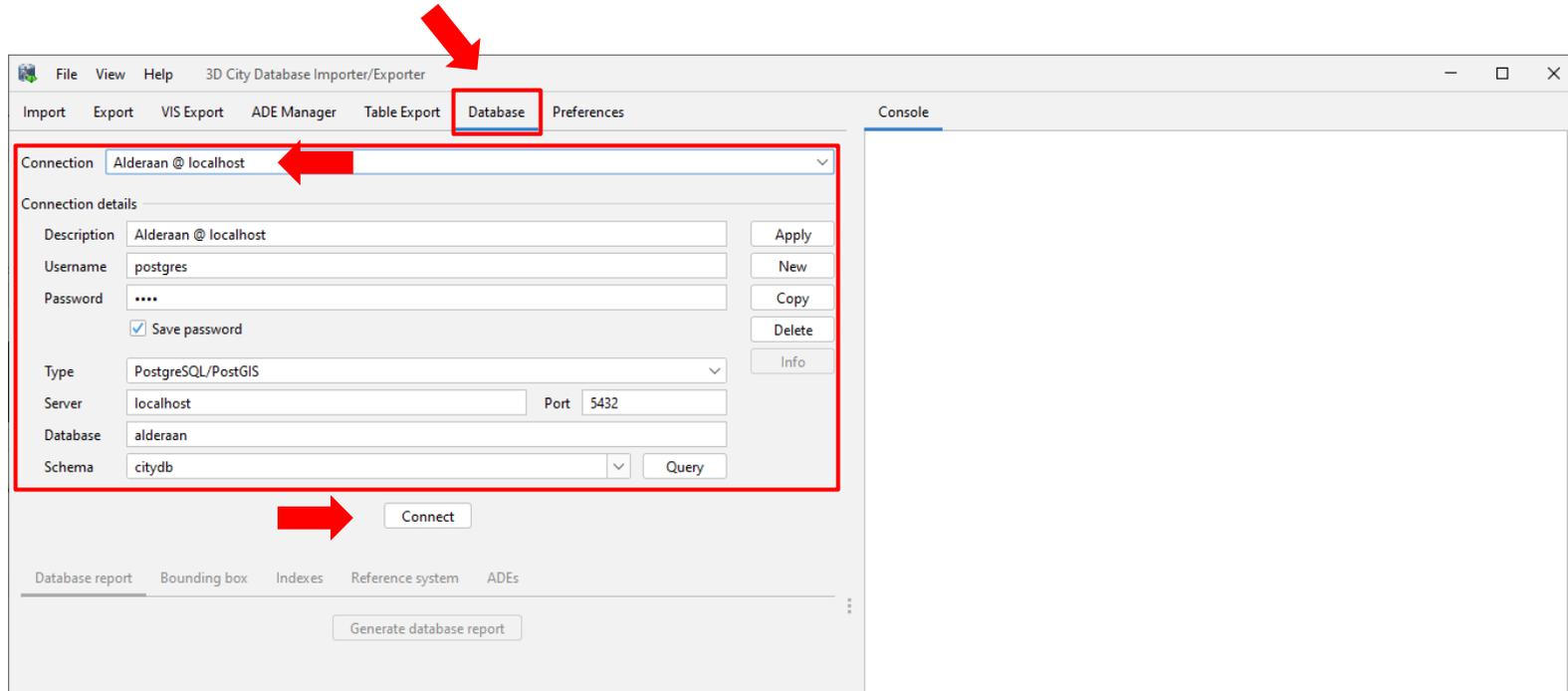
connection

Additional schemas

ADE plug-ins

Connecting to the database via Importer/Exporter

- Launch the 3DCityDB Importer/Exporter, select the "Database" tab
 - The Description field contains a simple string to identify the connection
 - Fill out the remaining fields with the connection parameters
 - Click on Connect



Software required
Software install
Database setup

- Database connection
- Database creation
- Create tables etc.
- Check via PgAdmin

Imp/Exp connection
Additional schemas
ADE plug-ins

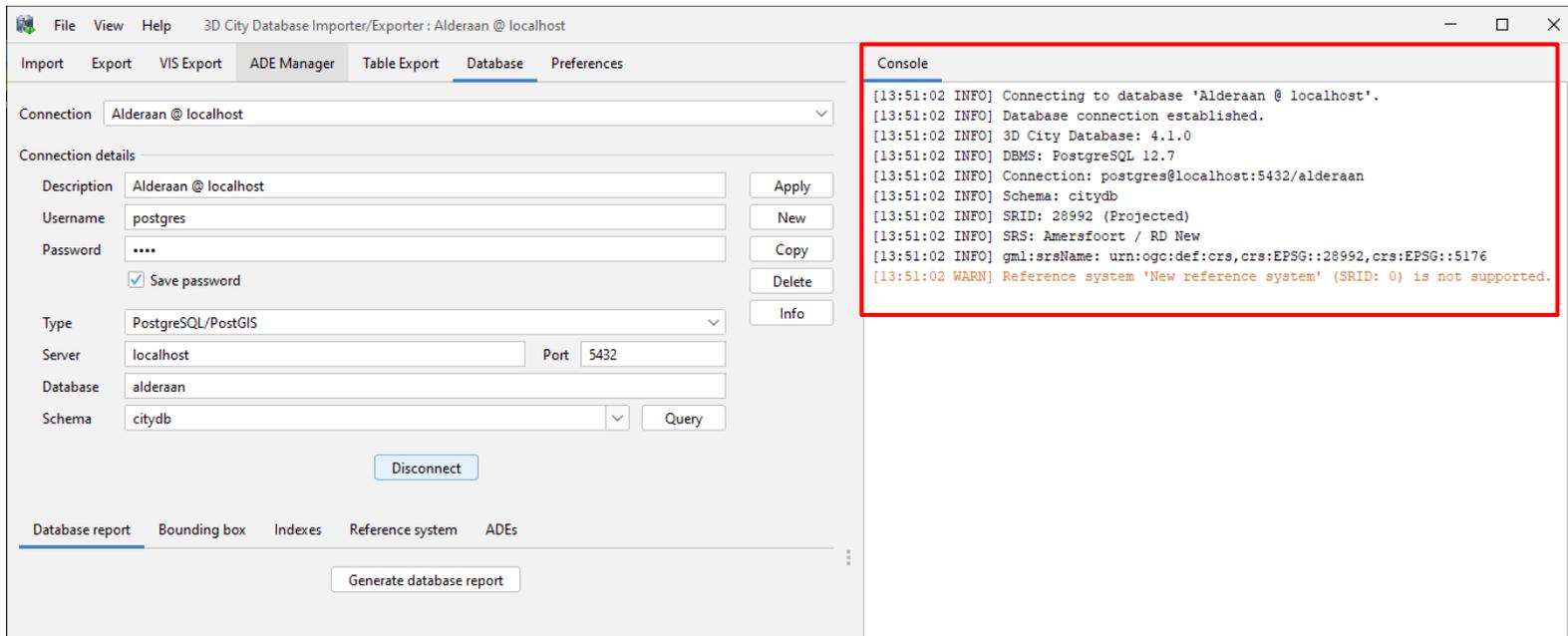
Connecting to the database via Importer/Exporter

- Launch the 3DCityDB Importer/Exporter, select the "Database" tab
 - Upon successful connection, you will see the notification in the console

Software required
 Software install
 Database setup

- Database connection
- Database creation
- Create tables etc.
- Check via PgAdmin

Imp/Exp connection
 Additional schemas
 ADE plug-ins



Connecting to the database via Importer/Exporter

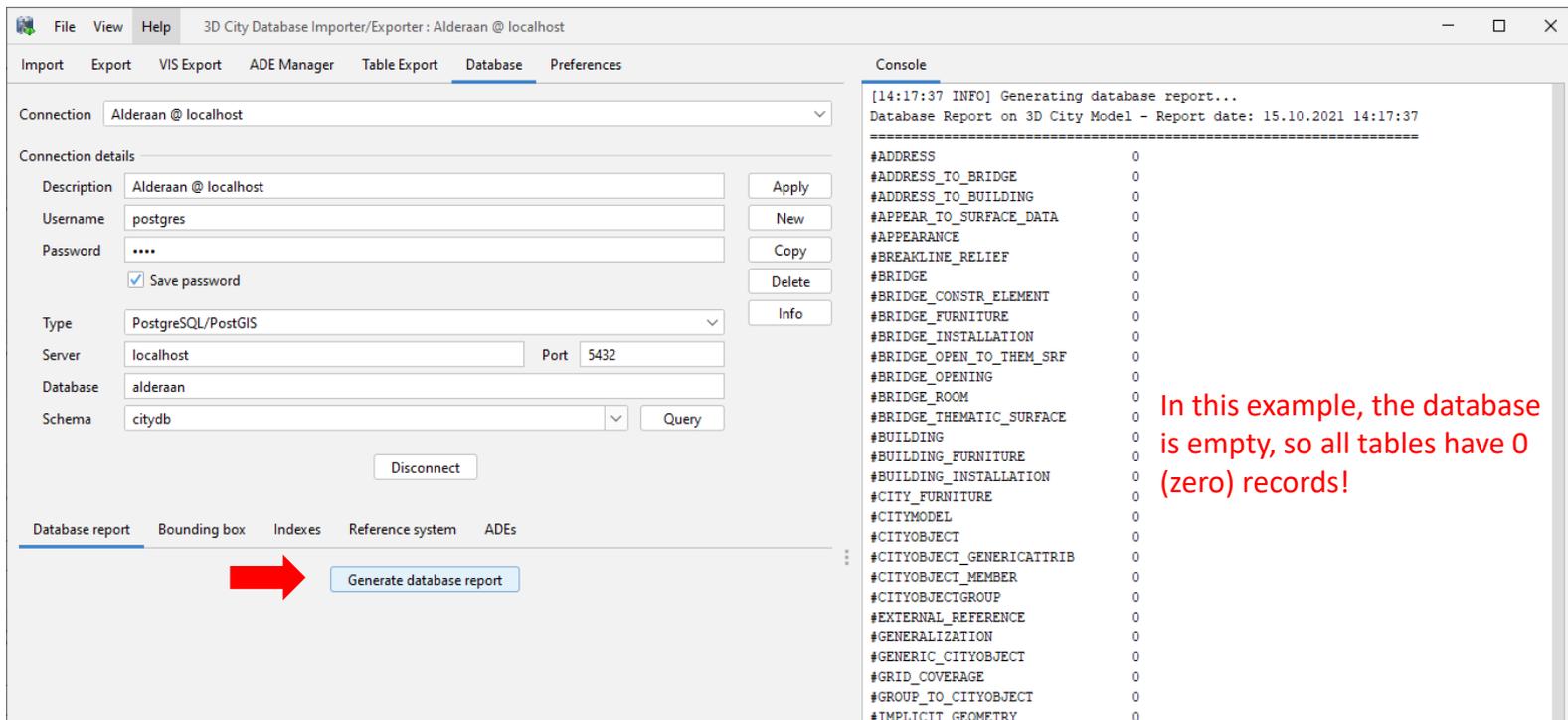
- Launch the 3DCityDB Importer/Exporter, select the "Database" tab
 - You can optionally also **Generate a database report**
 - If starting from an empty database, it will simply show that all tables are empty! 😊

Software required
 Software install
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Additional schemas
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The screenshot shows the '3D City Database Importer/Exporter' application window. The 'Database' tab is active, displaying connection details for 'Alderaan @ localhost'. A red arrow points to the 'Generate database report' button. The console on the right shows the following output:

```
[14:17:37 INFO] Generating database report...
Database Report on 3D City Model - Report date: 15.10.2021 14:17:37
-----
#ADDRESS 0
#ADDRESS_TO_BRIDGE 0
#ADDRESS_TO_BUILDING 0
#APPEAR_TO_SURFACE_DATA 0
#APPEARANCE 0
#BREAKLINE_RELIEF 0
#BRIDGE 0
#BRIDGE_CONSTR_ELEMENT 0
#BRIDGE_FURNITURE 0
#BRIDGE_INSTALLATION 0
#BRIDGE_OPEN_TO_THEM_SRF 0
#BRIDGE_OPENING 0
#BRIDGE_ROOM 0
#BRIDGE_THEMATIC_SURFACE 0
#BUILDING 0
#BUILDING_FURNITURE 0
#BUILDING_INSTALLATION 0
#CITY_FURNITURE 0
#CITYMODEL 0
#CITYOBJECT 0
#CITYOBJECT_GENERICATTRIB 0
#CITYOBJECT_MEMBER 0
#CITYOBJECTGROUP 0
#EXTERNAL_REFERENCE 0
#GENERALIZATION 0
#GENERIC_CITYOBJECT 0
#GRID_COVERAGE 0
#GROUP_TO_CITYOBJECT 0
#IMPLICIT_GEOMETRY 0
```

In this example, the database is empty, so all tables have 0 (zero) records!

Overview

**Install required
software**

**Set up the
database**

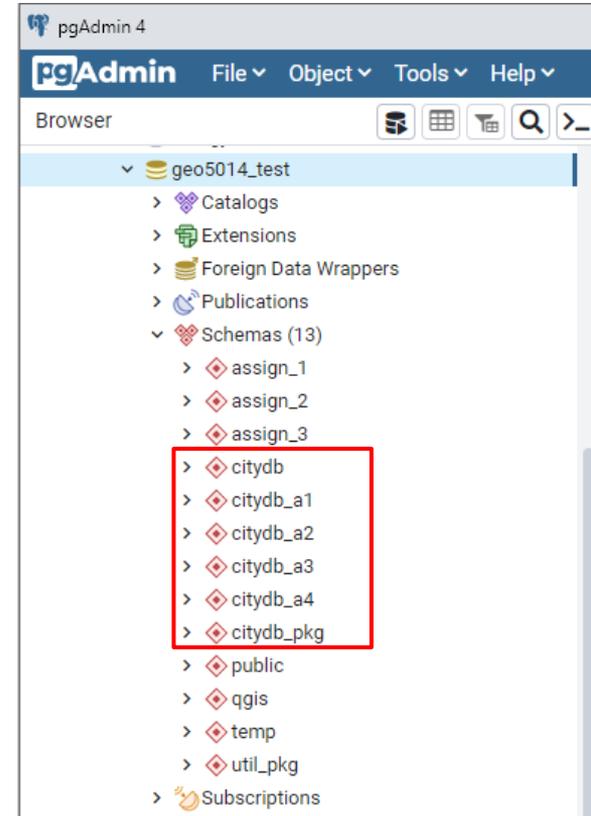
**Connect to the
database via the
Importer/Exporter**

**Add additional
database schemas
(Optional)**

**Install ADE plug-ins
(Optional)**

3D City Database: additional schemas

- **To add additional schemas** (OPTIONAL, besides the default citydb):
 - Check the connection parameters in file **CONNECTION_DETAILS.bat** (should be the same as before)
 - Run the **CREATE_SCHEMA** script. You will be requested to enter the name of the additional schema (e.g. "citydb_a1", or "scenario_1", etc.)
 - You can choose any name you want, but try to use only small letters
 - The new schema and its contents will be added automatically. The new schema will have the same CRS of the citydb schema
 - You can repeat these steps and add more schemas to the same database. At the end you will have
 - The citydb schema and n additional schemas
 - Only one citydb_pkg schema



3D City Database: additional schemas

- When using the Importer/Exporter, you can choose which schema to use to import/export data from the GUI.

Software required

Software install

Database setup

- Database connection

- Database creation

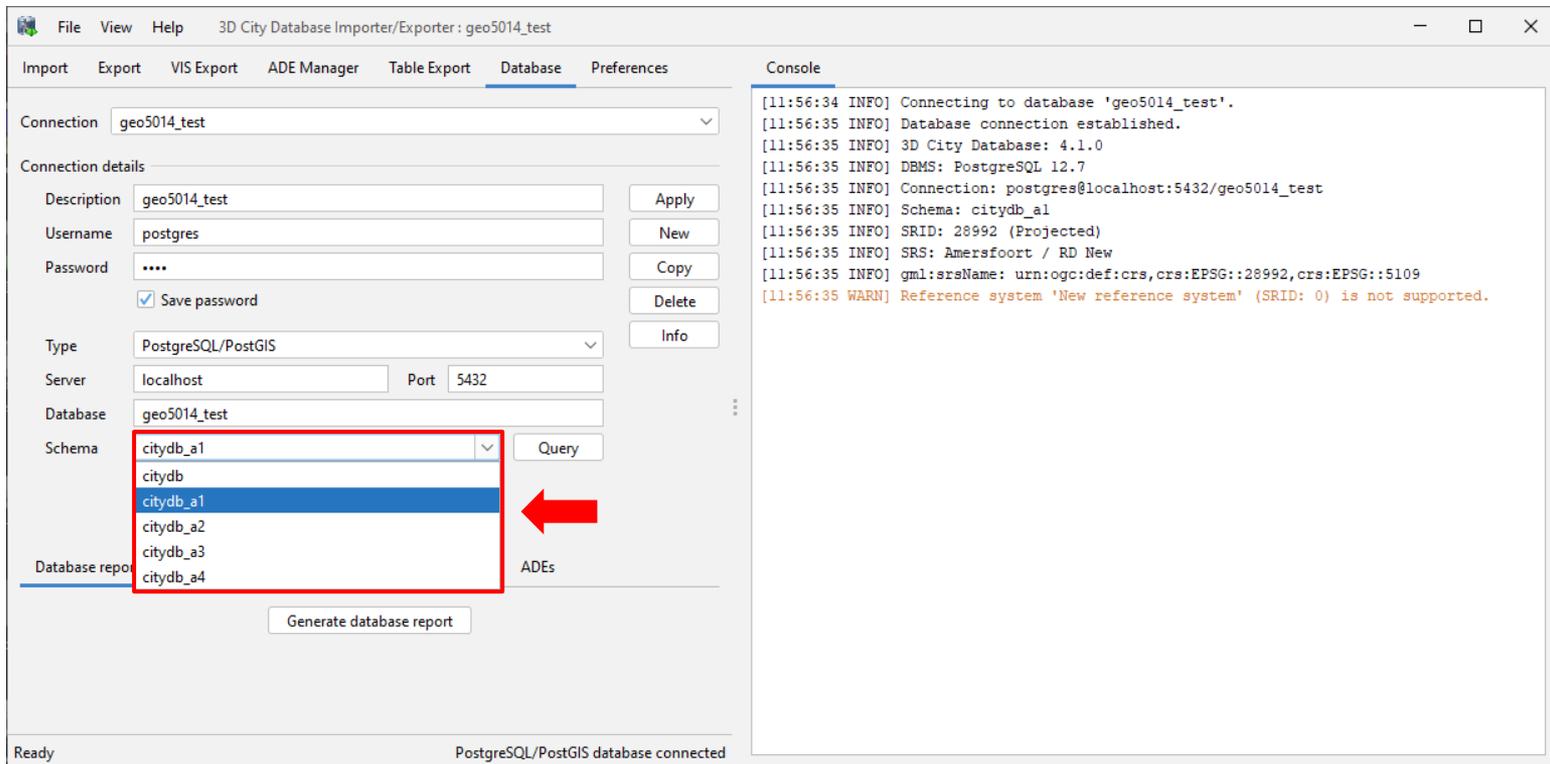
- Create tables etc.

- Check via PgAdmin

Imp/Exp connection

Additional schemas

ADE plug-ins



The screenshot shows the '3D City Database Importer/Exporter: geo5014_test' window. The 'Database' tab is active, displaying connection details for 'geo5014_test'. The 'Schema' dropdown menu is open, showing a list of schemas: 'citydb_a1', 'citydb', 'citydb_a1', 'citydb_a2', 'citydb_a3', and 'citydb_a4'. A red box highlights this list, and a red arrow points to the 'citydb_a1' entry. The 'Database report' section below shows 'Generate database report'.

The 'Console' window on the right displays the following log output:

```
[11:56:34 INFO] Connecting to database 'geo5014_test'.
[11:56:35 INFO] Database connection established.
[11:56:35 INFO] 3D City Database: 4.1.0
[11:56:35 INFO] DBMS: PostgreSQL 12.7
[11:56:35 INFO] Connection: postgres@localhost:5432/geo5014_test
[11:56:35 INFO] Schema: citydb_a1
[11:56:35 INFO] SRID: 28992 (Projected)
[11:56:35 INFO] SRS: Amersfoort / RD New
[11:56:35 INFO] gml:srsName: urn:ogc:def:crs,crs:EPSG::28992,crs:EPSG::5109
[11:56:35 WARN] Reference system 'New reference system' (SRID: 0) is not supported.
```

Overview

Install required
software

Set up the
database

Connect to the
database via the
Importer/Exporter

Add additional
database schemas
(Optional)

Install ADE plug-ins
(Optional)

ADE plug-in installation

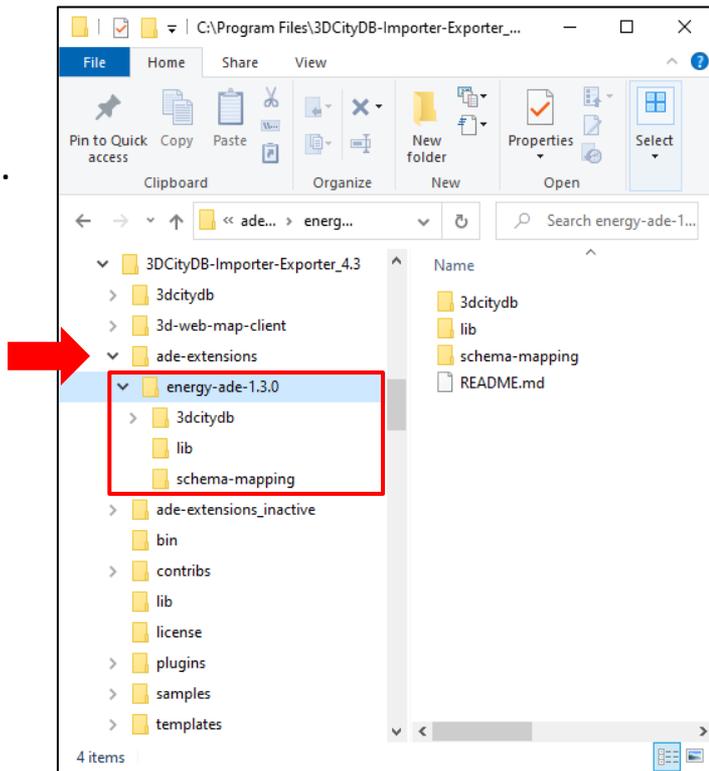
Please note: These slides refer to the Energy ADE plug-in for the 3DCityDB. However, a similar procedure can be followed for other ADE plug-ins.

Software required
Software install
Database setup
Imp/Exp connection
Additional schemas

ADE plug-ins

- Installation
- Data import
- Data export

- 1) Download the **energy-ade-citydb** extension for the Importer/Exporter
 - <https://github.com/3dcitydb/energy-ade-citydb/releases/>
- 2) Unzip it in folder ade-extensions of your 3DCityDB install path



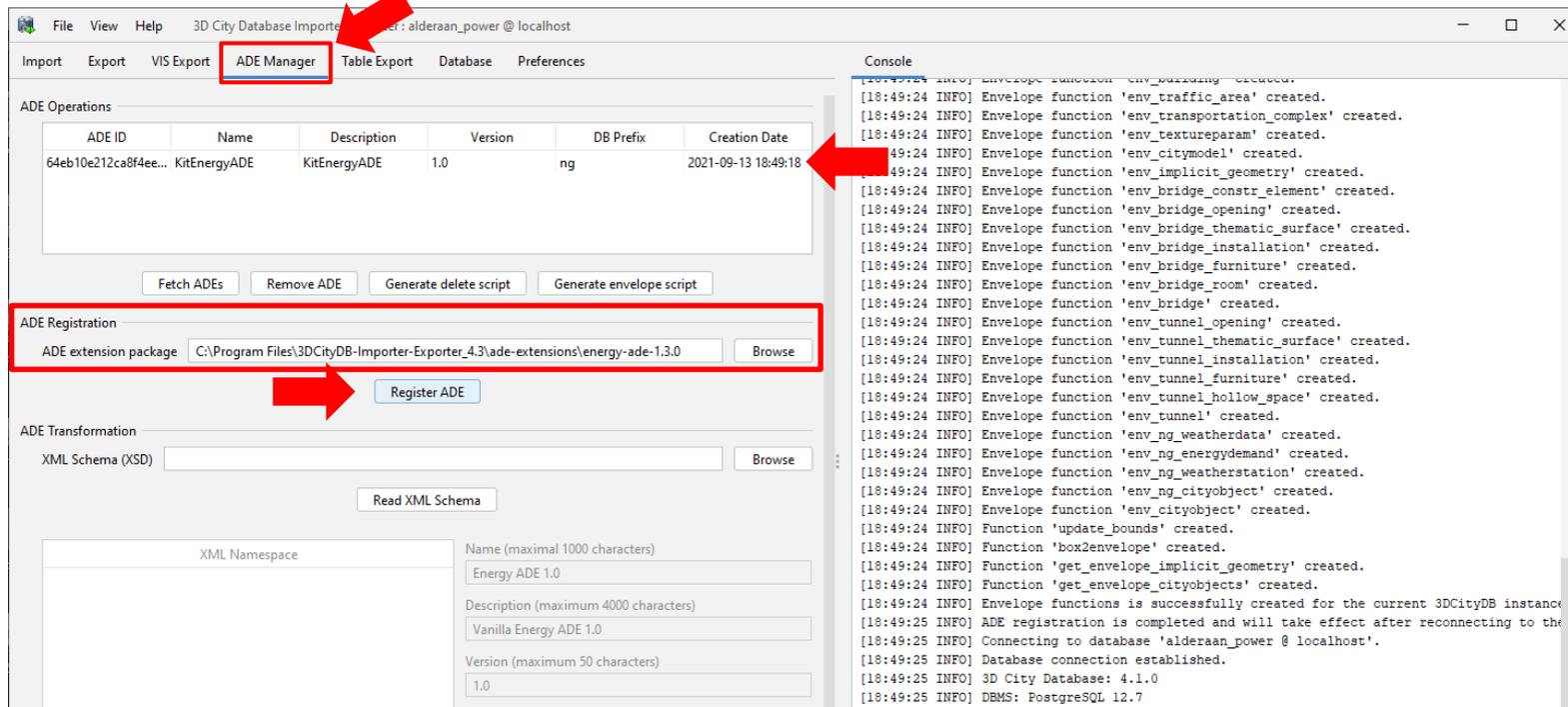
Detailed instructions available on-line

- <https://3dcitydb-docs.readthedocs.io/en/latest/plugins/ade-manager/index.html>

ADE plugin installation

- From the Importer/Exporter, connect to an existing 3DCityDB instance
 - In the "ADE extension package" add the path to the plug-in folder unzipped before
 - "Register" the ADE from the ADE Manager tab
 - The ADE will be added to the ADE list (and all tables, etc. will be added to the current schema)

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • Data import
 • Data export



The screenshot shows the '3D City Database Importer/Exporter' application window. The 'ADE Manager' tab is selected and highlighted with a red box. Below it, the 'ADE Operations' table lists the installed ADEs:

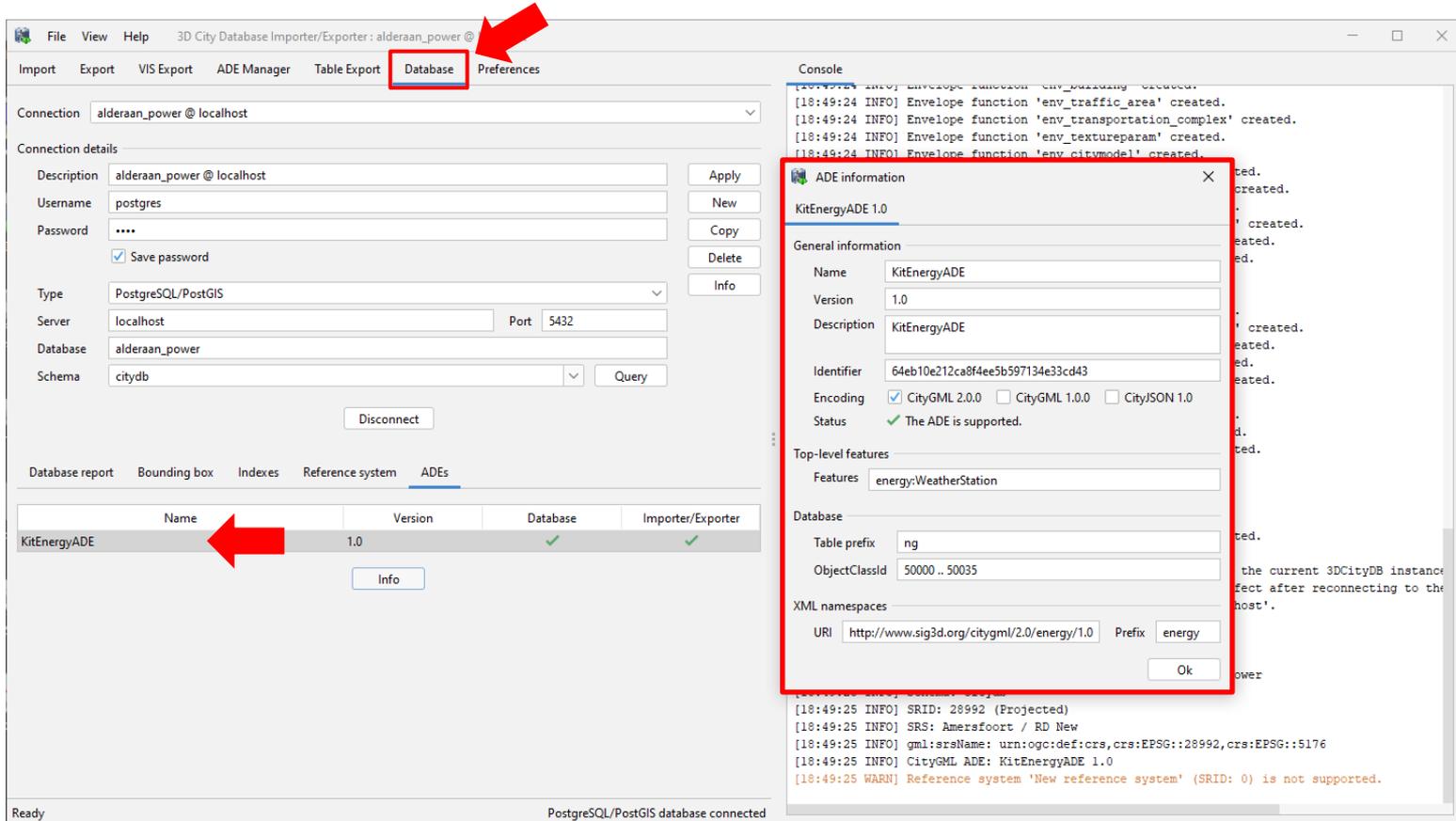
ADE ID	Name	Description	Version	DB Prefix	Creation Date
644eb10e212ca8f4ee...	KitEnergyADE	KitEnergyADE	1.0	ng	2021-09-13 18:49:18

Below the table are buttons for 'Fetch ADEs', 'Remove ADE', 'Generate delete script', and 'Generate envelope script'. The 'ADE Registration' section is also highlighted with a red box, showing the 'ADE extension package' field with the path 'C:\Program Files\3DCityDB-Importer-Exporter_4.3\ade-extensions\energy-ade-1.3.0' and a 'Browse' button. A 'Register ADE' button is located below this section. The 'ADE Transformation' section shows the 'XML Schema (XSD)' field and a 'Read XML Schema' button. The 'XML Namespace' section contains fields for 'Name', 'Description', and 'Version'. The console on the right shows a list of created envelope functions and the final message: 'ADE registration is completed and will take effect after reconnecting to the database'.

ADE plugin installation

- Check also in the database tab the ADEs properties

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • Data import
 • Data export



The screenshot shows the '3D City Database Importer/Exporter' application window. The 'Database' tab is selected, and the 'ADEs' sub-tab is active. A table lists the installed ADEs:

Name	Version	Database	Importer/Exporter
KitEnergyADE	1.0	✓	✓

An 'Info' button is located below the table. To the right, the 'ADE information' dialog box for 'KitEnergyADE 1.0' is open, showing the following details:

- General information:**
 - Name: KitEnergyADE
 - Version: 1.0
 - Description: KitEnergyADE
 - Identifier: 64eb10e212ca8f4ee5b597134e33cd43
 - Encoding: CityGML 2.0.0 CityGML 1.0.0 CityJSON 1.0
 - Status: The ADE is supported.
- Top-level features:**
 - Features: energy:WeatherStation
- Database:**
 - Table prefix: ng
 - ObjectClassId: 50000 .. 50035
- XML namespaces:**
 - URI: <http://www.sig3d.org/citygml/2.0/energy/1.0> Prefix: energy

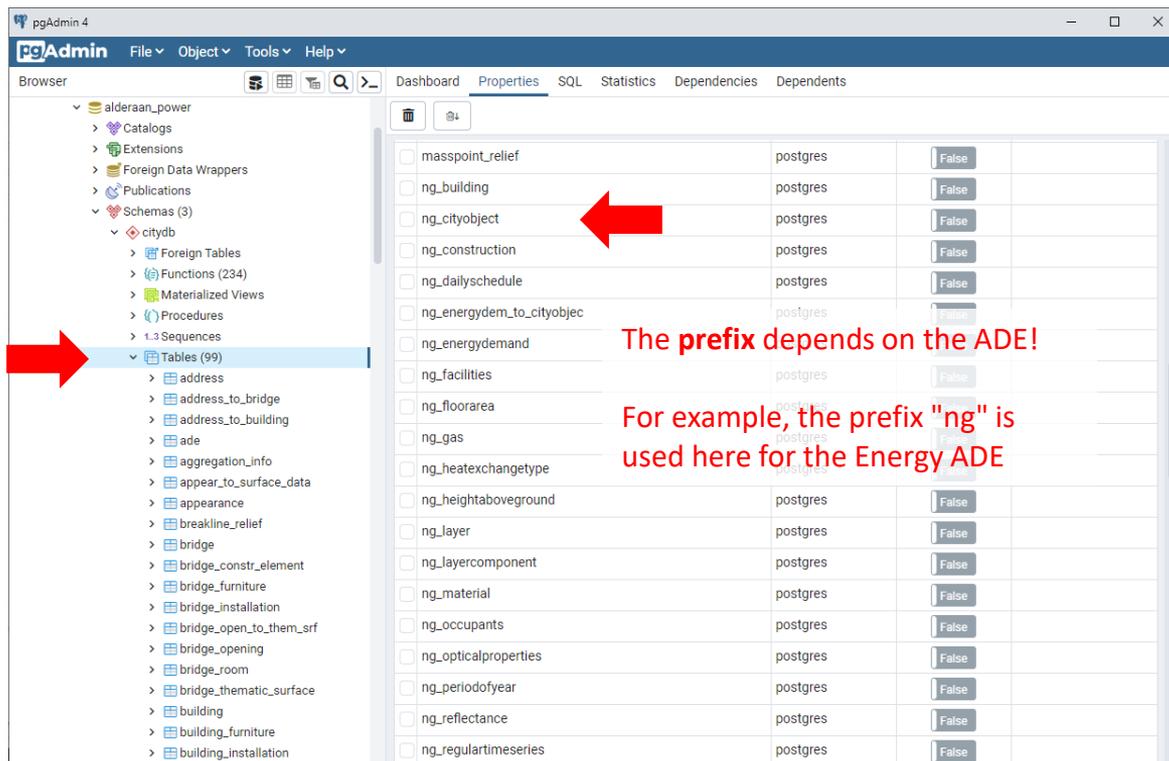
The status bar at the bottom indicates 'Ready' and 'PostgreSQL/PostGIS database connected'.

ADE plugin installation

- Check in PgAdmin: new tables (and functions) with prefix "ng" have been added

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
 ADE plug-ins

- Installation
- Data import
- Data export



The screenshot shows the pgAdmin 4 interface. The left sidebar displays a tree view of the database structure, with 'Tables (99)' selected under the 'citydb' schema. A red arrow points to this selection. The main window shows a list of tables with columns for name, type, and a 'False' button. A red arrow points to the 'ng_cityobject' table. Red text annotations are present:

The prefix depends on the ADE!

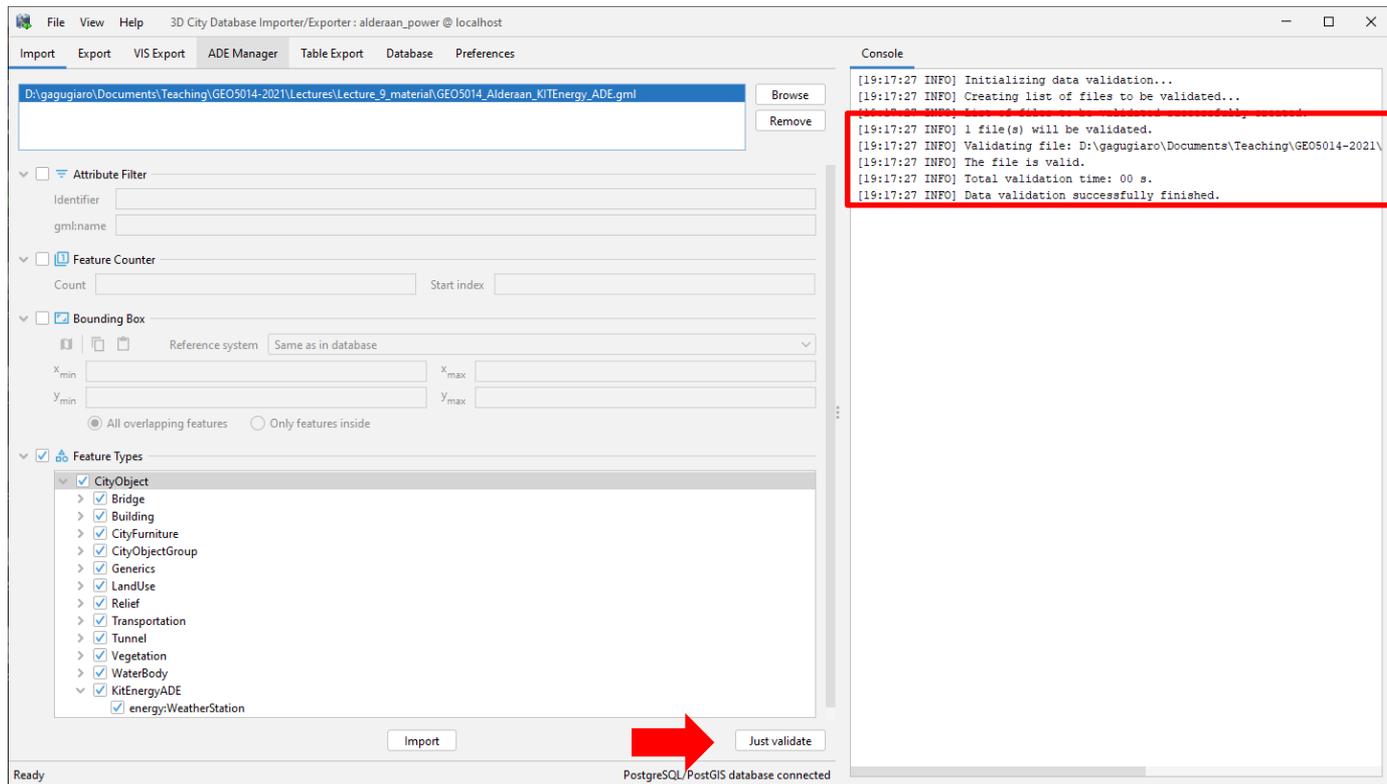
For example, the prefix "ng" is used here for the Energy ADE

Table Name	Type	Button
masspoint_relief	postgres	False
ng_building	postgres	False
ng_cityobject	postgres	False
ng_construction	postgres	False
ng_dailyschedule	postgres	False
ng_energydem_to_cityobjec	postgres	False
ng_energydemand	postgres	False
ng_facilities	postgres	False
ng_floorarea	postgres	False
ng_gas	postgres	False
ng_heatexchangetype	postgres	False
ng_heightaboveground	postgres	False
ng_layer	postgres	False
ng_layercomponent	postgres	False
ng_material	postgres	False
ng_occupants	postgres	False
ng_opticalproperties	postgres	False
ng_periodofyear	postgres	False
ng_reflectance	postgres	False
ng_regulartimeseries	postgres	False

ADE data import

- To import ADE data into the extended 3DCityDB, the procedure is the same as with non-ADE data via the Import tab

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • **Data import**
 • Data export



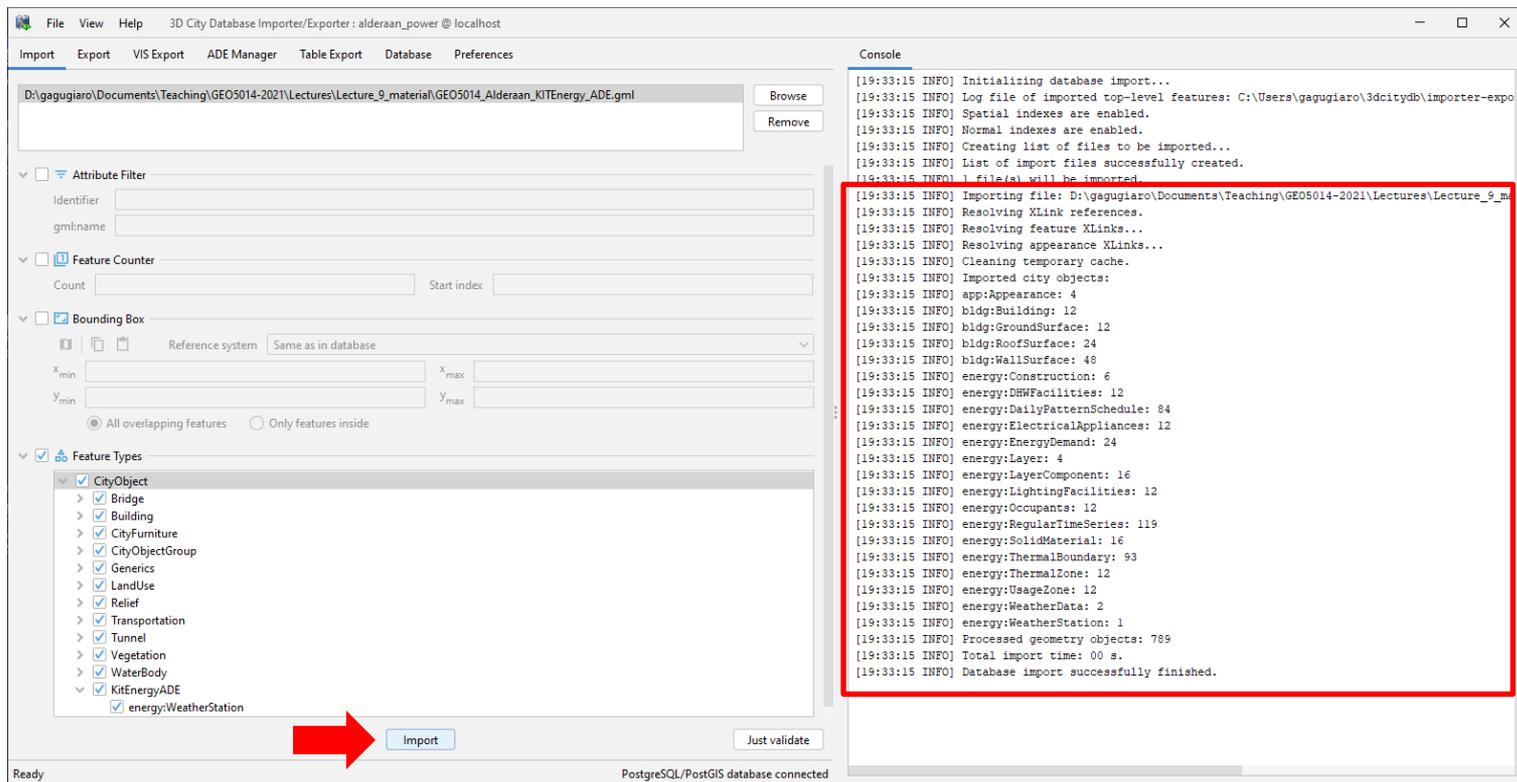
The screenshot shows the '3D City Database Importer/Exporter' application window. The 'ADE Manager' tab is active, displaying a file path: 'D:\gagugiaro\Documents\Teaching\GEO5014-2021\Lectures\Lecture_9_material\GEO5014_Alderaan_KITEnergy_ADE.gml'. Below the path are 'Browse' and 'Remove' buttons. The 'Attribute Filter' section is collapsed. The 'Feature Counter' section is also collapsed. The 'Bounding Box' section is expanded, showing 'Reference system' set to 'Same as in database' and empty input fields for 'x_min', 'x_max', 'y_min', and 'y_max'. The 'Feature Types' section is expanded, showing a list of categories with checkboxes: CityObject (checked), Bridge (checked), Building (checked), CityFurniture (checked), CityObjectGroup (checked), Generics (checked), LandUse (checked), Relief (checked), Transportation (checked), Tunnel (checked), Vegetation (checked), WaterBody (checked), and KitEnergyADE (checked). Under KitEnergyADE, 'energy:WeatherStation' is also checked. At the bottom, there are 'Import' and 'Just validate' buttons. A red arrow points to the 'Just validate' button. The 'Console' window on the right shows the following log output:

```
[19:17:27 INFO] Initializing data validation...
[19:17:27 INFO] Creating list of files to be validated...
[19:17:27 INFO] List of files to be validated successfully created.
[19:17:27 INFO] 1 file(s) will be validated.
[19:17:27 INFO] Validating file: D:\gagugiaro\Documents\Teaching\GEO5014-2021\
[19:17:27 INFO] The file is valid.
[19:17:27 INFO] Total validation time: 00 s.
[19:17:27 INFO] Data validation successfully finished.
```

ADE data import

- To import ADE data into the extended 3DCityDB, the procedure is the same as with non-ADE data via the Import tab

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • **Data import**
 • Data export



The screenshot shows the '3D City Database Importer/Exporter' application window. The 'Import' tab is active, displaying a file selection path: 'D:\gagugiaro\Documents\Teaching\GEO5014-2021\Lectures\Lecture_9_material\GEO5014_Alderaan_KITEnergy_ADE.gml'. Below this, there are sections for 'Attribute Filter', 'Feature Counter', 'Bounding Box', and 'Feature Types'. The 'Feature Types' section is expanded, showing a list of categories with checkboxes, including 'CityObject', 'Bridge', 'Building', 'CityFurniture', 'CityObjectGroup', 'Generics', 'LandUse', 'Relief', 'Transportation', 'Tunnel', 'Vegetation', 'WaterBody', 'KitEnergyADE', and 'energy:WeatherStation'. A red arrow points to the 'Import' button at the bottom right of the main window.

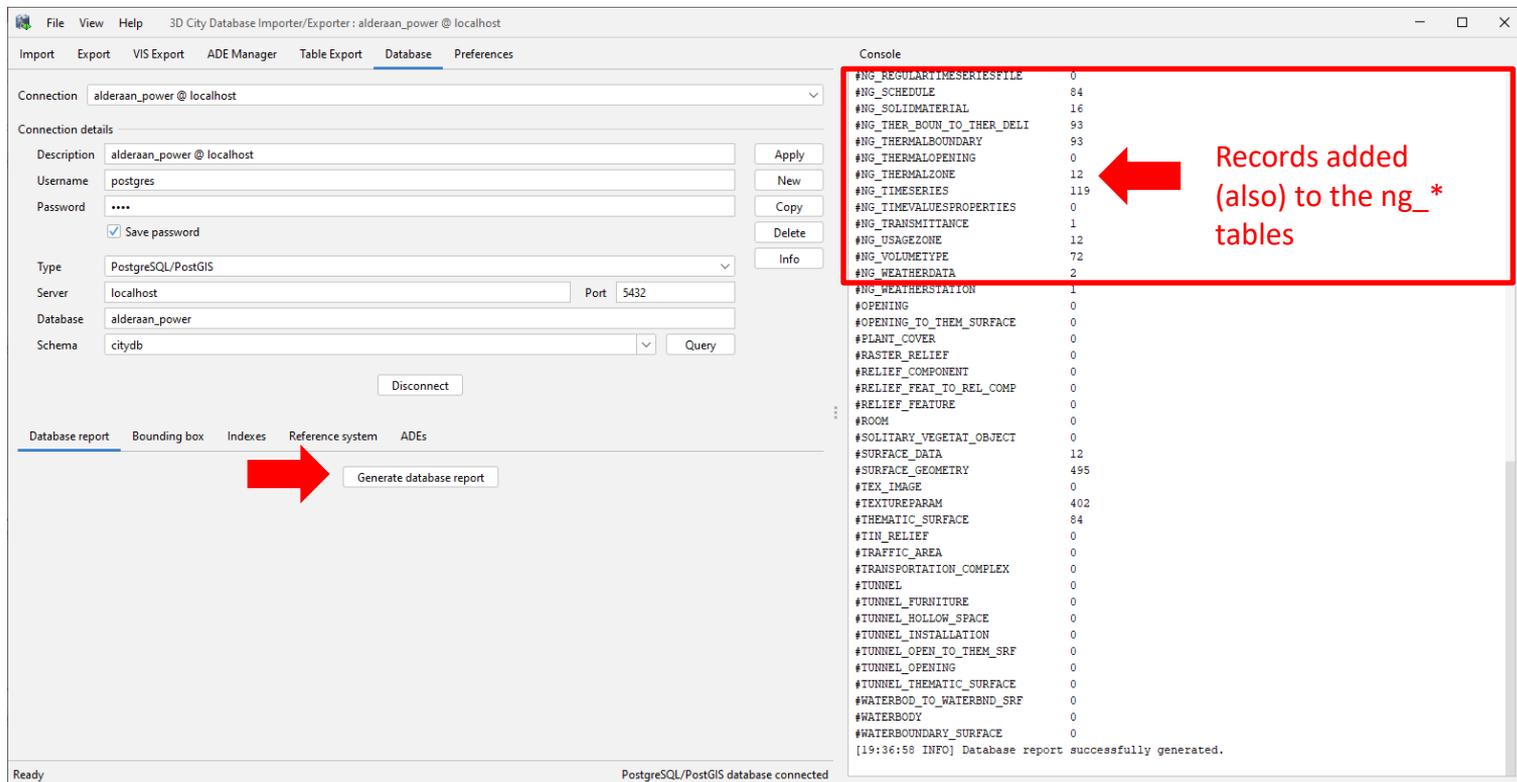
The 'Console' window on the right displays the following log output:

```
[19:33:15 INFO] Initialising database import...
[19:33:15 INFO] Log file of imported top-level features: C:\Users\gagugiaro\3dcitydb\importer-expo
[19:33:15 INFO] Spatial indexes are enabled.
[19:33:15 INFO] Normal indexes are enabled.
[19:33:15 INFO] Creating list of files to be imported...
[19:33:15 INFO] List of import files successfully created.
[19:33:15 INFO] 1 file(s) will be imported.
[19:33:15 INFO] Importing file: D:\gagugiaro\Documents\Teaching\GEO5014-2021\Lectures\Lecture_9_m
[19:33:15 INFO] Resolving XLink references.
[19:33:15 INFO] Resolving feature XLinks...
[19:33:15 INFO] Resolving appearance XLinks...
[19:33:15 INFO] Cleaning temporary cache.
[19:33:15 INFO] Imported city objects:
[19:33:15 INFO] app:Appearance: 4
[19:33:15 INFO] bldg:Building: 12
[19:33:15 INFO] bldg:GroundSurface: 12
[19:33:15 INFO] bldg:RoofSurface: 24
[19:33:15 INFO] bldg:WallSurface: 48
[19:33:15 INFO] energy:Construction: 6
[19:33:15 INFO] energy:DHWFacilities: 12
[19:33:15 INFO] energy:DailyPatternSchedule: 84
[19:33:15 INFO] energy:ElectricalAppliances: 12
[19:33:15 INFO] energy:EnergyDemand: 24
[19:33:15 INFO] energy:Layer: 4
[19:33:15 INFO] energy:LayerComponent: 16
[19:33:15 INFO] energy:LightingFacilities: 12
[19:33:15 INFO] energy:Occupants: 12
[19:33:15 INFO] energy:RegularTimeSeries: 119
[19:33:15 INFO] energy:SolidMaterial: 16
[19:33:15 INFO] energy:ThermalBoundary: 93
[19:33:15 INFO] energy:ThermalZone: 12
[19:33:15 INFO] energy:UsageZone: 12
[19:33:15 INFO] energy:WeatherData: 2
[19:33:15 INFO] energy:WeatherStation: 1
[19:33:15 INFO] Processed geometry objects: 789
[19:33:15 INFO] Total import time: 00 s.
[19:33:15 INFO] Database import successfully finished.
```

ADE data import

- Check also the database report in the database tab!

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • **Data import**
 • Data export



The screenshot shows the '3D City Database Importer/Exporter' application window. The 'Database' tab is active, displaying connection details for 'alderaan_power @ localhost'. A red arrow points to the 'Generate database report' button. The console window on the right shows the output of the database report, listing various tables and their record counts. A red box highlights the top portion of the report, and a red arrow points to it with the text 'Records added (also) to the ng_* tables'.

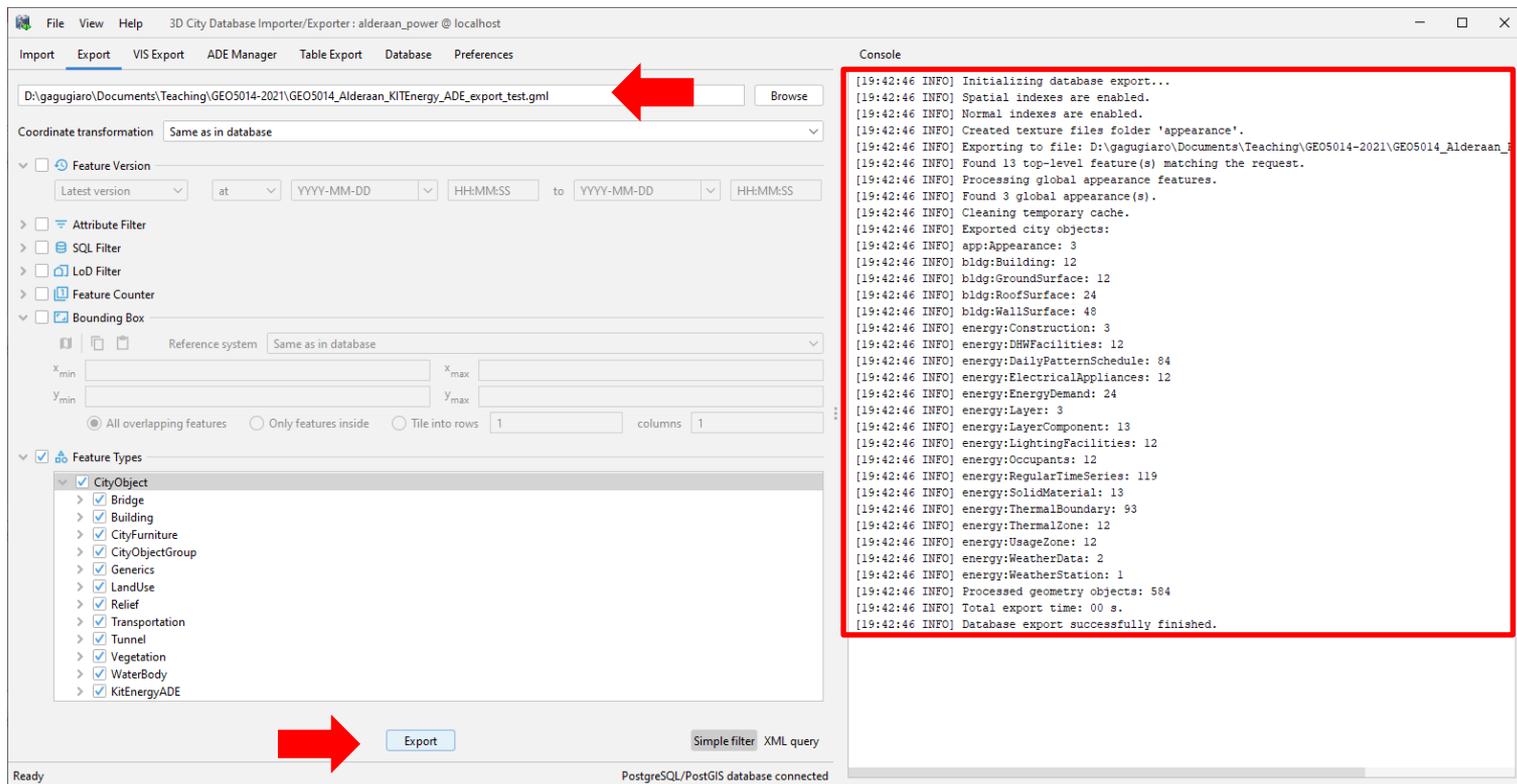
Table Name	Record Count
#NG_REGULARTIMESERIESFILE	0
#NG_SCHEDULE	84
#NG_SOLIDMATERIAL	16
#NG_THER_BOUN_TO_THER_DELI	93
#NG_THERMALBOUNDARY	93
#NG_THERMALOPENING	0
#NG_THERMALZONE	12
#NG_TIMESERIES	119
#NG_TIMEVALUESPROPERTIES	0
#NG_TRANSMITTANCE	1
#NG_USAGEZONE	12
#NG_VOLUMETYPE	72
#NG_WEATHERDATA	2
#NG_WEATHERSTATION	1
#OPENING	0
#OPENING_TO_THEM_SURFACE	0
#PLANT_COVER	0
#RASTER_RELIEF	0
#RELIEF_COMPONENT	0
#RELIEF_FEAT_TO_REL_COMP	0
#RELIEF_FEATURE	0
#ROOM	0
#SOLITARY_VEGETAT_OBJECT	0
#SURFACE_DATA	12
#SURFACE_GEOMETRY	495
#TEX_IMAGE	0
#TEXTUREPARAM	402
#THEMATIC_SURFACE	84
#TIN_RELIEF	0
#TRAFFIC_AREA	0
#TRANSPORTATION_COMPLEX	0
#TUNNEL	0
#TUNNEL_FURNITURE	0
#TUNNEL_HOLLOW_SPACE	0
#TUNNEL_INSTALLATION	0
#TUNNEL_OPEN_TO_THEM_SRF	0
#TUNNEL_OPENING	0
#TUNNEL_THEMATIC_SURFACE	0
#WATERBOD_TO_WATERBND_SRF	0
#WATERBODY	0
#WATERBOUNDARY_SURFACE	0

[19:36:58 INFO] Database report successfully generated.

ADE data export

- Conceptually analogous to the procedure without ADE content. Simply choose what to export, and run the exporter!

Software required
 Software install
 Database setup
 Imp/Exp connection
 Additional schemas
ADE plug-ins
 • Installation
 • Data import
 • Data export



The screenshot shows the '3D City Database Importer/Exporter' application window. The 'Export' tab is active, and the file path is set to 'D:\gagugiaro\Documents\Teaching\GEO5014-2021\GEO5014_Alderaan_KITEnergy_ADE_export_test.gml'. A red arrow points to the file path field. The 'Feature Types' section is expanded, showing a list of categories with checkboxes, all of which are checked. A red arrow points to the 'Export' button at the bottom right. The 'Console' window on the right displays a log of the export process, with a red box highlighting the text:

```
[19:42:46 INFO] Initializing database export...
[19:42:46 INFO] Spatial indexes are enabled.
[19:42:46 INFO] Normal indexes are enabled.
[19:42:46 INFO] Created texture files folder 'appearance'.
[19:42:46 INFO] Exporting to file: D:\gagugiaro\Documents\Teaching\GEO5014-2021\GEO5014_Alderaan_...
[19:42:46 INFO] Found 13 top-level feature(s) matching the request.
[19:42:46 INFO] Processing global appearance features.
[19:42:46 INFO] Found 3 global appearance(s).
[19:42:46 INFO] Cleaning temporary cache.
[19:42:46 INFO] Exported city objects:
[19:42:46 INFO] app:Appearance: 3
[19:42:46 INFO] bldg:Building: 12
[19:42:46 INFO] bldg:GroundSurface: 12
[19:42:46 INFO] bldg:RoofSurface: 24
[19:42:46 INFO] bldg:WallSurface: 48
[19:42:46 INFO] energy:Construction: 3
[19:42:46 INFO] energy:DHWFacilities: 12
[19:42:46 INFO] energy:DailyPatternSchedule: 84
[19:42:46 INFO] energy:ElectricalAppliances: 12
[19:42:46 INFO] energy:EnergyDemand: 24
[19:42:46 INFO] energy:Layer: 3
[19:42:46 INFO] energy:LayerComponent: 13
[19:42:46 INFO] energy:LightingFacilities: 12
[19:42:46 INFO] energy:Occupants: 12
[19:42:46 INFO] energy:RegularTimeSeries: 119
[19:42:46 INFO] energy:SolidMaterial: 13
[19:42:46 INFO] energy:ThermalBoundary: 93
[19:42:46 INFO] energy:ThermalZone: 12
[19:42:46 INFO] energy:UsageZone: 12
[19:42:46 INFO] energy:WeatherData: 2
[19:42:46 INFO] energy:WeatherStation: 1
[19:42:46 INFO] Processed geometry objects: 584
[19:42:46 INFO] Total export time: 00 s.
[19:42:46 INFO] Database export successfully finished.
```

Further resources

- For further information, check the official 3DCityDB documentation regarding the installation procedure details
- **Online documentation**
 - <https://3dcitydb-docs.readthedocs.io/en/latest/>
- **Online tutorial by TU Munich**
 - <https://github.com/3dcitydb/tutorials>

Software required
PostgreSQL
3DCityDB
Further resources

Thank you for your attention!



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