

Geospatial Ducks

DuckDB in practice

An embeded, analytical DB for all.

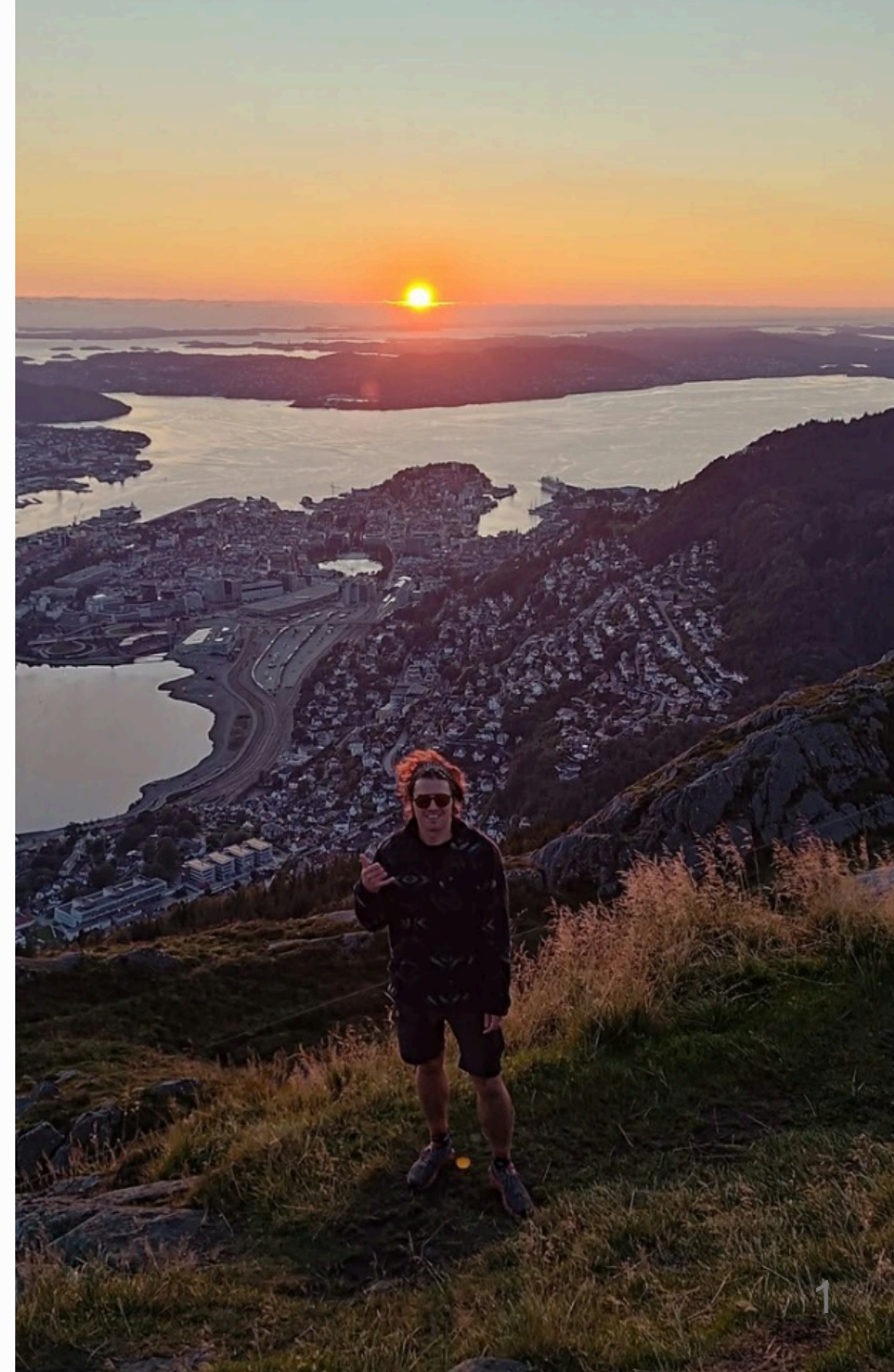
Bergen Open Source 2026

© Simon Šanca



\$ whoami

- Simon, MSc in Geodesy and Geoinformation,
- not an IT-guy, just trying to get by,
- PhDropped, Dr. Almost in CS,
- destroying my posture at UiB ITA since 2024,
- **Linux Platform Team ~ DataOPS,**
- when life gets tough: Ulriken or the airport,
- I like foxes, Pinot Noir, movement and reading.



outline

1. DuckDB - yet another DB.
2. Geospatial data, what is that?
3. QGIS
4. DuckDB spatial
5. (Geo)data analytics - examples
6. Resources to learn more
7. Q / A
8. Beer(s) and Peking duck(s)

DuckDB

Great docs: <https://duckdb.org/docs/2.0/>

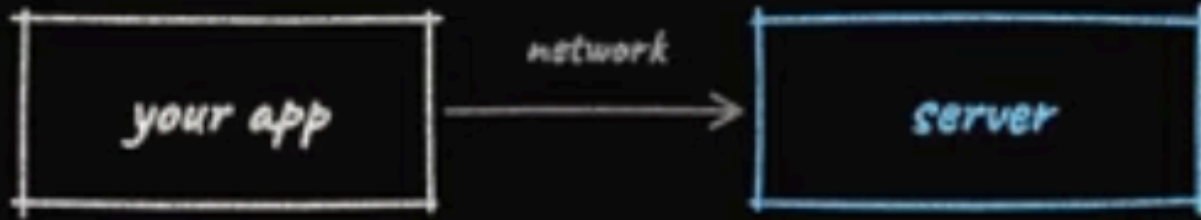
[Quack Remote Protocol](#): client-server over HTTP.

DuckDB 2.0.0 LTS - "Cinnamon Teal"

- Developed in 2019 in the Netherlands       .
- v1.0.0 released in 2024.
- 2.0.0, just released 21. 10. 2026.
- **Long-term support:** LTS releases receive community support for at least one year; DuckDB 2.0 is supported until at least **October 2027**.
- **New capabilities:** SQL triggers, `VARIANT`, `CONNECT` for remote DuckDB databases, asynchronous Parquet/CSV I/O, and CLI agent mode.

SQL analytics without running a DB server

- **In-process OLAP analytical** — runs inside your application, CLI, or notebook;
- no separate server to install or manage, makes life easier.
- **Query files directly** — read CSV, JSON, Parquet, and Iceberg locally.
- **No administration needed for simple use** - no forgotten passwords.
- **Columnar and vectorized** — optimized for aggregations, joins, filters, and analytical scans.
- **PostgreSQL inspired** with practical analytics features: `PIVOT`, `ASOF JOIN` .
- **Portable and extensible** - API support: C++, Python, R, Rust, Julia, Go, ...



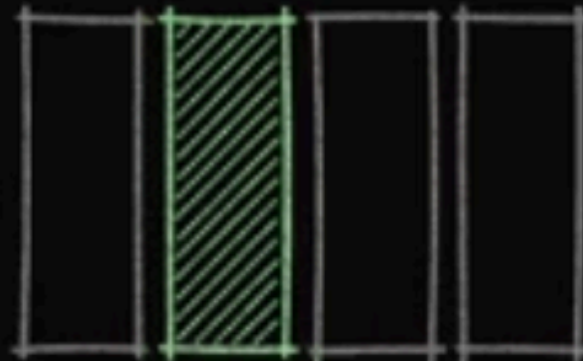
a server



no server

a library, like SQLite

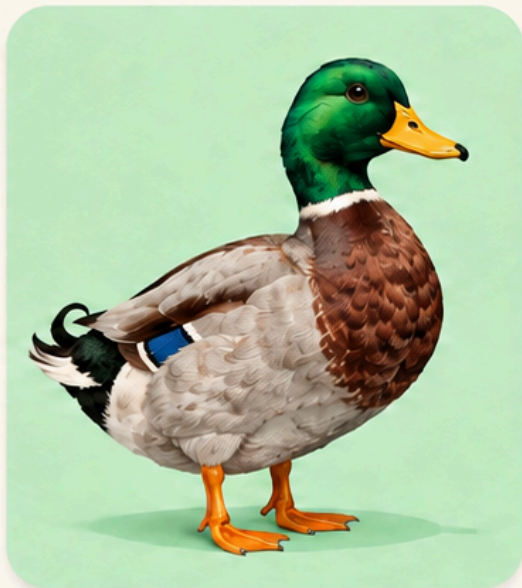
built for analytics



reads one column



SQL directly on the file



Simple



Free



Fast



Feature-rich

Installation

```
$ curl https://install.duckdb.org | bash
```

```
*** DuckDB Linux/macOS installation script, version 2.0.0 ***
```

```
    .;odxdl,  
    .XXXXXXXXXXKc  
0XXXXXXXXXXXXd    c000:  
,XXXXXXXXXXXXXK    0XXXXd  
0XXXXXXXXXXXXXo    c000:  
    .XXXXXXXXXXKc  
    .;odxdl,
```

```
Successfully installed DuckDB 2.0.0 to /home/simon/.duckdb/cli/2.0.0/duckdb
```

```
$ duckdb --version  
v2.0.0 2c861e24f4
```

~ 🦊 \$ duckdb

DuckDB v2.0.0 (Cyanoptera)

Enter ".help" for usage hints.

memory D select 'DuckDB' as database, count(*) as ducks from range(10000);

database varchar	ducks int64
DuckDB	10000

memory D select today() - '2026-01-01'::DATE as days_after_new_year;

days_after_new_year int64
294

memory D select 1 + 1 as basic_math, 'Still not enough beer on a Friday evening.' as conclusion;

basic_math int32	conclusion varchar
2	Still not enough beer on a Friday evening.

memory D █

data wrangling - CLI

workflow

1. Start with a simple shell script.
2. Evolve it into a complex one.
3. Rewrite the script with Python; pandas, polars, ...

You can do this with DuckDB too.

- `PIVOT` - take a long table, convert it into a wide table.

Unix	SQL
<code>cut</code>	<code>SELECT</code>
<code>grep</code>	<code>WHERE</code>
<code>sort</code>	<code>ORDER BY</code>
<code>sort -u</code>	<code>DISTINCT</code>
<code>wc -l</code>	<code>count(*)</code>
<code>cat</code>	<code>UNION ALL</code>
<code>head</code>	<code>LIMIT</code>
<code>paste</code>	<code>POSITIONAL JOIN</code>
<code>comm -12</code>	<code>INTERSECT ALL</code>
<code>comm -23</code>	<code>EXCEPT ALL</code>

Geospatial data

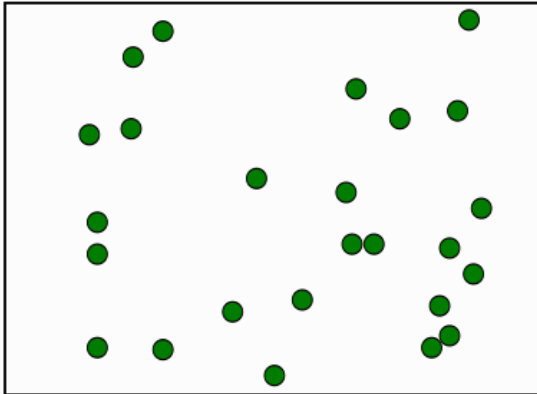
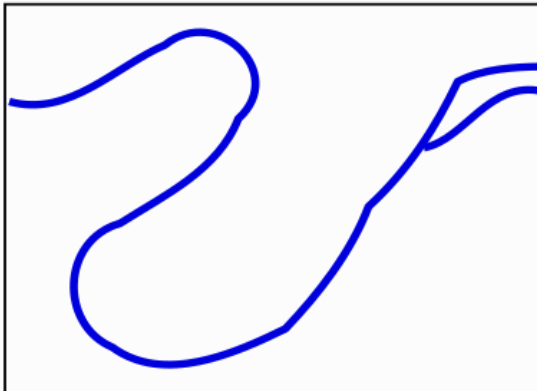
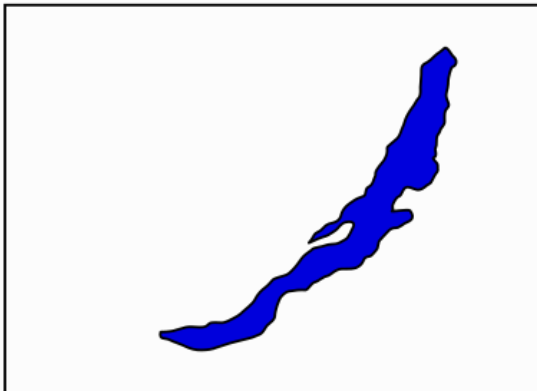
Data tied to a specific location on (or near) the Earth's surface, usually using **location** with **coordinates** - **P(X,Y)**, **attributes** and **time**.

- **raster data** - including aerial, satellite, drone images, DEMs.
- **vector data** - points, lines, polygons.

[GDAL - Geospatial Data Abstraction Library](#): open-source, the Holy Grail  translator library for geospatial data.

DuckDB has support for geospatial data by simply installing the spatial extension.

```
$ install spatial;  
$ load spatial;
```

Primitive	Feature	Representation	Attributes																								
Points			<table><thead><tr><th>ID</th><th>HEIGHT</th><th>DIAMETER</th></tr></thead><tbody><tr><td>1</td><td>17.5</td><td>35</td></tr><tr><td>2</td><td>22</td><td>45.6</td></tr><tr><td>3</td><td>15</td><td>27.2</td></tr><tr><td>4</td><td>19.7</td><td>36.1</td></tr><tr><td>.</td><td></td><td></td></tr><tr><td>.</td><td></td><td></td></tr><tr><td>.</td><td></td><td></td></tr></tbody></table>	ID	HEIGHT	DIAMETER	1	17.5	35	2	22	45.6	3	15	27.2	4	19.7	36.1	.			.			.		
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QGIS - open-source desktop GIS

- **Explore geospatial data** — work with vector layers, raster imagery, terrain models, and point clouds.
- **Manipulate data** — digitise points, lines, and polygons.
- **Spatial analysis** — buffers, overlays, spatial joins, etc.
- **Automate workflows** — model designer, batch processing, Python, and plugins.
- **QDuckDB plugin:**
 - <https://plugins.qgis.org/plugins/qduckdb/>
 - reads DuckDB databases and displays their tables as layers in QGIS.

DuckDB Spatial

https://duckdb.org/docs/2.0/core_extensions/spatial/functions

- **Read spatial files** — GeoJSON, Shapefile, and GeoPackage via GDAL.
- **Analyze geometries** — calculate areas, distances, buffers, and intersections.
- **Transform coordinates** — convert between coordinate reference systems.
- **Combine datasets** — spatial joins alongside standard SQL analytics.

Simple spatial example - draw a Polygon around Bryggen

- `ST_Point(x, y)` creates a single two-dimensional point geometry.
- `ST_ConvexHull` - returns the convex hull enclosing the input geometry.
- export the tables as two separate GPKG files.

```
~/Documents/duckdb 🦊 $ duckdb bryggen.duckdb;
DuckDB v2.0.0 (Cyanoptera)
Enter ".help" for usage hints.
bryggen D show tables;

  name
  varchar

0 rows
bryggen D create table bryggen_area ( point_id integer, description varchar, geom geometry);
```

```
bryggen D load spatial;
bryggen D insert into bryggen_area values (1, 'NW', ST_Point(5.322, 60.389));
bryggen D insert into bryggen_area values (2, 'NE', ST_Point(5.341, 60.397));
bryggen D insert into bryggen_area values (3, 'SW', ST_Point(5.310, 60.401));
bryggen D insert into bryggen_area values (4, 'SE', ST_Point(5.355, 60.392));
bryggen D
bryggen D
bryggen D
bryggen D
bryggen D create table bryggen_grense as select 'Bryggen' AS area_name, ST_ConvexHull(ST_Union_Agg(geom)) as geom from bryggen_area;
bryggen D select area_name ST_AsText(geom) as boundary_wkt from bryggen_grense;
```

```
bryggen D
bryggen D select area_name, ST_AsText(geom) as boundary_wkt from bryggen_grense;
```

area_name varchar	boundary_wkt varchar
Bryggen	POLYGON ((5.322 60.389, 5.31 60.401, 5.341 60.397, 5.355 60.392, 5.322 60.389))

```
bryggen D
```

```

bryggen D set geometry_always_xy = true;
bryggen D copy (
    select
        point_id,
        description,
        geom
    from bryggen_area
)
to 'bryggen_points.gpkg'
with (
    format gdal,
    driver 'gpkg',
    srs 'epsg:4326',
    layer_creation_options 'write_bbox=yes'
);
bryggen D copy (
    select
        area_name,
        geom
    from bryggen_grense
)
to 'bryggen_grense.gpkg'
with (
    format gdal,
    driver 'gpkg',
    srs 'epsg:4326',
    layer_creation_options 'write_bbox=yes'
);
bryggen D show tables;

```

name varchar
bryggen_area bryggen_grense

```

bryggen D

```

Plugins | Installed (15)

All

Installed

Not installed

Install from ZIP

Settings

duck

☒

 QDuckDB

QDuckDB

This plugin adds a new data provider that can read DuckDB databases and display their tables as a layer in QGIS.

Plugin for using DuckDB databases in QGIS.

If you're running on Windows, this plugin comes with the necessary version of duckdb, so you don't have to install by yourself. Two things you may know:

- it's neither more nor less than the same version you could have installed with a 'pip install' (but we know how complicated that is in the Python environment of QGIS on Windows)
- the library is installed in a subdirectory of the plugin, which means that it is only activated when the plugin itself is activated.

You can get [more information in the documentation](#).

★★★★★

0 rating vote(s), 38379 downloads

Category

Database

Tags

[duckdb](#), [database](#), [parquet](#), [sql](#), [overture](#), [insee-fr](#)

More info

[homepage](#) [bug tracker](#) [code repository](#)

Author

[Florent Fougères \(Oslandia\)](#), [Jean Felder \(Oslandia\)](#), [Julien Moura \(Oslandia\)](#)

Installed version

2.3.1

Available version (stable)

2.3.1 updated at 10.07.2026 19:11 CEST

Changelog

Version 2.3.1:

- Fix bandit error !244

Version 2.3.0:

- Improvements to unit tests !227 !229 !230
- Support for the STRUCT column type !224
- Bump to DuckDB version 1.5.4 !239

Upgrade All

Uninstall Plugin

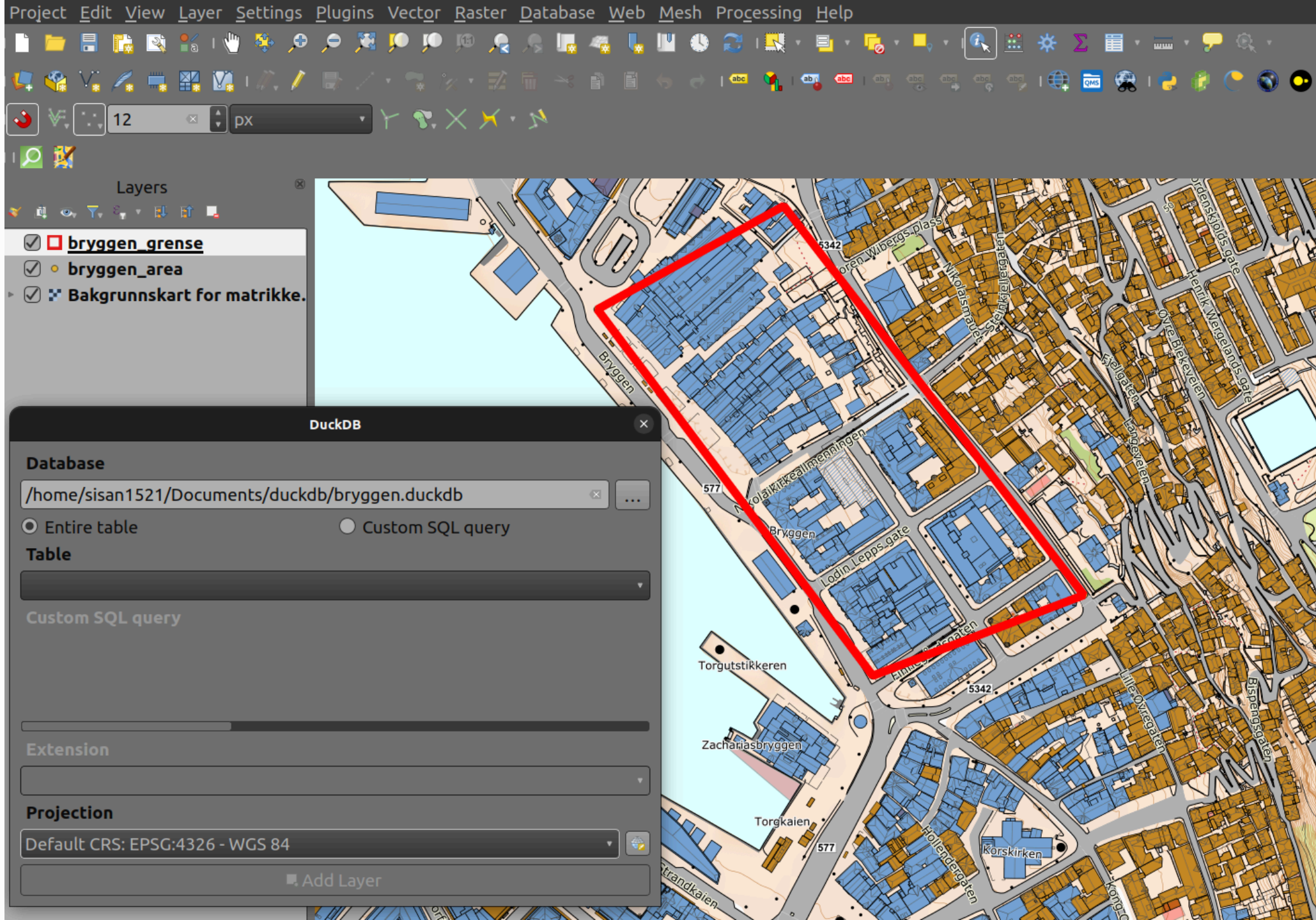
Reinstall Plugin

Help

Close

© S. Š.

16



(Geo)data Analytics

We will explore two datasets:

1. [Crime rates in Norway](#)
2. [New York City Taxi data](#)

If we will run out of time you can run them at home.



Resources to learn about DuckDB

- Spatial Data Management with DuckDB: <https://duckdb.gishub.org/>
- DuckDB blog: <https://duckdb.org/news/>
- DBQuacks: <https://dbquacks.com/>
- Motherduck: <https://motherduck.com/>

Q / A



