

TY B.Tech. (CSE) – II [2022-23]

5CS372: Advanced Database System Lab.

Assignment No. 12

Name : Megha Jivanagi

PRN : 2020BTECS00067

Batch : T3

Branch: T.Y CSE

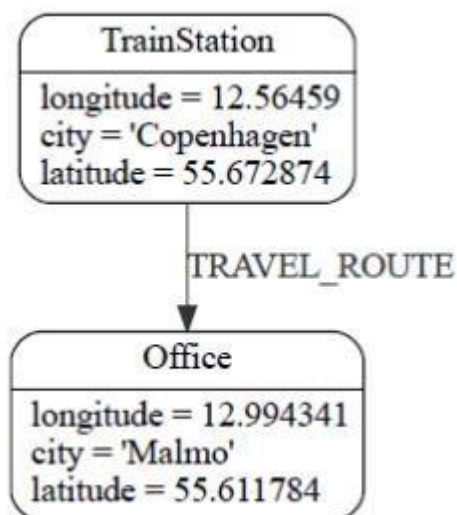
Spatial and Geographic Data

Geospatial is the natural domain for Graph Database Use Neo4j and Neo4j Spatial Problem

Statement : Finding Things Close to Other Things.

Task :

1. Use Neo4j graph database installed in previous assignments.
2. Install/configure Neo4jSpatial (<https://github.com/neo4jcontrib/spatial>) from GitHub. It is the Neo4j plug-in that facilitates geospatial operations on data stored in Neo4j.
3. Write CQL (Cypher Query Language) script to add randomly 10,000 location points as follows. Assume any data.

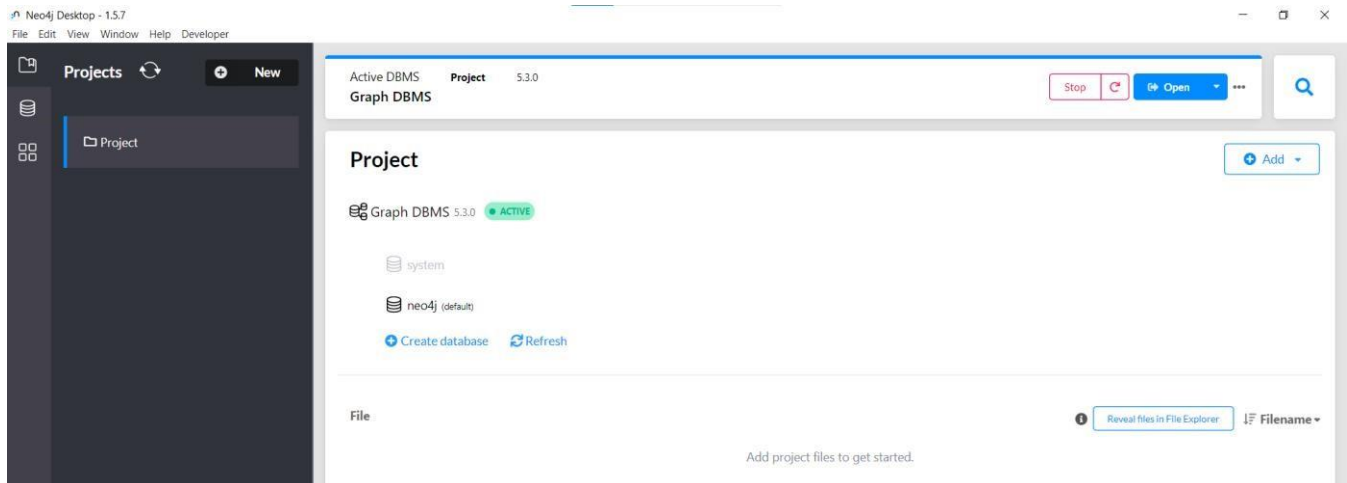


4. Use the point() , distance() function of Neo4j to answer the queries “which things close/nearest to which other things”.
5. Demonstrate the result by firing different cypher queries (write CQL statement Application in :

location-based services on the web

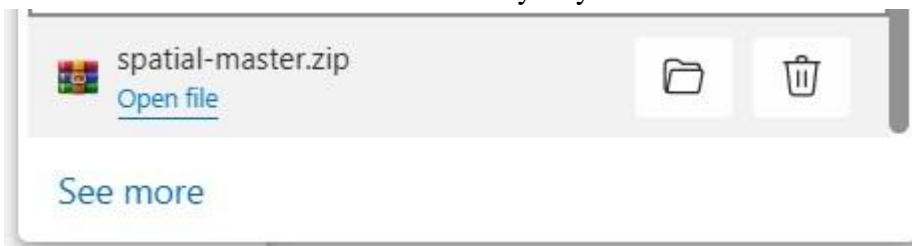
Task

1:

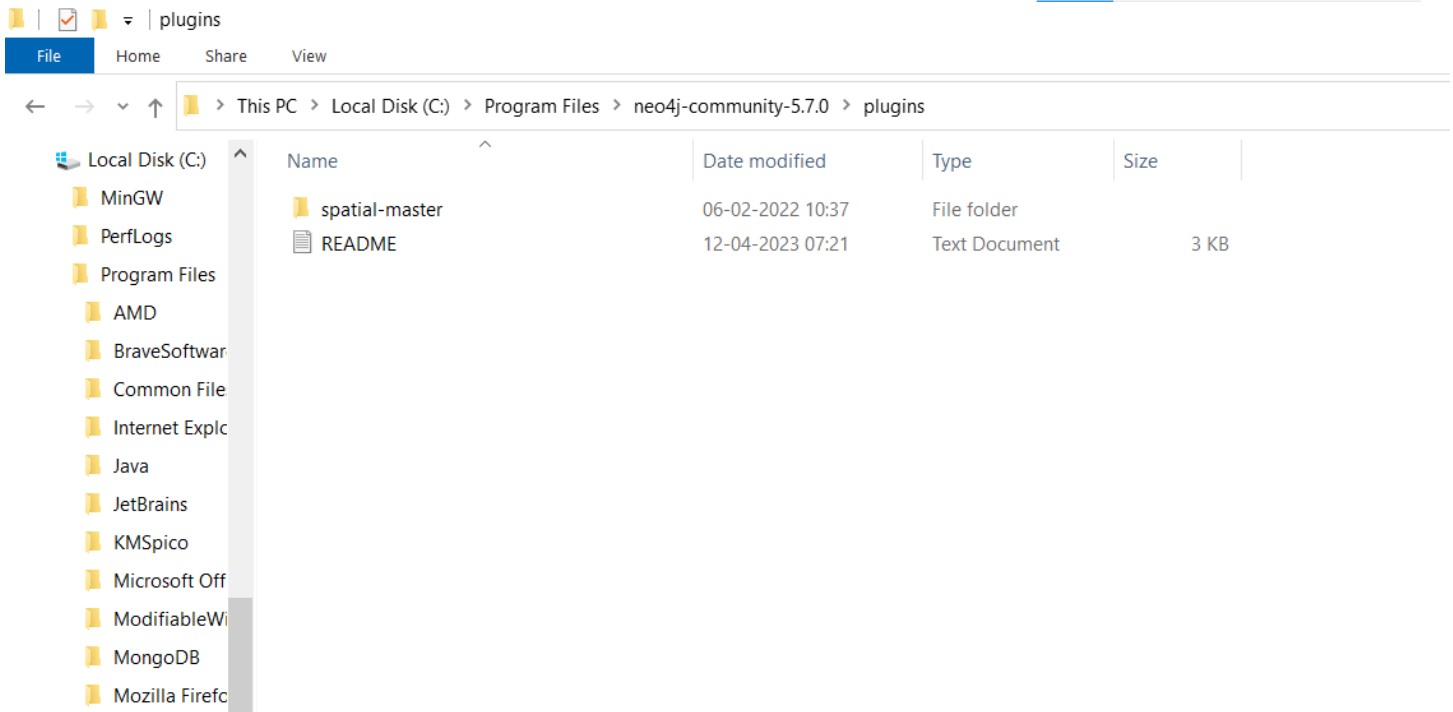


2. Configuration of the Neospatial master

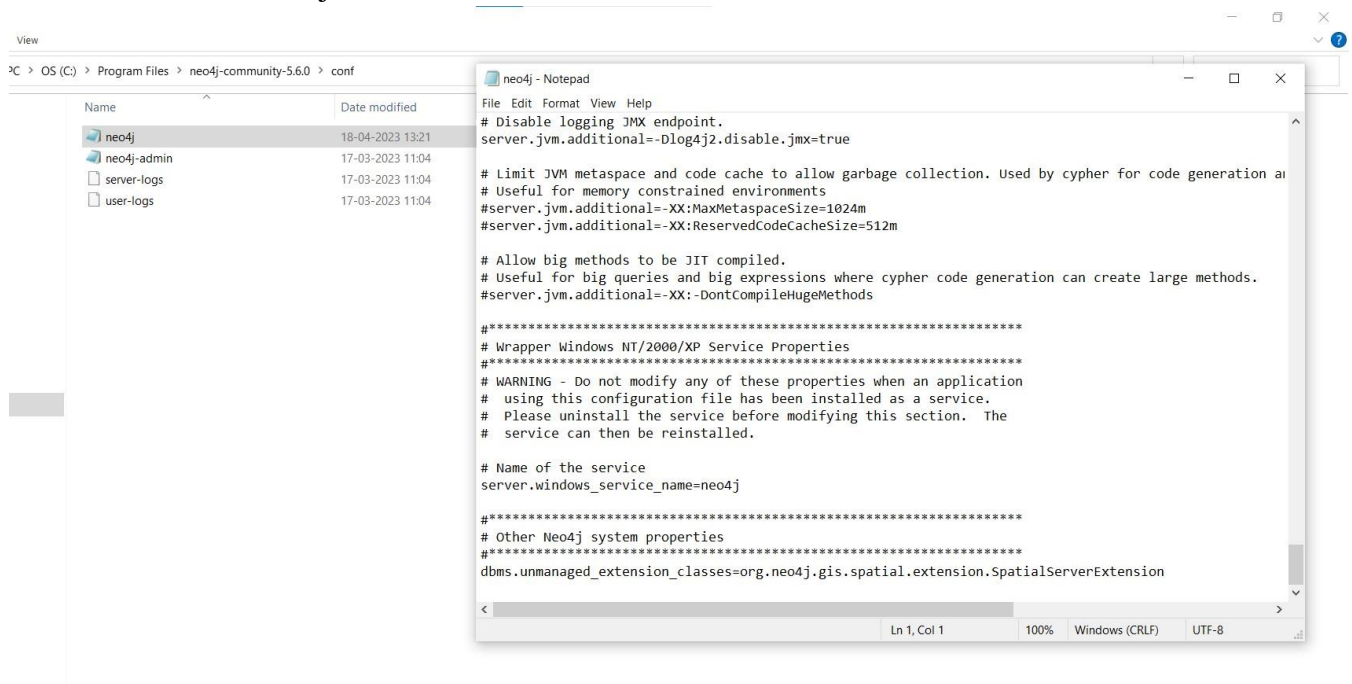
- Download Neo4jSpatial from GitHub at <https://github.com/neo4j-contrib/spatial/releases>.
- You can download the latest release or a specific version that you want to use.
- Extract the downloaded file to a directory of your choice.



- Copy the extracted "neo4j-spatial-" directory to the "plugins" directory of your Neo4j installation.
- This directory is typically located at "neo4j-installation-directory/plugins/".



- Open the "neo4j.conf" file located in the "conf" directory of your Neo4j installation.
- Add the following line to the end of the file:
- Copy code
- `dbms.unmanaged_extension_classes=org.neo4j.gis.spatial.extension.SpatialServerExtension` •
This line enables the SpatialServerExtension, which provides the REST API for Neo4jSpatial.
- Save and close the "neo4j.conf" file.



```

neo4j - Notepad
File Edit Format View Help
# Disable logging JMX endpoint.
server.jvm.additional=-Dlog4j2.disable.jmx=true

# Limit JVM metaspace and code cache to allow garbage collection. Used by cypher for code generation at
# Useful for memory constrained environments
#server.jvm.additional=-XX:MaxMetaspaceSize=1024m
#server.jvm.additional=-XX:ReservedCodeCacheSize=512m

# Allow big methods to be JIT compiled.
# Useful for big queries and big expressions where cypher code generation can create large methods.
#server.jvm.additional=-XX:-DontCompileHugeMethods

# *****
# Wrapper Windows NT/2000/XP Service Properties
# *****
# WARNING - Do not modify any of these properties when an application
# using this configuration file has been installed as a service.
# Please uninstall the service before modifying this section. The
# service can then be reinstalled.

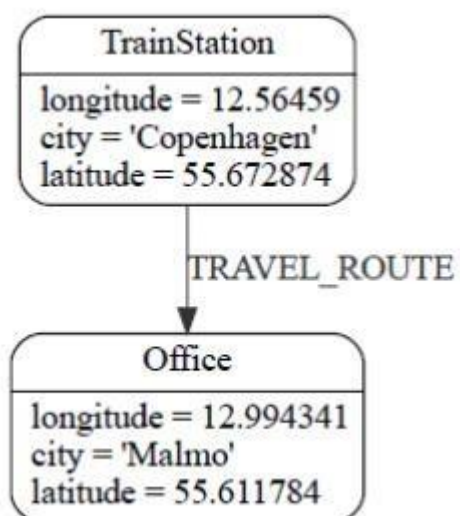
# Name of the service
server.windows_service_name=neo4j

# *****
# Other Neo4j system properties
# *****
dbms.unmanaged_extension_classes=org.neo4j.gis.spatial.extension.SpatialServerExtension

```

- Restart Neo4j to apply the changes.

3. Write CQL (Cypher Query Language) script to add randomly 10,000 location points as follows.
Assume any data.



Cypher script :

```
// Create 10,000 Train Station nodes
```

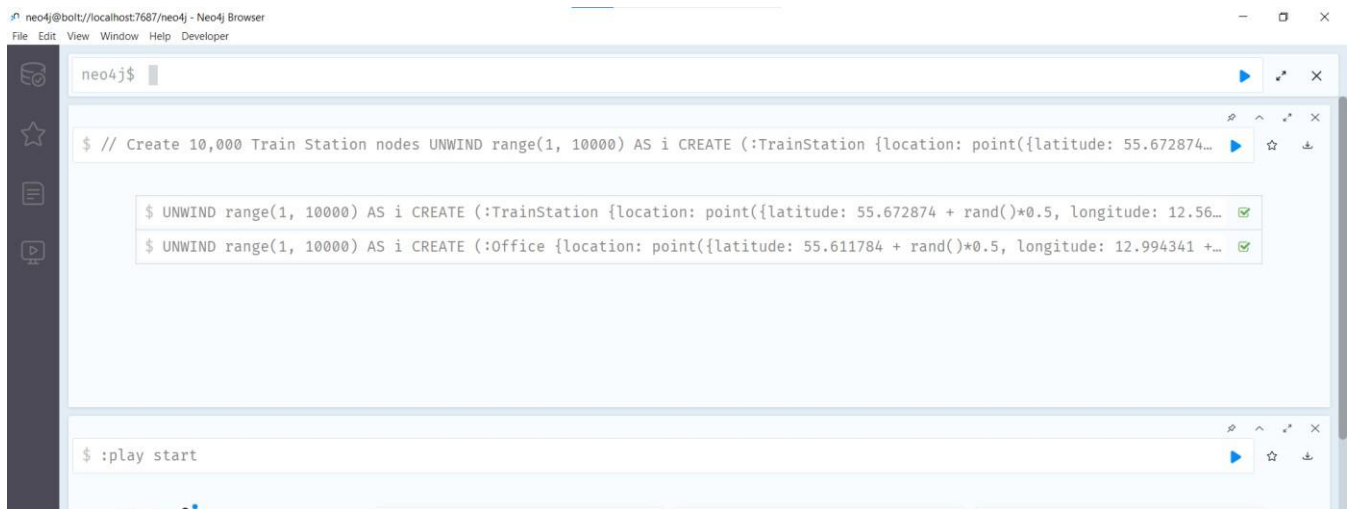
```
UNWIND range(1, 10000) AS i
```

```
CREATE (:TrainStation {location: point({latitude: 55.672874 + rand()*0.5, longitude: 12.56459 +  
rand()*0.5}), city: 'Copenhagen'});
```

```
// Create 10,000 Office nodes
```

```
UNWIND range(1, 10000) AS i
```

```
CREATE (:Office {location: point({latitude: 55.611784 + rand()*0.5, longitude: 12.994341 +  
rand()*0.5}), city: 'Malmo'});
```



4. Use the `point()` , `distance()` function of Neo4j to answer the queries “which things close/nearest to which other things”.

5. Demonstrate the result by firing different cypher queries (write CQL statement)

1. Find the nearest train station to each office in Malmo:

neo4j@bolt://localhost:7687/neo4j - Neo4j Browser

File Edit View Window Help Developer

neo4j\$

```
1 MATCH (o:Office {city: 'Malmo'})
2 MATCH (t:TrainStation {city: 'Copenhagen'})
3 RETURN o, t
4 ORDER BY point.distance(o.location, t.location)
5 LIMIT 100
```

o	t
(:Office {city: "Malmo",location: point((srid:4326, x:13.016732287894044, y:55.79982195584575))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.016694295389103, y:55.799722061282885))})
(:Office {city: "Malmo",location: point((srid:4326, x:13.034241649549434, y:55.9028790956404))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.034416978013777, y:55.90291769776662))})
(:Office {city: "Malmo",location: point((srid:4326, x:12.994909395478162, y:56.042385167108755))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:12.994835061602862, y:56.04251237010324))})
(:Office {city: "Malmo",location: point((srid:4326, x:13.008316013380696, y:55.98087059969795))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.00856954783194, y:55.98087146353818))})
(:Office {city: "Malmo",location: point((srid:4326, x:13.001428598486022, y:55.90161301381432))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.00138175795822, y:55.901758771110046))})
(:Office {city: "Malmo",location: point((srid:4326, x:13.006870146195926, y:55.722659498868815))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.007143732515232, y:55.722639878073224))})
(:Office {city: "Malmo",location: point((srid:4326, x:13.00507194237406, y:55.04114660660311))})	(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.0057637561364, y:55.04076440007311))})

MAX COLUMN WIDTH: 100

2. Find the closest Office to each Train Station in Copenhagen:

neo4j@bolt://localhost:7687/neo4j - Neo4j Browser

File Edit View Window Help Developer

neo4j\$

```
1 MATCH (t:TrainStation {city: 'Copenhagen'})
2 MATCH (o:Office {city: 'Malmo'})
3 RETURN t, o
4 ORDER BY point.distance(t.location, o.location)
5 LIMIT 50
6
```

t	o
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.016694295389103, y:55.799722061282885))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.016732287894044, y:55.79982195584575))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.034416978013777, y:55.90291769776662))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.034241649549434, y:55.9028790956404))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:12.994835061602862, y:56.04251237010324))})	(:Office {city: "Malmo",location: point((srid:4326, x:12.994909395478162, y:56.042385167108755))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.00856954783194, y:55.98087146353818))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.008316013380696, y:55.98087059969795))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.00138175795822, y:55.901758771110046))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.001428598486022, y:55.90161301381432))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.007143732515232, y:55.722639878073224))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.006870146195926, y:55.722659498868815))})
(:TrainStation {city: "Copenhagen",location: point((srid:4326, x:13.0057637561364, y:55.04076440007311))})	(:Office {city: "Malmo",location: point((srid:4326, x:13.00507194237406, y:55.04114660660311))})

MAX COLUMN WIDTH: 100

3. Find the closest Office to each other Office in Malmo.

neo4j@bolt://localhost:7687/neo4j - Neo4j Browser

File Edit View Window Help Developer

neo4j\$

```
1
2 MATCH (o1:Office {city: 'Malmo'})
3 MATCH (o2:Office {city: 'Malmo'})
4 WHERE o1 < o2
5 RETURN o1, o2
6 ORDER BY point.distance(o1.location, o2.location)
7 LIMIT 50
8
```

o1	o2
{:Office (city: "Malmo",location: point({srid:4326, x:13.2676899791225, y:55.87239031172561}))}	{:Office (city: "Malmo",location: point({srid:4326, x:13.2676899791225, y:55.87239031172561}))}
{:Office (city: "Malmo",location: point({srid:4326, x:13.2676899791225, y:55.87239031172561}))}	{:Office (city: "Malmo",location: point({srid:4326, x:13.2676899791225, y:55.87239031172561}))}
{:Office (city: "Malmo",location: point({srid:4326, x:12.9959606486067, y:55.89952577914258}))}	{:Office (city: "Malmo",location: point({srid:4326, x:12.9959606486067, y:55.89952577914258}))}
{:Office (city: "Malmo",location: point({srid:4326, x:12.9959606486067, y:55.89952577914258}))}	{:Office (city: "Malmo",location: point({srid:4326, x:12.9959606486067, y:55.89952577914258}))}
{:Office (city: "Malmo",location: point({srid:4326, x:13.3210717351557, y:55.71544114334308}))}	{:Office (city: "Malmo",location: point({srid:4326, x:13.3210717351557, y:55.71544114334308}))}
{:Office (city: "Malmo",location: point({srid:4326, x:13.3210717351557, y:55.71544114334308}))}	{:Office (city: "Malmo",location: point({srid:4326, x:13.3210717351557, y:55.71544114334308}))}
{:Office (city: "Malmo",location: point({srid:4326, x:13.4903765583352, y:55.7000150522607011}))}	{:Office (city: "Malmo",location: point({srid:4326, x:13.4903765583352, y:55.7000150522607011}))}

MAX COLUMN WIDTH: 1000

