Date:14.04.2022

Third Year B. Tech., Sem VI 2021-22

4CS372 : Advanced Database System Lab

Assignment Submission

PRN No: 2019BTECS00064

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Batch: T2

Assignment: 11 A

Title of assignment: Demonstrate Neo4j Clustering

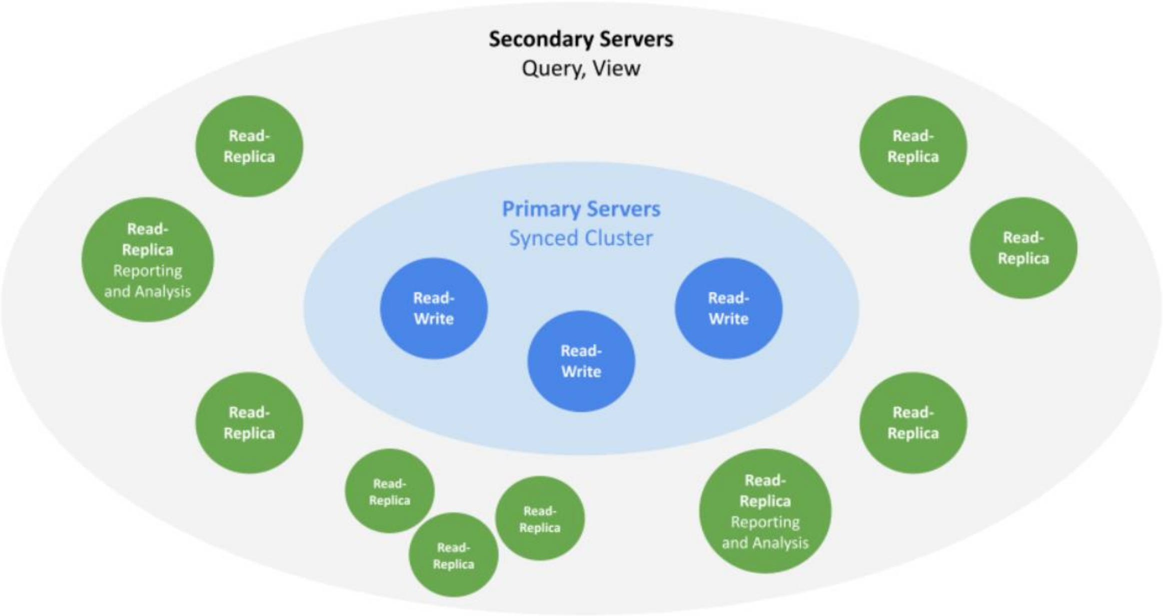
Objective:

1. Setup a multi-node Neo4j Cluster (Take 3 machine in lab or on single machine).
2. Deploy “Northwind” example database in above cluster.
3. Design a python GUI client to perform CRUD operations on “Customers” table of “Northwind” database. Demonstrate by connecting this client to any one node and automatically updating the data in other nodes.

Introduction & Theory:

Neo4j Casual Clustering provides three main features:

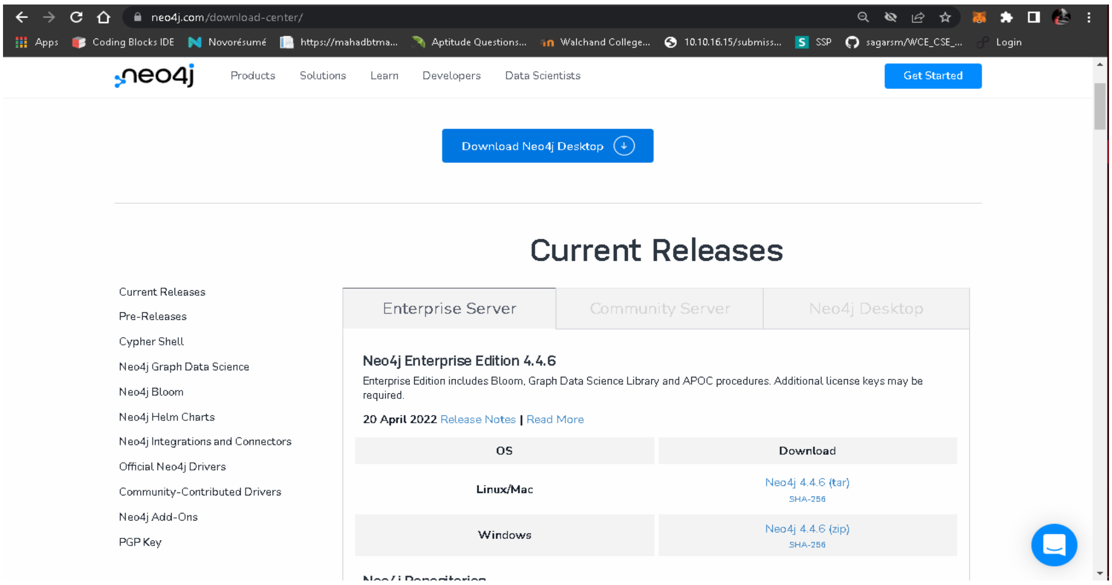
1. Safety: Core Servers provide a fault tolerant platform for transaction processing which will remain available while a simple majority of those Core Servers are functioning.
2. Scale: Read Replicas provide a massively scalable platform for graph queries that enables very large graph workloads to be executed in a widely distributed topology.
3. Casual consistency: When invoked, a client application is guaranteed to read at least its own writes. From an operational point of view, it is useful to view the cluster as being composed of servers with two different roles, referred to as Primary and Secondary servers.



The two roles are foundational in any production deployment but are managed at different scales from one another and undertake different roles in managing the fault tolerance and scalability of the overall cluster.

Neo4j Local Clustering:

First download neo4j enterprise edition.



Current Releases

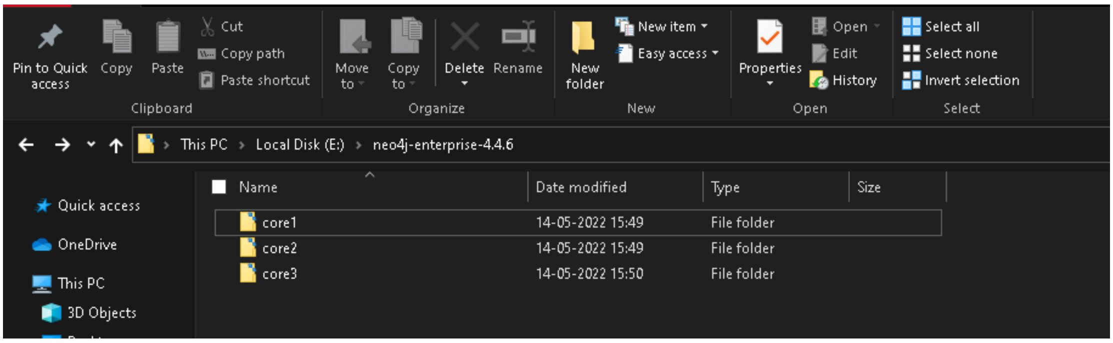
Neo4j Enterprise Edition 4.4.6

Enterprise Edition includes Bloom, Graph Data Science Library and APOC procedures. Additional license keys may be required.

20 April 2022 Release Notes | Read More

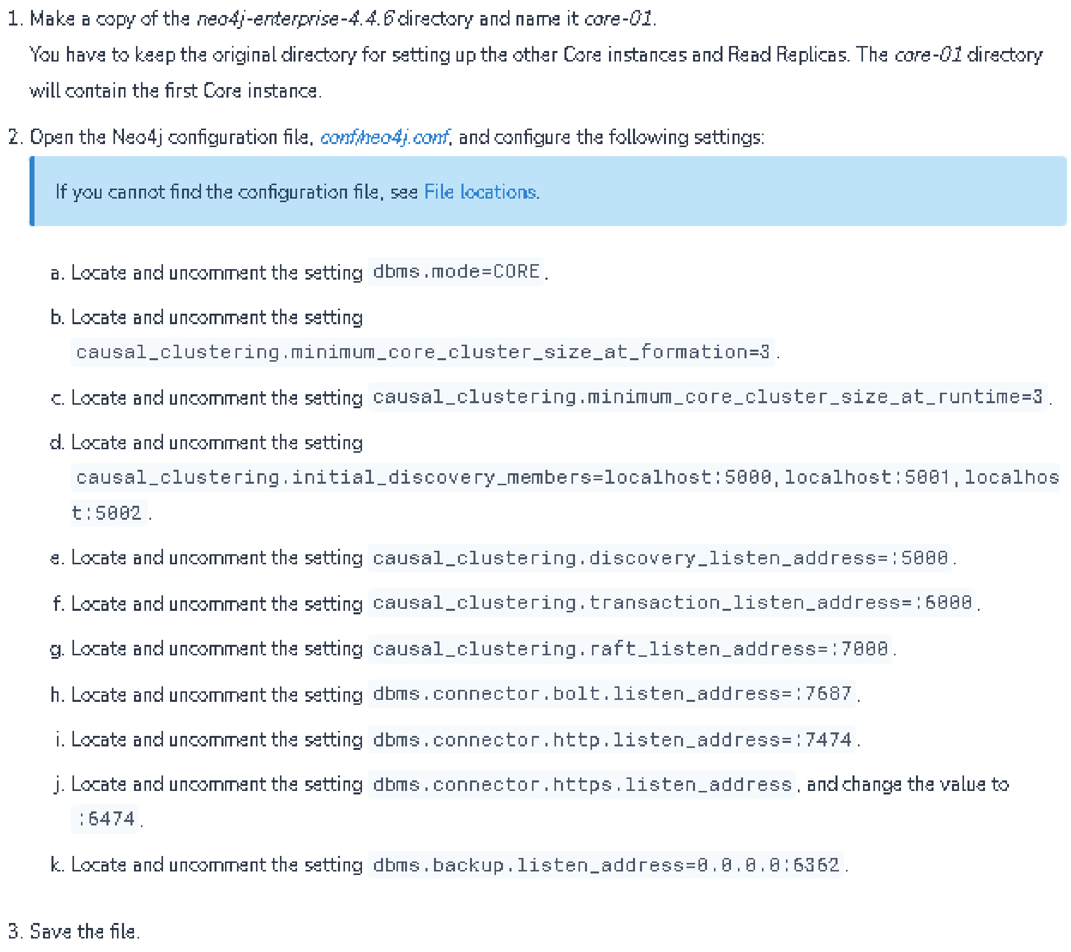
OS	Download
Linux/Mac	Neo4j 4.4.6 (tar) SHA-256
Windows	Neo4j 4.4.6 (zip) SHA-256

Neo4j Repositories



Name	Date modified	Type	Size
core1	14-05-2022 15:49	File folder	
core2	14-05-2022 15:49	File folder	
core3	14-05-2022 15:50	File folder	

Core-01



1. Make a copy of the *neo4j-enterprise-4.4.6* directory and name it *core-01*.
   You have to keep the original directory for setting up the other Core instances and Read Replicas. The *core-01* directory will contain the first Core instance.
2. Open the Neo4j configuration file, *conf/neo4j.conf*, and configure the following settings:

   > If you cannot find the configuration file, see File locations.

   a. Locate and uncomment the setting `dbms.mode=CORE`.

   b. Locate and uncomment the setting `causal_clustering.minimum_core_cluster_size_at_formation=3`.

   c. Locate and uncomment the setting `causal_clustering.minimum_core_cluster_size_at_runtime=3`.

   d. Locate and uncomment the setting `causal_clustering.initial_discovery_members=localhost:5000,localhost:5001,localhost:5002`.

   e. Locate and uncomment the setting `causal_clustering.discovery_listen_address=:5000`.

   f. Locate and uncomment the setting `causal_clustering.transaction_listen_address=:6000`.

   g. Locate and uncomment the setting `causal_clustering.raft_listen_address=:7000`.

   h. Locate and uncomment the setting `dbms.connector.bolt.listen_address=:7687`.

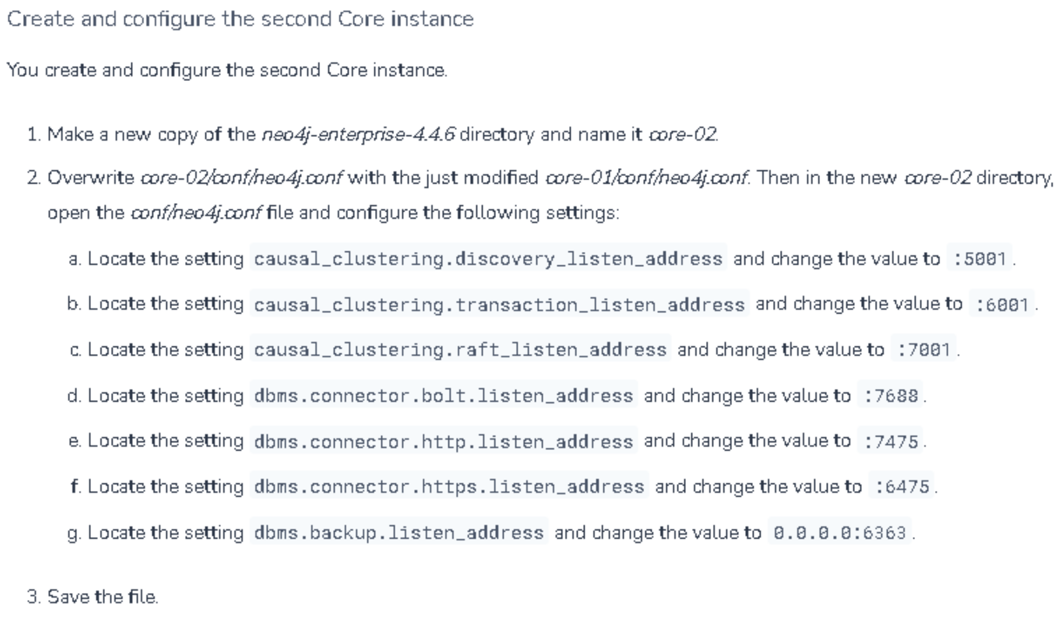
   i. Locate and uncomment the setting `dbms.connector.http.listen_address=:7474`.

   j. Locate and uncomment the setting `dbms.connector.https.listen_address`, and change the value to `:6474`.

   k. Locate and uncomment the setting `dbms.backup.listen_address=0.0.0.0:6362`.

3. Save the file.

Core-02:



Create and configure the second Core instance

You create and configure the second Core instance.

1. Make a new copy of the *neo4j-enterprise-4.4.6* directory and name it *core-02*.
2. Overwrite *core-02/conf/neo4j.conf* with the just modified *core-01/conf/neo4j.conf*. Then in the new *core-02* directory, open the *conf/neo4j.conf* file and configure the following settings:

   a. Locate the setting `causal_clustering.discovery_listen_address` and change the value to `:5001`.

   b. Locate the setting `causal_clustering.transaction_listen_address` and change the value to `:6001`.

   c. Locate the setting `causal_clustering.raft_listen_address` and change the value to `:7001`.

   d. Locate the setting `dbms.connector.bolt.listen_address` and change the value to `:7688`.

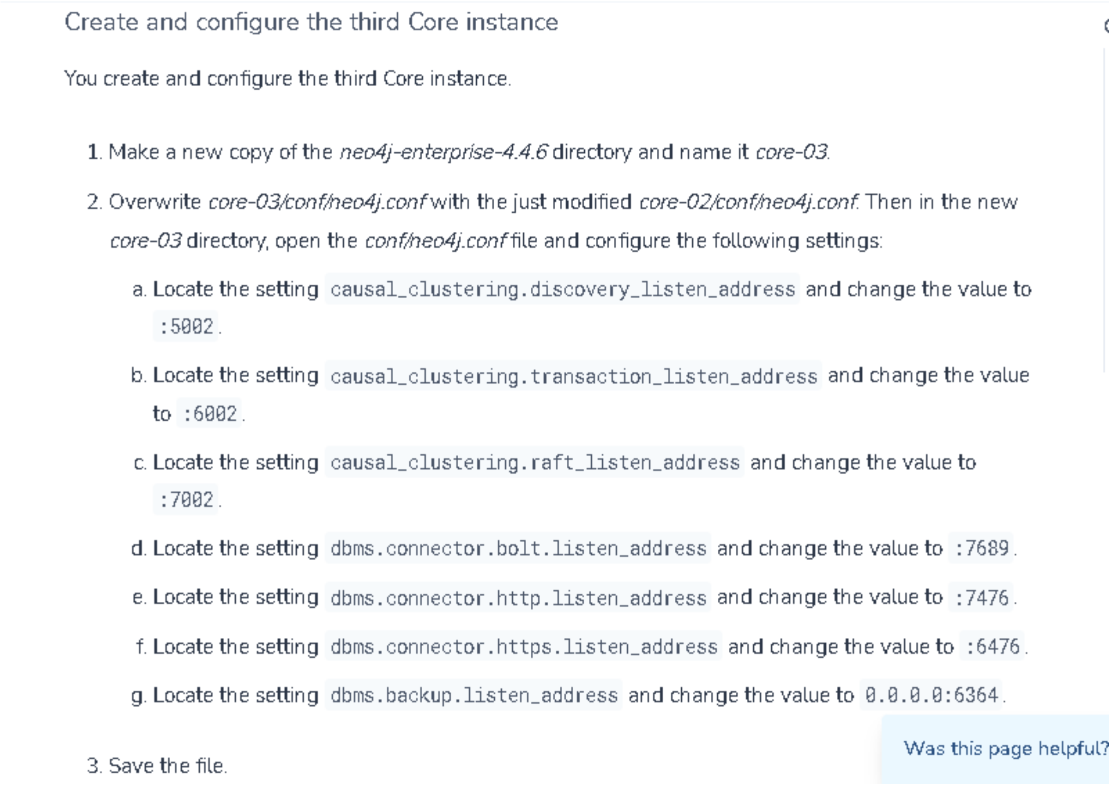
   e. Locate the setting `dbms.connector.http.listen_address` and change the value to `:7475`.

   f. Locate the setting `dbms.connector.https.listen_address` and change the value to `:6475`.

   g. Locate the setting `dbms.backup.listen_address` and change the value to `0.0.0.0:6363`.

3. Save the file.

Core-03:

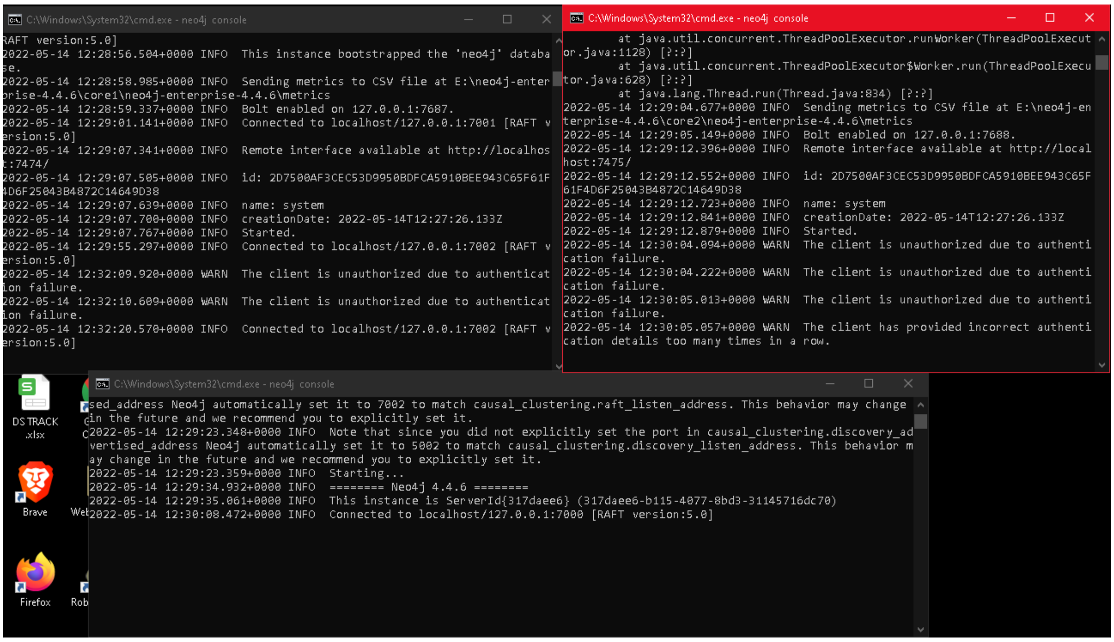


Create and configure the third Core instance

You create and configure the third Core instance.

1. Make a new copy of the *neo4j-enterprise-4.4.6* directory and name it *core-03*.
2. Overwrite *core-03/conf/neo4j.conf* with the just modified *core-02/conf/neo4j.conf*. Then in the new *core-03* directory, open the *conf/neo4j.conf* file and configure the following settings:
   a. Locate the setting `causal_clustering.discovery_listen_address` and change the value to `:5002`.
   b. Locate the setting `causal_clustering.transaction_listen_address` and change the value to `:6002`.
   c. Locate the setting `causal_clustering.raft_listen_address` and change the value to `:7002`.
   d. Locate the setting `dbms.connector.bolt.listen_address` and change the value to `:7689`.
   e. Locate the setting `dbms.connector.http.listen_address` and change the value to `:7476`.
   f. Locate the setting `dbms.connector.https.listen_address` and change the value to `:6476`.
   g. Locate the setting `dbms.backup.listen_address` and change the value to `0.0.0.0:6364`.
3. Save the file.

Now go to bin directory of each core and command prompt and type neo4j console.



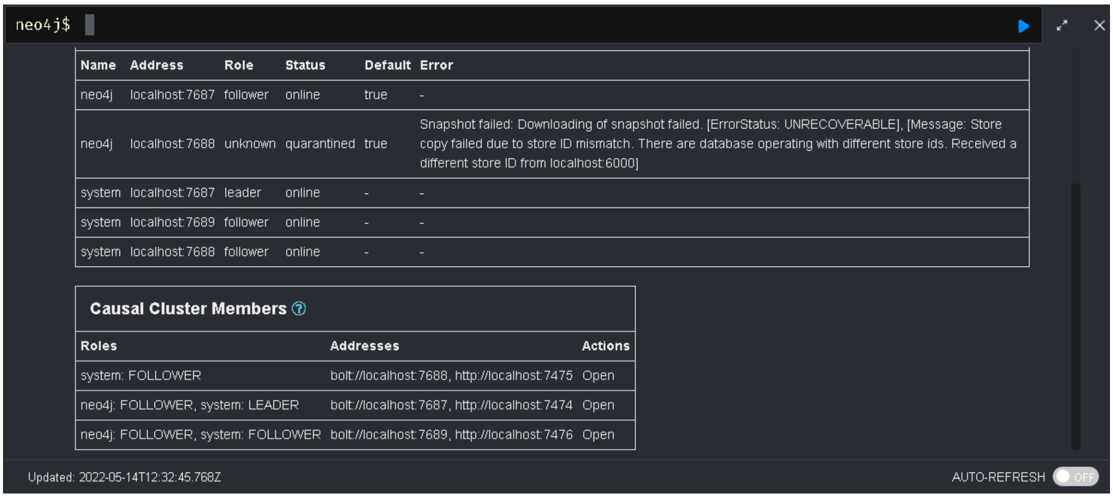
C:\Windows\System32\cmd.exe - neo4j console
C:\Windows\System32\cmd.exe - neo4j console
C:\Windows\System32\cmd.exe - neo4j console
DS TRACK .xlsx
Brave
Firefox

```
RAFT version:5.0]
2022-05-14 12:28:56.504+0000 INFO  This instance bootstrapped the 'neo4j' databa
se.
2022-05-14 12:28:58.985+0000 INFO  Sending metrics to CSV file at E:\neo4j-enter
prise-4.4.6\core1\neo4j-enterprise-4.4.6\metrics
2022-05-14 12:28:59.337+0000 INFO  Bolt enabled on 127.0.0.1:7687.
2022-05-14 12:29:01.141+0000 INFO  Connected to localhost/127.0.0.1:7001 [RAFT v
ersion:5.0]
2022-05-14 12:29:07.341+0000 INFO  Remote interface available at http://localhos
t:7474/
2022-05-14 12:29:07.505+0000 INFO  id: 2D7500AF3CEC53D9950BDFCA5910BEE943C65F61F
4D6F25043B4872C14649D38
2022-05-14 12:29:07.639+0000 INFO  name: system
2022-05-14 12:29:07.700+0000 INFO  creationDate: 2022-05-14T12:27:26.133Z
2022-05-14 12:29:07.767+0000 INFO  Started.
2022-05-14 12:29:55.297+0000 INFO  Connected to localhost/127.0.0.1:7002 [RAFT v
ersion:5.0]
2022-05-14 12:32:09.920+0000 WARN  The client is unauthorized due to authenticat
ion failure.
2022-05-14 12:32:10.609+0000 WARN  The client is unauthorized due to authenticat
ion failure.
2022-05-14 12:32:20.570+0000 INFO  Connected to localhost/127.0.0.1:7002 [RAFT v
ersion:5.0]
```

```
        at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecut
or.java:1128) [?:?]
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecu
tor.java:628) [?:?]
        at java.lang.Thread.run(Thread.java:834) [?:?]
2022-05-14 12:29:04.677+0000 INFO  Sending metrics to CSV file at E:\neo4j-en
terprise-4.4.6\core2\neo4j-enterprise-4.4.6\metrics
2022-05-14 12:29:05.149+0000 INFO  Bolt enabled on 127.0.0.1:7688.
2022-05-14 12:29:12.396+0000 INFO  Remote interface available at http://local
host:7475/
2022-05-14 12:29:12.552+0000 INFO  id: 2D7500AF3CEC53D9950BDFCA5910BEE943C65F
61F4D6F25043B4872C14649D38
2022-05-14 12:29:12.723+0000 INFO  name: system
2022-05-14 12:29:12.841+0000 INFO  creationDate: 2022-05-14T12:27:26.133Z
2022-05-14 12:29:12.879+0000 INFO  Started.
2022-05-14 12:30:04.094+0000 WARN  The client is unauthorized due to authenti
cation failure.
2022-05-14 12:30:04.222+0000 WARN  The client is unauthorized due to authenti
cation failure.
2022-05-14 12:30:05.013+0000 WARN  The client is unauthorized due to authenti
cation failure.
2022-05-14 12:30:05.057+0000 WARN  The client has provided incorrect authenti
cation details too many times in a row.
```

```
sed_address Neo4j automatically set it to 7002 to match causal_clustering.raft_listen_address. This behavior may change
in the future and we recommend you to explicitly set it.
2022-05-14 12:29:23.348+0000 INFO  Note that since you did not explicitly set the port in causal_clustering.discovery_ad
vertised_address Neo4j automatically set it to 5002 to match causal_clustering.discovery_listen_address. This behavior m
ay change in the future and we recommend you to explicitly set it.
2022-05-14 12:29:23.359+0000 INFO  Starting...
2022-05-14 12:29:34.932+0000 INFO  ======== Neo4j 4.4.6 ========
2022-05-14 12:29:35.061+0000 INFO  This instance is ServerId{317daee6} (317daee6-b115-4077-8bd3-31145716dc70)
2022-05-14 12:30:08.472+0000 INFO  Connected to localhost/127.0.0.1:7000 [RAFT version:5.0]
```

Getting cluster status:



```
neo4j$
```

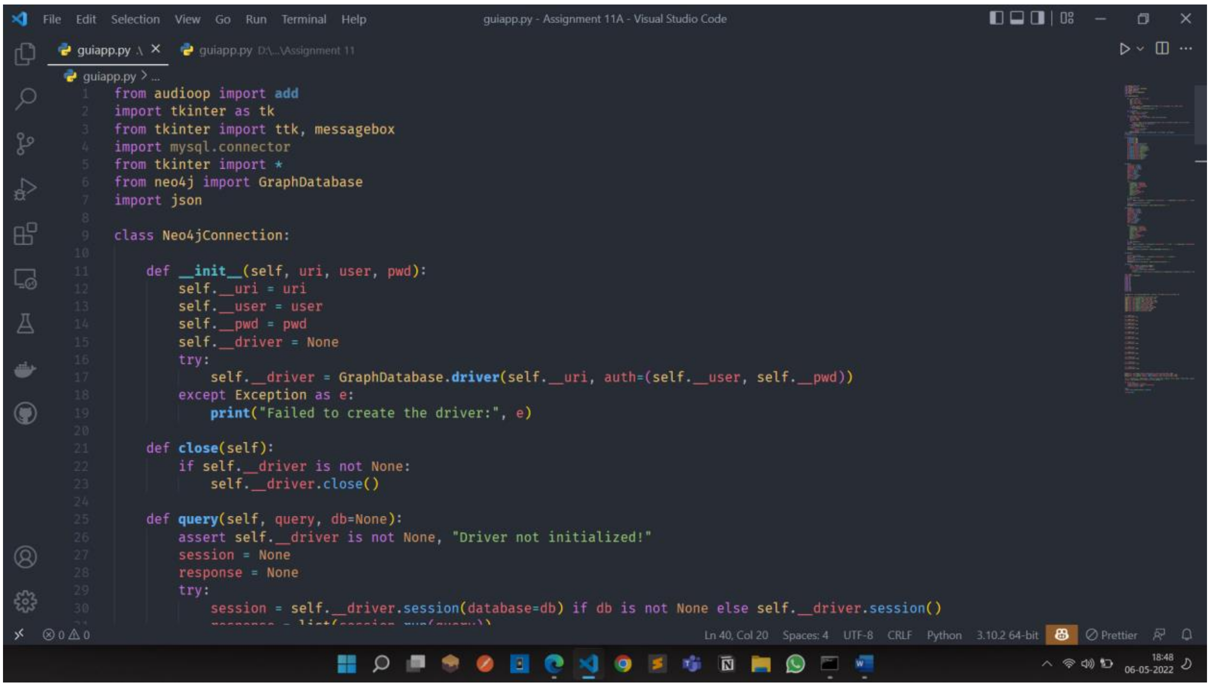
Name	Address	Role	Status	Default	Error
neo4j	localhost:7687	follower	online	true	-
neo4j	localhost:7688	unknown	quarantined	true	Snapshot failed: Downloading of snapshot failed. [ErrorStatus: UNRECOVERABLE], [Message: Store copy failed due to store ID mismatch. There are database operating with different store ids. Received a different store ID from localhost:6000]
system	localhost:7687	leader	online	-	-
system	localhost:7689	follower	online	-	-
system	localhost:7688	follower	online	-	-

Causal Cluster Members

Roles	Addresses	Actions
system: FOLLOWER	bolt://localhost:7688, http://localhost:7475	Open
neo4j: FOLLOWER, system: LEADER	bolt://localhost:7687, http://localhost:7474	Open
neo4j: FOLLOWER, system: FOLLOWER	bolt://localhost:7689, http://localhost:7476	Open

Updated: 2022-05-14T12:32:45.768Z

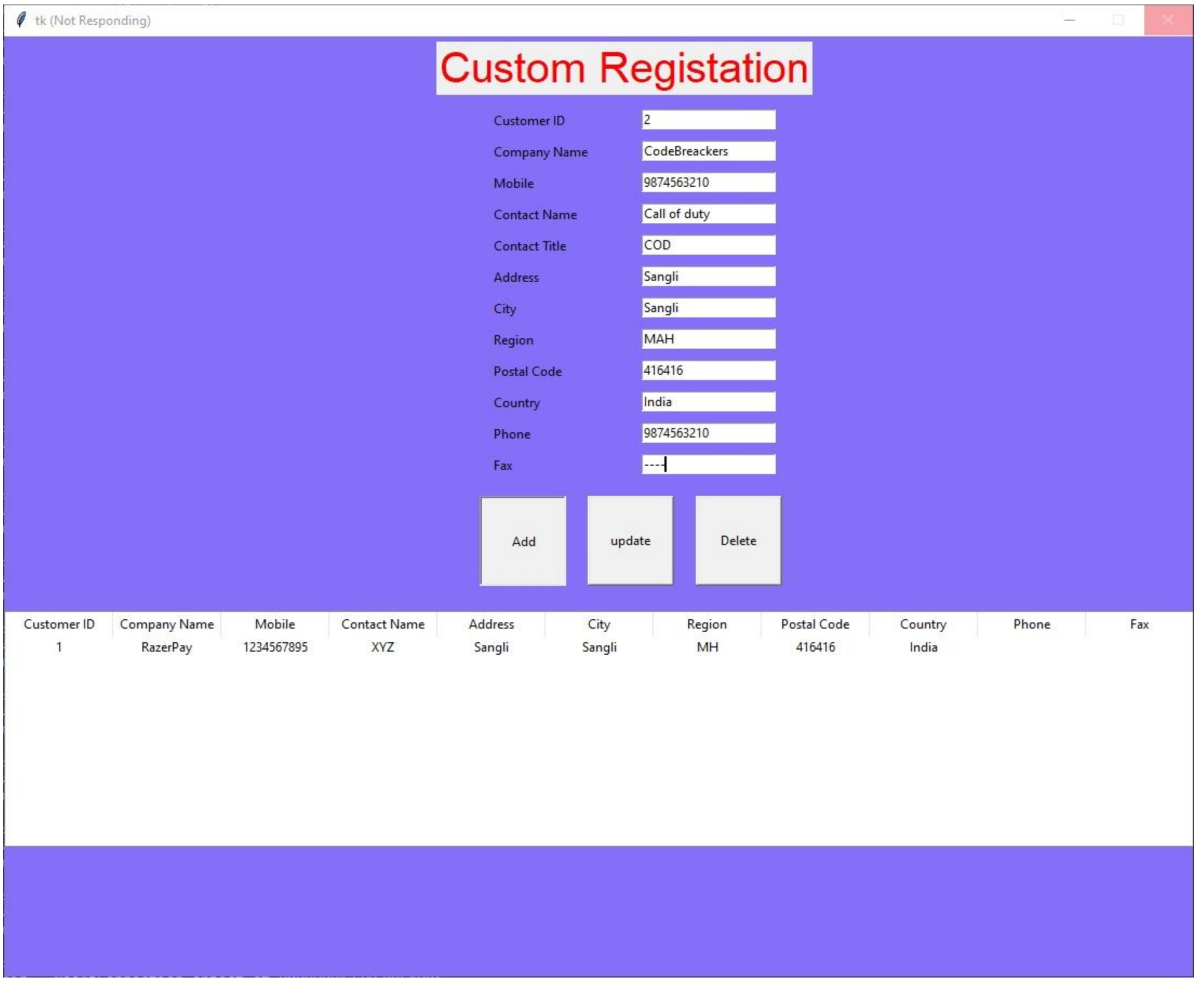
Now performing CRUD operation using python Gui Application.



File Edit Selection View Go Run Terminal Help
guiapp.py - Assignment 11A - Visual Studio Code
guiapp.py
guiapp.py D:\...\Assignment 11
guiapp.py > ...
Ln 40, Col 20 Spaces: 4 UTF-8 CRLF Python 3.10.2 64-bit
Prettier
18:48
06-05-2022

```python
from audioop import add
import tkinter as tk
from tkinter import ttk, messagebox
import mysql.connector
from tkinter import *
from neo4j import GraphDatabase
import json

class Neo4jConnection:

    def __init__(self, uri, user, pwd):
        self.__uri = uri
        self.__user = user
        self.__pwd = pwd
        self.__driver = None
        try:
            self.__driver = GraphDatabase.driver(self.__uri, auth=(self.__user, self.__pwd))
        except Exception as e:
            print("Failed to create the driver:", e)

    def close(self):
        if self.__driver is not None:
            self.__driver.close()

    def query(self, query, db=None):
        assert self.__driver is not None, "Driver not initialized!"
        session = None
        response = None
        try:
            session = self.__driver.session(database=db) if db is not None else self.__driver.session()
            response = list(session.run(query))
```

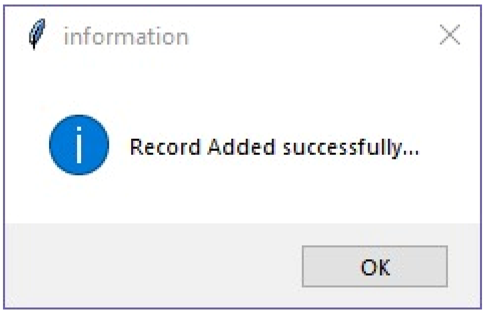
1. Add customer



Custom Registation

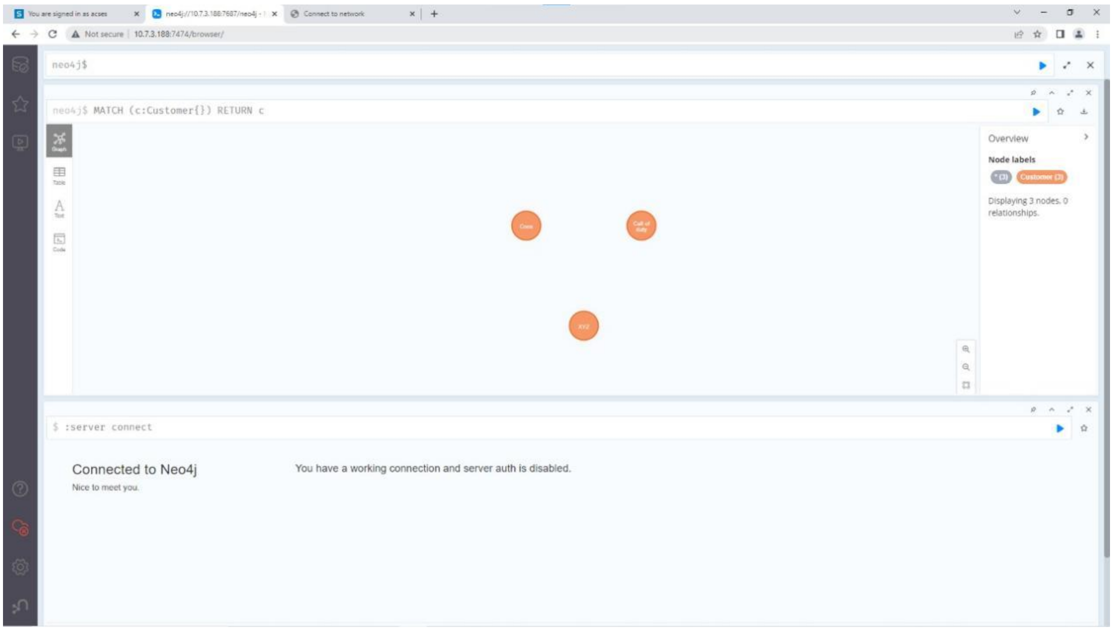
Customer ID	2
Company Name	CodeBreackers
Mobile	9874563210
Contact Name	Call of duty
Contact Title	COD
Address	Sangli
City	Sangli
Region	MAH
Postal Code	416416
Country	India
Phone	9874563210
Fax	----

Customer ID	Company Name	Mobile	Contact Name	Address	City	Region	Postal Code	Country	Phone	Fax
1	RazerPay	1234567895	XYZ	Sangli	Sangli	MH	416416	India		



Record Added successfully...

2. In followers node, nodes are added in graph



```
neo4j$
```

```
neo4j$ MATCH (c:Customer{}) RETURN c
```

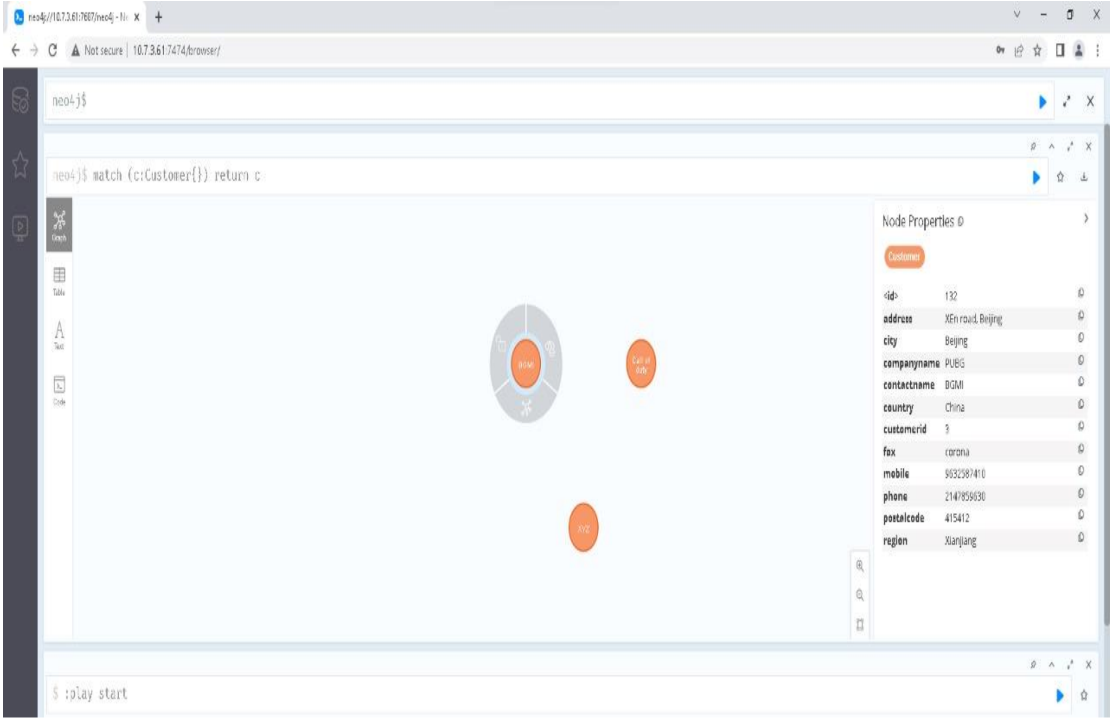
Displaying 3 nodes, 0 relationships.

```
$ :server connect
```

Connected to Neo4j

Nice to meet you.

You have a working connection and server auth is disabled.



```
neo4j$
```

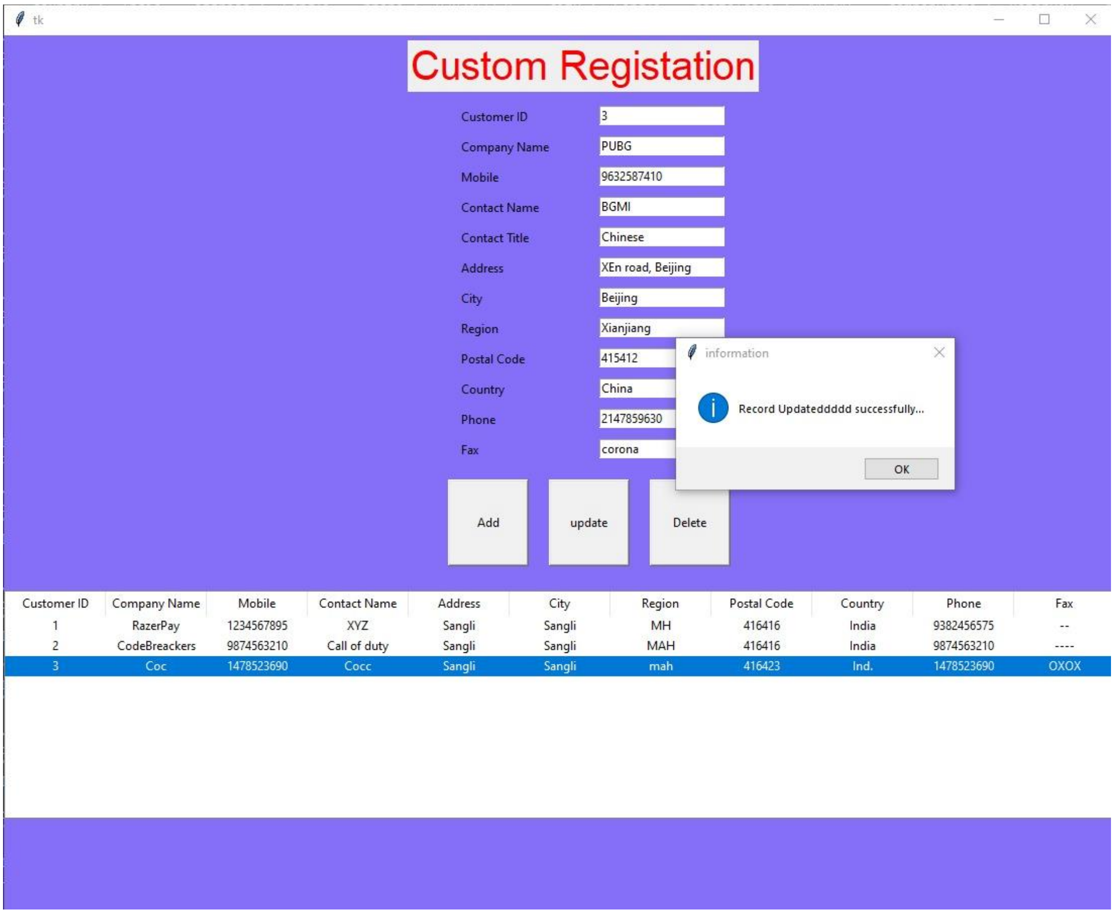
```
neo4j$ match (c:Customer{}) return c
```

Node Properties

<id>	132
address	XEn road, Beijing
city	Beijing
companyname	PUBG
contactname	BGMI
country	China
customerid	3
fax	corona
mobile	9632587410
phone	2147859630
postalcode	415412
region	Xianjiang

```
$ :play start
```

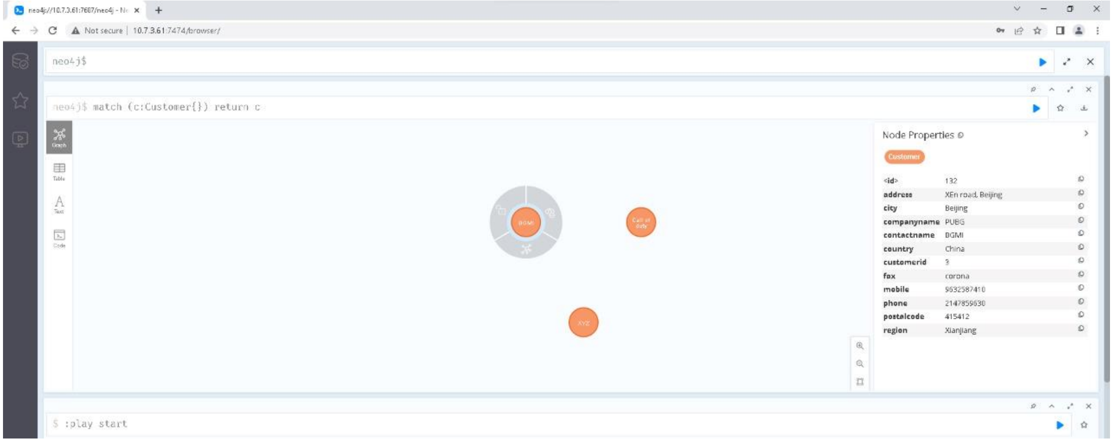
3. Read and Update Customer Record:



Customer ID	3
Company Name	PUBG
Mobile	9632587410
Contact Name	BGMI
Contact Title	Chinese
Address	XEn road, Beijing
City	Beijing
Region	Xianjiang
Postal Code	415412
Country	China
Phone	2147859630
Fax	corona

Record Updatedddd successfully...

Customer ID	Company Name	Mobile	Contact Name	Address	City	Region	Postal Code	Country	Phone	Fax
1	RazerPay	1234567895	XYZ	Sangli	Sangli	MH	416416	India	9382456575	--
2	CodeBreackers	9874563210	Call of duty	Sangli	Sangli	MAH	416416	India	9874563210	----
3	Coc	1478523690	Cocc	Sangli	Sangli	mah	416423	Ind.	1478523690	OXOX



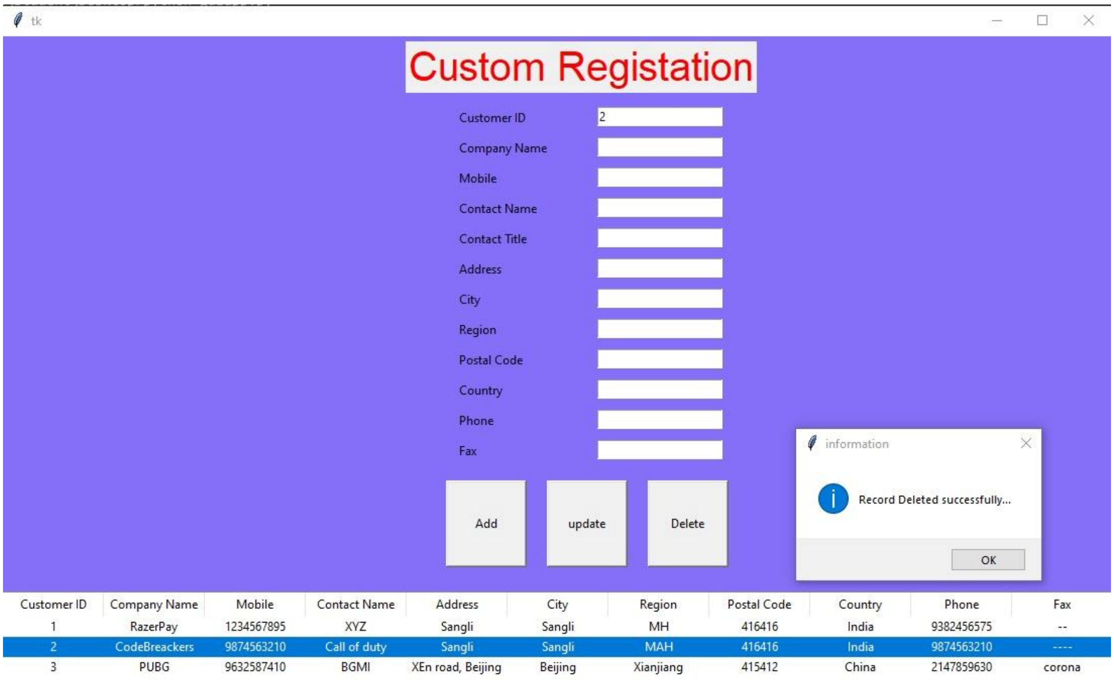
```
neo4j$
```

```
neo4j$ match (c:Customer{}) return c
```

<id>	132
address	XEn road, Beijing
city	Beijing
companyname	PUBG
contactname	BGMI
country	China
customerid	3
fax	corona
mobile	9632587410
phone	2147859630
postalcode	415412
region	Xianjiang

```
$ :play start
```

4. Delete a record:



Custom Registation

Customer ID 2

Company Name

Mobile

Contact Name

Contact Title

Address

City

Region

Postal Code

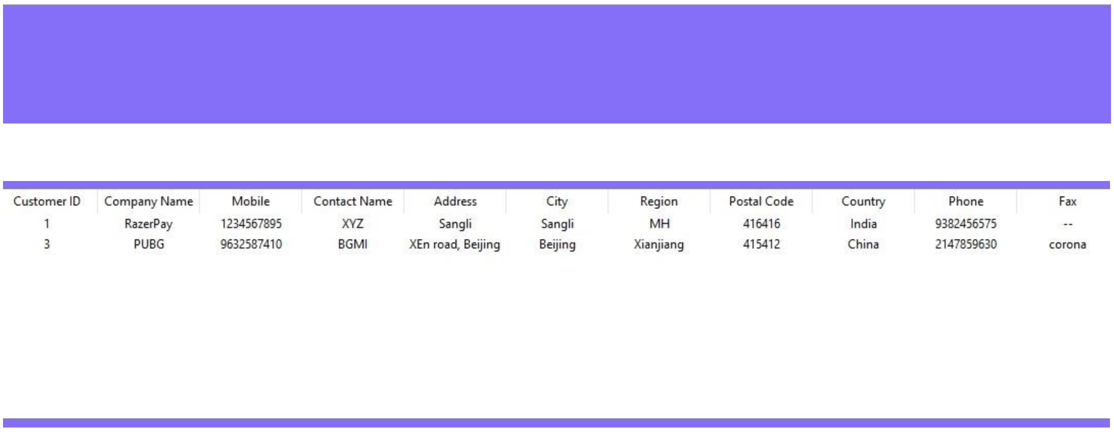
Country

Phone

Fax

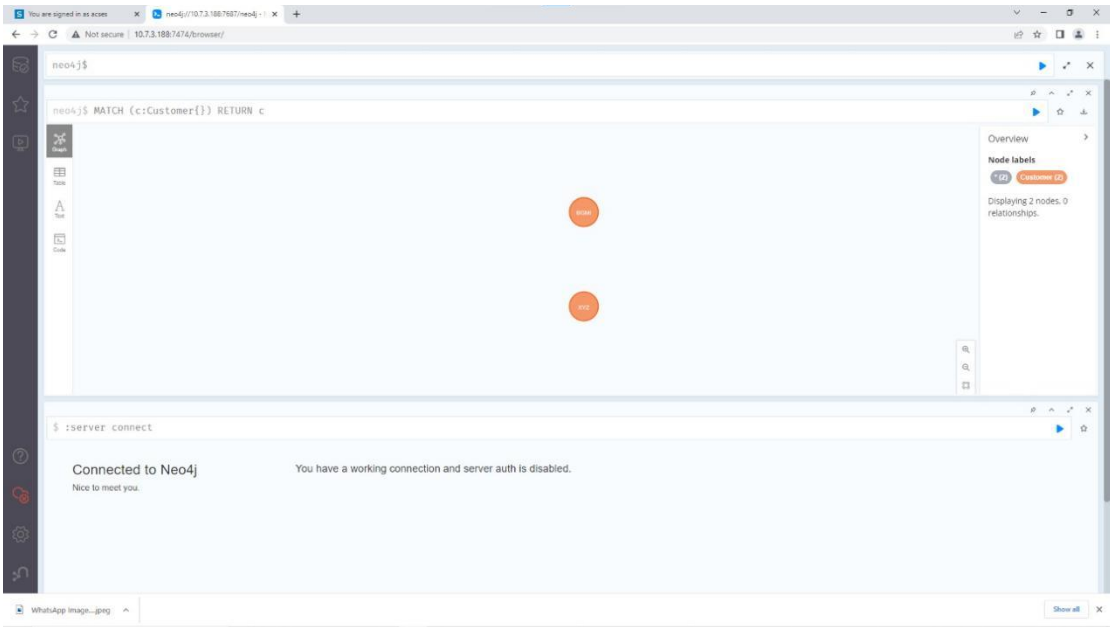
Record Deleted successfully...

Customer ID	Company Name	Mobile	Contact Name	Address	City	Region	Postal Code	Country	Phone	Fax
1	RazerPay	1234567895	XYZ	Sangli	Sangli	MH	416416	India	9382456575	--
2	CodeBreackers	9874563210	Call of duty	Sangli	Sangli	MAH	416416	India	9874563210	----
3	PUBG	9632587410	BGMI	XEn road, Beijing	Beijing	Xianjiang	415412	China	2147859630	corona



Customer ID	Company Name	Mobile	Contact Name	Address	City	Region	Postal Code	Country	Phone	Fax
1	RazerPay	1234567895	XYZ	Sangli	Sangli	MH	416416	India	9382456575	--
3	PUBG	9632587410	BGMI	XEn road, Beijing	Beijing	Xianjiang	415412	China	2147859630	corona

5. Changes reflected in Database of followers



```
neo4j$
```

```
neo4j$ MATCH (c:Customer{}) RETURN c
```

Overview

Node labels

*(2) Customer (2)

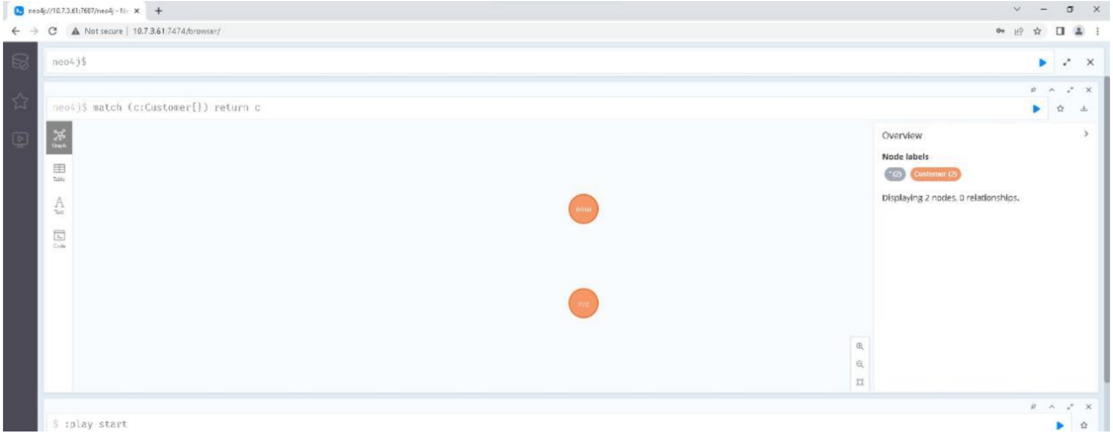
Displaying 2 nodes, 0 relationships.

```
$ :server connect
```

Connected to Neo4j

Nice to meet you.

You have a working connection and server auth is disabled.



```
neo4j$
```

```
neo4j$ match (c:Customer{}) return c
```

Overview

Node labels

*(2) Customer (2)

Displaying 2 nodes, 0 relationships.

```
$ :play start
```