



# Introduction to Database Systems: CS312

## Neo4j; Building Your Own Graph

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## Neo4J

Start Neo4j  
in Docker

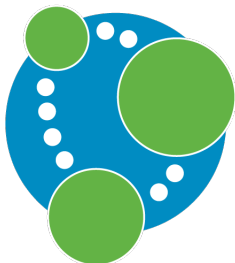
Killing a  
container

Cypher Code

Graphgists  
Projects

Shutting  
Down

Consider This



# neo4j

- A visual database system using methods from graph theory to use networks to determine relationships (edges) and discover meaning from connected data-points (nodes). Users are able to interact with the data in a network.

- <https://neo4j.com/>
- Graphgists Projects: <https://neo4j.com/graphgists/>

# Getting started with Neo4j in Docker

These files are located in `sandbox/`

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Run batch file to create a Docker container from DockerHub for Neo4j: Windows.

```
run_neo4j_windows.bat
```

Run sh file to create a Docker container from DockerHub for Neo4j: MacOS and Linux.

```
sh run_neo4j_macOSAndLinux.sh
```

Command to start Neo4j inside files

```
docker start testneo4j # windows
```

```
sudo docker start testneo4j # MacOS and Linux
```

# Killing a Docker Container

Container name *already in use?* Stop, Destroy and Relaunch

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Consider This

Find out the container's ID

```
docker ps
```

Your container's ID. This one is; 662a6801959f

CONTAINER ID	IMAGE
662a6801959f	neo4j:latest

Stop Neo4j container

```
docker stop testneo4j # Windows
```

```
sudo docker stop testneo4j # MacOS and Linux
```

Remove Neo4j container

```
docker rm 662a6801959f # Windows
```

```
sudo docker rm 662a6801959f # MacOS and Linux
```

You should now be able to run your run and execute commands from above.

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Consider This

```
$ :server connect
```

## Connect to Neo4j

Database access requires an  
authenticated connection.

Connect URL

Username

Password

● Open your browser and head to: <http://127.0.0.1:7474/browser/>

● Your first login

- **User:** neo4j
- **Password:** test

# Add Nodes

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Destroy all nodes in the graph and erase the graph

```
MATCH (n) DETACH DELETE n
```

## Add the nodes

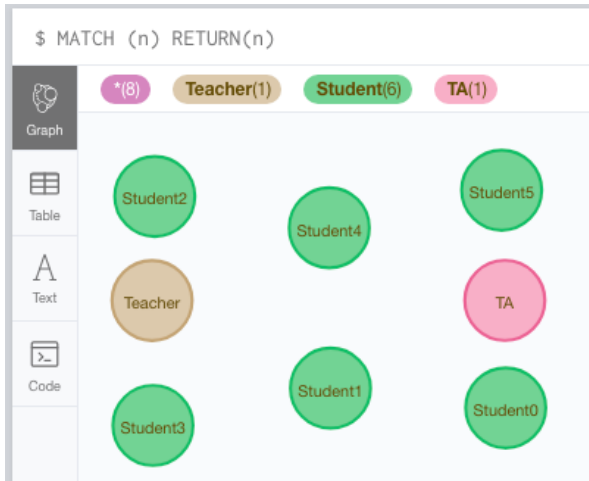
```
CREATE (  
  :Teacher {  
    name: "Teacher",  
    Jackjet: "green",  
    Jeans: "blue",  
    MarkerCol: "red"}  
)  
FOREACH (r IN range(0,5)|  
  CREATE (  
    :Student { name:"Student" + r,  
      extraUtility: "backpack" + r,  
      lastTestScore:tan(rand())*100 })  
  )  
CREATE (:TA { name: "TA", Machine: "Laptop"})
```

- Adds a Teacher, a TA and five Student nodes, with some sample data

# Show the Nodes

## Show the unconnected graph

```
MATCH (n) RETURN (n)
```



# Add Edges

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Consider This

## Add some connectivity to nodes

```
MATCH (t:Teacher), (s:Student), (a:TA)
MERGE (t) - [:INSTRUCTS] -> (s) <-[:HELPS] - (a)
MERGE (a) - [:LISTENS_TO] -> (t)
MERGE (t) - [:INSTRUCTS] -> (a) <-[:HELPS] - (s)
```

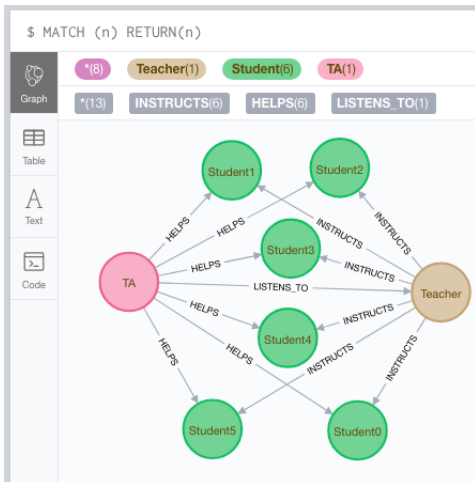
- The Teacher (*t*) and Student (*s*) nodes are linked by *INSTRUCTS* and an arrow to show direction, *- >*
- The TA (*a*) and Student (*s*) nodes are linked by *HELPS* and an arrow to show direction, *< -*
- The TA (*a*) and TEACHER (*t*) nodes are linked by *LISTENS\_TO* and an arrow to show direction, *- >*
- The Teacher (*t*) and TA (*a*) nodes are linked by *INSTRUCTS* and an arrow to show direction, *- >*
- The Student (*s*) and TA (*a*) nodes are linked by *HELPS* and an arrow to show direction, *< -*



# Show The Edges

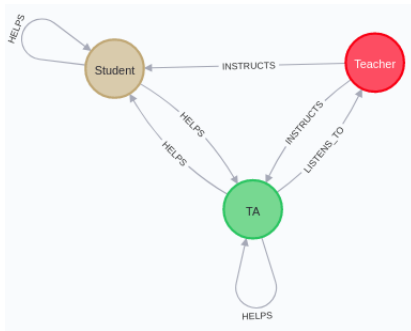
Show the connected graph

`MATCH (n) RETURN (n)`



## Show the schema

```
call db.schema.visualization
```

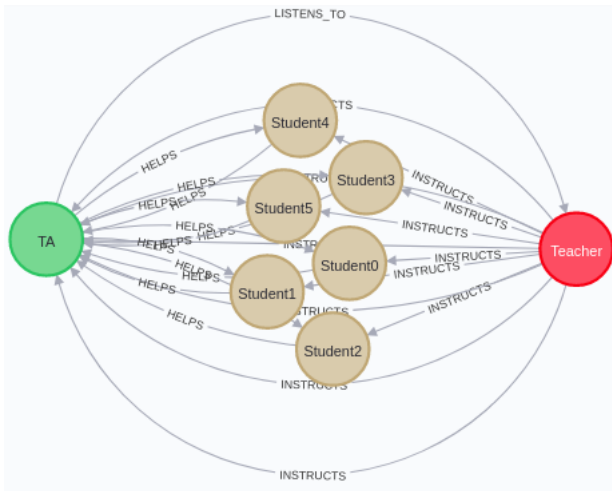


- The Teacher **Instructs** each Student
- The Student is **Instructed** and **Helped** by Teacher
- The TA is **Instructed** by Teacher and **Listens to** Teacher, **Helps** Student and self.

# Relationship Queries

## Who instructs whom?

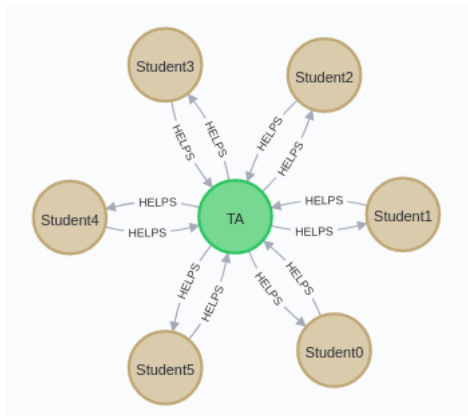
```
MATCH t=()-[s:INSTRUCTS]->() RETURN t
```



# Relationship Queries

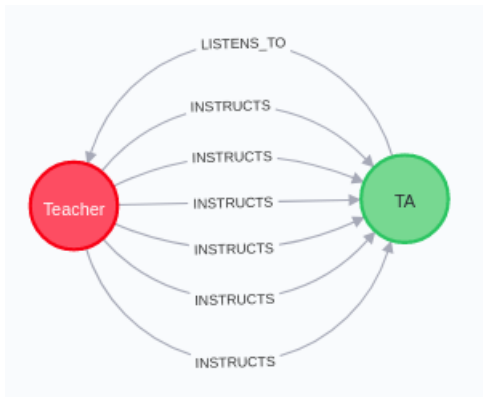
## Who helps whom?

```
MATCH t=()-[s:HELPS]->>() RETURN t
```



## Who listens to whom?

```
MATCH t=()-[s:LISTENS_TO]->() RETURN t
```



# Commonly Used Commands

Sample code in Cypher script

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## What is the Schema?

```
CALL db.schema.visualization
```

## What are the relationship types?

```
CALL db.relationshipTypes()
```

## Display all nodes with their relationships (I)

```
MATCH (n) RETURN n
```

## Display all nodes with their relationships (II)

```
MATCH (a)-[r]-() RETURN a, r
```

# Commonly Used Commands

From last time

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Consider This

## What are the node types?

```
CALL db.schema.nodeTypeProperties
```

## What are the relationship types?

```
CALL db.relationshipTypes()
```

## Display all nodes

```
MATCH (n) RETURN n
```

## Who reviewed what?

```
MATCH p=()-[r:LISTENS_TO]->() RETURN p
```

## Who produced what?

```
MATCH p=()-[r:HELPS]->() RETURN p
```

# Spend Some Time Playing With Other Graphs ...

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GraphGist Challenge Entries



Sports and Recreation



Master Data Management



Real-Time Recommendations



Optimization



Fraud Detection



Pop Culture



Network and IT Operations



Holidays



Graph-Based Search



General Business



Graph Gist How-tos



Data Analysis



Public Web APIs



Internet of Things



Investigative Journalism



Open Government Data and Politics



Identity and Access Management

- See What the community has done with Neo4j
- Graphgists Projects: <https://neo4j.com/graphgists/>



# How To Shut Down a Session



## Stop Neo4j container

```
docker stop testneo4j # Windows  
sudo docker stop testneo4j # MacOS and Linux
```

## Remove Neo4j container (if necessary!)

```
docker rm containerID # Windows  
sudo docker rm containerID # MacOS and Linux
```

# Consider This...

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Consider This



# THINK

- Can you work with data as nodes and edges in *your own* network?
- Can you discover new relationships between your nodes?