



Introduction to Database Systems: CS312

Neo4J; Building Your Own Graph

Oliver Bonham-Carter

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- 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

Neo4J

Start Neo4J

Cypher Code

Graphgists
Projects

Shutting
Down

Consider this

- Copy your Neo4J setup tar file (neo4j-community-3.5.4-unix.tar.gz) to a desktop directory. Do not copy this file or open it in your submission directory!!!
- Click on this file to unpack its contents
- Locate the bin directory and then locate file: neo4j

Start the Neo4J server

```
./neo4j start
```

Check the status

```
./neo4j status
```

Note: Stop the Neo4J server

```
./neo4j stop
```

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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: neo4j
- (You should have already changed your password by this time...)

Add Nodes

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Consider this

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

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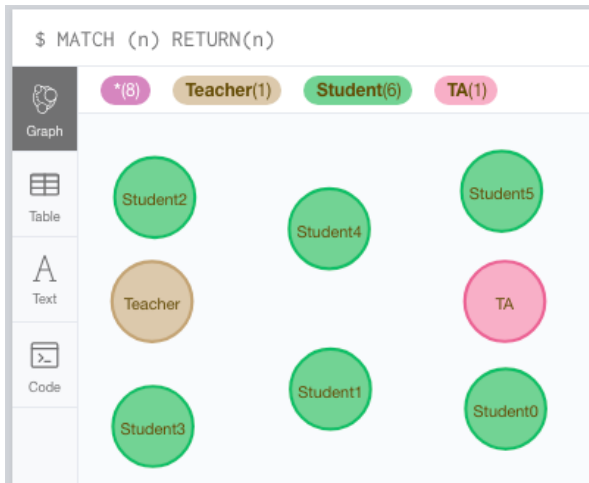
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Consider this

Show the unconnected graph

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



Add Edges

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Consider this

Add some connectivity to nodes

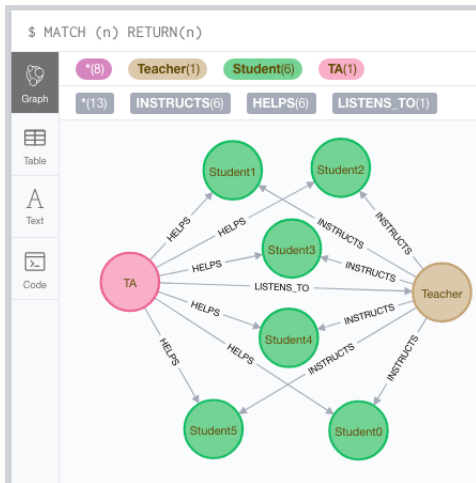
```
MATCH (t:Teacher), (s:Student), (a:TA)
CREATE UNIQUE (t) - [:INSTRUCTS] -> (s) <-[:HELPS] - (a)
CREATE UNIQUE (a) - [:LISTENS_TO] -> (t)
```

- The Teacher (*t*) and Student (*s*) nodes are linked by *INSTRUCT* 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, *->*

Show the Edges

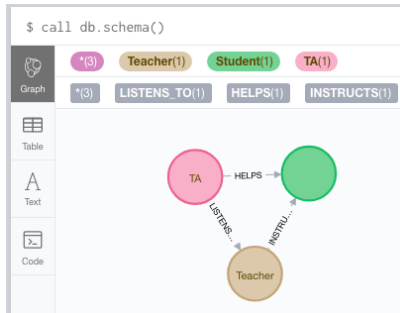
Show the connected graph

`MATCH (n) RETURN (n)`



Show the schema

```
call db.schema()
```



- The Teacher Instructs each Student
- The TA helps each Student
- The TA listens to the Teacher

Relationship Queries

Who Instructs whom?

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

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



Graph



Table



Text



Code

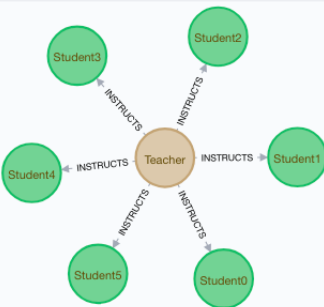
*(7)

Teacher(1)

Student(6)

*(6)

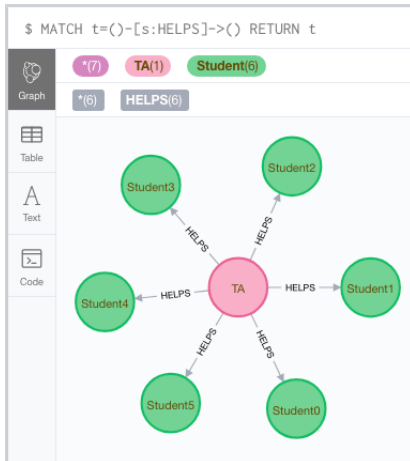
INSTRUCTS(6)



Relationship Queries

Who helps whom?

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



Relationship Queries

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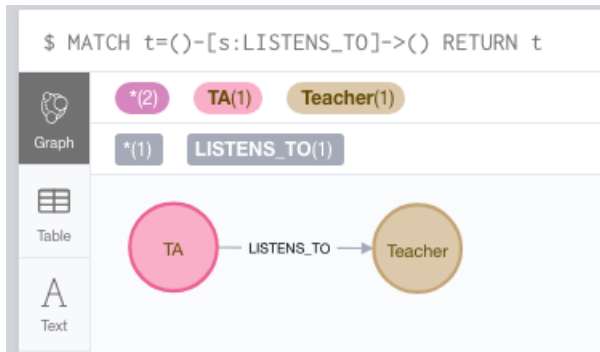
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Consider this

Who Listens to whom?

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



Commonly Used Commands

Sample code in Cypher script

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Consider this

What is the Schema?

```
CALL db.schema()
```

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
```

Spend some time playing with other Graphs ...

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Consider this



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

Neo4J

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Consider this



Closing down

- `./neo4j stop`
- `./neo4j status`

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?