

# Applied Databases

## Neo4j I Exercise Sheet - Solutions

### Part 1

- Run Neo4j as follows:
  - Open a Windows Command prompt/PowerShell and change to the **bin** folder of the Neo4j installation.
  - Run **neo4j console**



```
C:\>cd \Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\bin

C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\bin>neo4j console
Directories in use:
home:           C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3
config:         C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\conf
logs:           C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\logs
plugins:        C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\plugins
import:         C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\import
data:           C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\data
certificates:   C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\certificates
licenses:       C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\licenses
run:            C:\Users\GHarrison\Documents\neo4j-community-4.3.3-windows\neo4j-community-4.3.3\run
Starting Neo4j.
2021-09-29 19:21:36.589+0000 INFO  Starting...
2021-09-29 19:21:38.479+0000 INFO  ===== Neo4j 4.3.3 =====
2021-09-29 19:21:39.424+0000 INFO  Performing postInitialization step for component 'security-users' with version 3 and
status CURRENT
2021-09-29 19:21:39.425+0000 INFO  Updating the initial password in component 'security-users'
2021-09-29 19:21:40.085+0000 INFO  Bolt enabled on 127.0.0.1:7687.
2021-09-29 19:21:40.621+0000 INFO  Remote interface available at http://localhost:7474/
2021-09-29 19:21:40.623+0000 INFO  Started.
```

- Then open a browser to <http://localhost:7474>



- Create the following nodes with a label :Student with the following properties:

- o name: "Tom"
- o sid: "G001"
- o age: 23
- o sex: "M"
- o address: "Galway"
- o hair: "brown"
- o email: "tom@gmail.com"

```
create(:Student{
sid:"G001",name:"Tom",age:23,sex:"M",address:"Galway",hair:"brown",email:"tom@gmail.com"})
```

- o name: "Sean"
- o sid: "G002"
- o age: 19
- o sex: "M"
- o address: "Galway"
- o email: "sean@gmail.com"

```
create(:Student{
sid:"G002",name:"Sean",age:19,sex:"M",address:"Galway",email:"sean@gmail.com"})
```

- o name: "Bob"
- o sid: "G003"
- o age: 22
- o sex: "M"
- o address: "Mayo"
- o email: "[bob123@hotmail.com](mailto:bob123@hotmail.com)"
- o twitter: "@bob123"

```
create(:Student{
sid:"G003",name:"Bob",age:22,sex:"M",address:"Mayo",email:"bob123@gmail.com",twitter:"@bob123"})
```

- o name: "Mary"
- o sid: "G004"
- o age: 20
- o sex: "F"
- o address: "Mayo"
- o hair: "blonde"
- o email: "[mary19@gmail.com](mailto:mary19@gmail.com)"
- o twitter: "@mary19"
- o snapchat: "mary19"

```
create(:Student{  
sid:"G004",name:"Mary",age:20,sex:"F",address:"Mayo",hair  
:"blonde",email:"mary19@gmail.com",twitter:"@mary19",snap  
chat:"mary19"})
```

- o name: "Alice"
- o sid: "G005"
- o age: 28
- o sex: "F"
- o address: "Roscommon"
- o email: "[alice@hotmail.com](mailto:alice@hotmail.com)"
- o snapchat: "alice123"

```
create(:Student{sid:"G005",name:"Alice",age:28,sex:"F",ad  
dress:"Roscommon",email:"alice@hotmail.com",snapchat:"ali  
ce123"})
```

- o name: "Pat"
- o sid: "G006"
- o age: 24
- o sex: "M"
- o address: "Roscommon"
- o email: "[pat@hotmail.com](mailto:pat@hotmail.com)"
- o twitter: "patABC"

```
create(:Student{  
sid:"G006",name:"Pat",age:24,sex:"M",address:"Roscommon",  
email:"pat@hotmail.com",snapchat:"patABC"})
```

- Create the following nodes with a label :Lecturer with the following properties:

- o name: "Alan"
- o sid: "L001"
- o age: 57
- o sex: "M"
- o address: "Galway"
- o email: "[alan@gmit.ie](mailto:alan@gmit.ie)",
- o twitter: "@alan"



```
create(:Lecturer{
sid:"L001",name:"Alan",age:57,sex:"M",address:"Galway",email
:"alan@gmit.ie"})
```

- o name: "Mary"
- o sid: "L002"
- o age: 47
- o sex: "F"
- o address: "Mayo"
- o email: "[mary@gmit.ie](mailto:mary@gmit.ie)"
- o hair: "brown"

```
create(:Lecturer{
sid:"L002",name:"Mary",age:47,sex:"F",address:"Mayo",email:"ma
ry@gmit.ie"})
```

- Find the average age of Students, rounded to the nearest whole number.

```
MATCH (n:Student) RETURN round(avg(n.age))
```

- Show the name of each student and his/her age.

```
MATCH (n:Student) RETURN n.name,n.age
```

- Find the age of the youngest Student.

```
MATCH (n:Student) RETURN min(n.age)
```

- Show the names of students who have a *twitter* attribute.

```
MATCH (n:Student) WHERE n.twitter IS NOT NULL
RETURN n.name
```



- Show the number of students who have a *twitter* attribute.  
`MATCH(n:Student) RETURN count(n.twitter)`
- Show the average of age of people in their 20s, 30s and 40s rounded to one decimal place.  
`MATCH(n) WHERE n.age>=20 AND n.age<=49  
RETURN round(avg(n.age),1)`
- Show all the properties for the Student *Tom*.  
`MATCH (n:Student{name:"Tom"}) return keys(n)`
- Increase everyone's age by 1.  
`match(n) set n.age=n.age+1 return n`
- Return the name and age of all males living in Galway.  
`MATCH (n) where n.sex="M" and n.address="Galway" RETURN  
n.name, n.age`



- Create the following nodes with both :Student and :Lecturer labels
  - o name: "Yvonne"
    - age: 37
    - sex: "F"
    - address: "Galway"
    - email: [yvonne@gmit.ie](mailto:yvonne@gmit.ie)
    - twitter: "@yv12"
  - o name: "Walter"
    - age: 44
    - address: "Galway"
    - email: [walter@gmit.ie](mailto:walter@gmit.ie)
    - hair: "black"

```
create (:Lecturer:Student{name:"Yvonne",age:37,sex:"F",address:"Galway",email:"yvonne@gmit.ie",twitter:"yv12"})
```

```
create (:Lecturer:Student{name:"Walter",age:44,sex:"M",address:"Galway",email:"walter@gmit.ie",hair:"black"})
```

*or*

```
CREATE (:Student:Lecturer{name:"Yvonne",age:37,sex:"F",address:"Galway",email:"yvonne@gmit.ie",twitter:"@yv12"}), (:Student:Lecturer{name:"Walter",age:44,address:"Galway",email:"walter@gmit.ie",hair:"black"})
```



- Show the name, age and hair colour of everyone who is both a Student and a Lecturer.

```
match(n:Student:Lecturer) return n.name, n.age, n.hair
```

*or*

```
MATCH(p) WHERE p:Student AND p:Lecturer  
RETURN p.name, p.hair
```



- Update the *twitter* attribute of all lectures to have GMIT after their existing twitter name.  
E.g. “@alan” should become “@alanGMIT”.

```
match(n:Lecturer) set n.twitter = n.twitter+"@GMIT"  
return n
```

Only updates the *twitter* attribute to have “@GMIT” appended for Lecturer nodes, if they currently have a *twitter* attribute.

- Find the average age of Males and find the youngest Male(s).  
Then return the name (as *Name*) and age (as *Age*) of the youngest Male(s) as well as the average age of Males (as *AverageAge*) and the difference in age between the youngest Male(s) and the average age (as *Difference*).

E.g., If the average age of Males was 30, and the youngest Male was called “Tony” aged 20, the following should be returned:

Name	Age	AverageAge	Difference
Tony	20	30	10

```
MATCH(p{sex:"M"}) WITH avg(p.age) AS avgAge  
MATCH(p1{sex:"M"}) WITH min(p1.age) AS minAge, avgAge  
MATCH(p2{sex:"M"}) WHERE p2.age = minAge  
RETURN p2.name, p2.age, avgAge, avgAge-  
p2.age AS Difference
```





## Part 2

- Use a new database.
- In the Neo4j Browser, create a new (blank) database and type the following command:

```
tdb$ :play movies
```

- This will return the following:

The Movie Graph

**Create**

To the right is a giant code block containing a single Cypher query statement composed of multiple CREATE clauses. This will create the movie graph.

1. Click on the code block
2. Notice it gets copied to the editor above ↑
3. Click the editor's play button to execute
4. Wait for the query to finish

WARNING: This adds data to the current database, each time it is run!

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- Go to page 2 and follow steps 1 to 4.
- A series of 171 nodes (representing Movies and People) and 253 relationships (such as ACTED\_IN, DIRECTED etc.) between the nodes should now be created.
- Type MATCH(n) RETURN n to see all nodes and relationships:

Database Information

Use database: tdb

Node Labels: Movie, Person

Relationship Types: ACTED\_IN, DIRECTED, PRODUCED, REVIEWED, WRITING

Property Keys: born, name, rating, released, roles, summary, tagline, title

Connected as: Username: neo4j, Roles: -

tdb\$ MATCH(n) RETURN n

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Displaying 171 nodes, 253 relationships.

- Show each movie node for movies that were released between 2000 and 2010

```
match(m:Movie) where m.released >= 2000 and m.released <= 2010  
return m
```



- Set an attribute called olderThan70 to true for all Persons born in the 1930s.

```
match(p:Person) where p.born >= 1930 and p.born <= 1939
set p.olderThan70 = true
return p
```

- Show the movie title and the year it was released for the first 10 movies in alphabetical order.

```
match(m:Movie) RETURN m.title, m.released ORDER BY m.title LIMIT 10
```

- Show the unique years in which movies were released in chronological order.

```
match(m:Movie) RETURN distinct m.released ORDER BY m.released
```

- Show the title and tagline for movies released in 1999.

```
match(m:Movie{released:1999}) return m.title, m.tagline
```

or

```
match(m:Movie) WHERE m.released=1999 return m.title, m.released
```

- Show the names of the people (as *People*) and the year they were born (as *YOB*) for everyone older than "Robin Williams".

```
MATCH(p:Person{name:"Robin Williams"}) with p.born as williamsBorn
MATCH(p1:Person) WHERE p1.born < williamsBorn
RETURN p1.name AS Person, p1.born as YOB
ORDER BY YOB, Person
```

- Show the number of movies released in 2006 (as *Releases\_in\_2006*).

```
MATCH(m:Movie{released:2006}) return count(m) AS Releases_in_2006
```

- Show the name (as *Name*) and born (as *YOB*) the youngest Person(s).

```
MATCH(p:Person) WITH max(p.born) as youngest
MATCH(p1:Person) WHERE p1.born = youngest
RETURN p1.name as Name, p1.born as YOB
```