

Advanced Databases - Lab 4 (hands on Neo4j)

Environment set up

For this first step, we will use a Neo4j instance hosted on a cloud server.

1. Create a user account on <https://sandbox.neo4j.com>
2. Create an empty project (Blank Sandbox)
3. Once created, open this project using the browser (by clicking on the button **Open with Browser**).

In this lab, we will explore a graph database in Neo4j using the Cypher query language.

- nodes are abstract entities,
- relations/edges are oriented links between nodes,
- properties/Attributees are labels associated to a node or to a relation

Cypher Query:

- **MATCH** : specifying the search pattern
- **WHERE** : filtering results
- **RETURN** : results format
- **LIMIT** : specification of the size of the displayed results
- **ORDER BY** : sorting results

Recall Cypher queryies

- Delete all nodes and relationships (edges)

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

- Create node of type 'Person' that have Tom as name (name: 'Tom') and consultant as job (job: 'Consultant').

```
CREATE (n:Person { name: 'Tom', job: 'Consultant' })
```

- Search for people having less than 30 year old.

```
MATCH (n:Person)
WHERE n.age < 30
RETURN n.name, n.age
```

- Add relation Own between a **person** whose name is Jack and he own a **car** whose model is 'Clio'

```
MATCH (p:Person),(c:Car) WHERE p.lastname = 'Jack' AND c.modele = 'Clio'
CREATE (p)-[r:Own]->(c)
```

- Change Tom's job from Consultant to Manager

```
MATCH (p: Person)
WHERE p.name='TOM'
SET p.metier = 'Manager'
RETURN p
```

Your turn

Note: If you run the cypher query many times. The answers will be duplicated. If you want to delete all the relationships, here the query: `MATCH (a) -[r]-> (b) DELETE r` and to delete all `MATCH (n) DELETE n`.

1. Start by creating nodes with different Attributes(properties) as represented in table 1

Id	Label	Attribute 1	Attribute 2	Attribute 3	Attribute 4
S1	Student	studentNum : 172	lastname : 'Richard'	firstname : 'Ana'	firstname2 : 'Maria'
S2	Student	studentNum : 284	lastname : 'Leroux'	firstname : 'Nicolas'	firstname2 : 'Jean'
S3	Student	studentNum : 145	lastname : 'Marc'	firstname : 'Alex'	
S4	Student	studentNum : 189	lastname : 'Bern'	firstname : 'Clara'	
S5	Student	studentNum : 187	lastname : 'Lavoisier'	firstname : 'Sarah'	

Id	Label	Attribute 1	Attribute 2
C1	Course	courseNum : 1	courseName : 'Data Science'
C2	Course	courseNum : 2	courseName : 'Data bases'
C3	Course	courseNum : 3	courseName : 'Virtualisation'

Id	Label	Attribute 1	Attribute 2
P1	Project	NumProject : 34	projectName : 'Data mining'
P2	Project	NumProject : 44	projectName : 'Data Analysis'
P3	Project	NumProject : 3	projectName : 'Machine learning'
P4	Project	NumProject : 51	projectName : 'Virtualisation'

Id	Label	Attribute 1
R1	room	roomName : 'B001'
R2	room	roomName : 'Amphi'
R3	room	roomName : 'E002'
R4	room	roomName : 'k001'
R5	room	roomName : '02'

Table 1: Nodes to be created

2. Create the links between the nodes created on question 1 using the table 1 information.

from	Label	To
C1	TakePlaceAt	R1
C1	TakePlaceAt	R3
C1	TakePlaceAt	R4
C2	TakePlaceAt	R2

from	Label	To
S1	Attend	C1
S2	Attend	C1
S3	Attend	C2
S4	Attend	C1

from	Label	To	Attribute
S1	workOn	P1	Hours : '1'
S1	workOn	P2	Hours : '2'
S2	workOn	P1	Hours : '3'
S2	workOn	P2	Hours : '4'
S2	workOn	P3	Hours : '1'
S2	workOn	P4	Hours : '1'
S3	workOn	P1	Hours : '1'
S3	workOn	P2	Hours : '2'
S3	workOn	P4	Hours : '3'

Table 2: Relationships to be added

Now that the database contains data, we will be able to perform some manipulations and queries :

1. Give students' lastname.
2. List all projects
3. Add another student using your lastname and firstname.
4. Create the Course 'C4' whose title is "Nosql". Link the student just created in question 3 to this Course.
5. In which rooms do classes with the number "1" take place? Retrieve the names of the courses and the names of the rooms in which the course takes place.
6. How many Hours and in which projects does the student with `studentNum` is equal to "172" work? Retrieve the student's firstname, the project the student is working on, and the corresponding Hours worked on the project.

7. Which students and how many hours are they working on the project with project number '51'? Give the project name, the student's last name, and the corresponding number of hours worked on the project.
8. Which students are working on which projects and how many hours? Collect students' last names, the names of the projects they are working on, and the corresponding number of hours. Sort the results by student last name. Limit the results to four.
9. Which students have the same last name and work on the same projects? Give the first name of the students and the name of the projects they share.
10. What is the average time that students spend on a project.
11. Which students are taking the same course and working on the same project.