uc3m Universidad Carlos III de Madrid

OpenCourseWare Database

Lourdes Moreno López Paloma Martínez Fernández José Luis Martínez Fernández Rodrigo Alarcón García

Lab demo 4 (Topic neo4j (3.4))





Data Base Bachelor in Data Science and Engineering SUBJECT: Lab demo 4 (Topic 3.4: neo4j)



In this lab demo, we will work the neo4j application and will use the language Cypher.

Part 1: Create nodes and relationships with their properties

1.1. Create nodes with the given properties. (see Figure 1)

CREATE (n {name: {value}})

```
Example:
```

```
CREATE (Maria:Person {name:'Maria', born:1974})
CREATE (Juan:Person {name:'Juan', born:1977})
CREATE (Jose:Person {name:'José', born:1981})
CREATE (Hugo:Person {name:'Hugo', born:1980})
CREATE (Natalia:Person {name:'Natalia', born:1977})
CREATE (Roberto:Person {name:'Roberto', born:1975})
CREATE (Rosa:Person {name:'Rosa', born:1982})
```

```
CREATE (UC3M:University {name:'Universidad Carlos III de
Madrid', central_office:'Leganés'})
CREATE (UCM:University {name:'Universidad Complutense de
Madrid', central office:'Madrid'})
```



Figure 1

Recover all nodes and relationships (display graph) (see Figure 2 and Figure 3) MATCH (n) RETURN n

😻 neo4j@bolt://	localhost:7687 - Neo4j Browser		
File Edit View	Window Help Developer		
6	Database Information		\$
\overleftrightarrow	Node Labels	\$ MA	TCH (n) RETURN n
	(9) Person University	Graph	n
	Relationship Types	H	
	No relationships in database	Table	{ "name": "Maria".
	Property Keys	A	"born": 1974
		124	1
	Dob born central_office	>_	1
	grade last_name name	Code	
	orientation		{
			"name": "Juan".
	Connected as		"born": 1977
			}
	Username: neo4j Poles: admin		
	Admin: Server user list		
	Server user add		
			{
	Database		"name": "José".
	Version: 3.5.12	Sta	rted streaming 9 records after 1 ms and completed after 2 ms.





Figure 3

1.1. Create relationships with the given properties

CREATE (n)-[r:KNOWS]->(m)

```
CREATE
(Maria)-[:CLASSMATE_OF {role:['Database course']}]->(Juan),
(Maria)-[:CLASSMATE_OF {role:['Discrete mathematics course']}]-
>(Jose),
```

```
(Juan)-[:CLASSMATE_OF {role:[' Discrete mathematics course']}]-
>(Hugo),
(Roberto)-[:CLASSMATE_OF {role:['Automata theory and compilers
course']}]->(Natalia),
(Miriam)-[:CLASSMATE_OF {role:['Automata theory and compilers
course']}]->(Rosa)
CREATE
(Maria)-[:STUDY_AT {campus:['Leganes']}]->(UC3M),
(Rosa)-[:STUDY_AT {campus:['Paraninfo']}]->(UCM),
(Juan)-[:STUDY_AT {campus:['Colmenarejo']}]->(UC3M),
(Hugo)-[:STUDY_AT {campus:['Colmenarejo']}]->(UC3M)
(Hugo)-[:STUDY_AT {campus:['Colmenarejo']}]->(UC3M)
CREATE
(Juan)-[:IS FAMILY OF { relationship:['cousin']}]->(Rosa)
```

Recover all nodes and relationships (display graph) (see Figure 4) MATCH (n) RETURN n



Figure 4

Write a query to display the schema of your database.

CALL db.schema()



Part 2: Queries

2.1. Search by node property

Search for Maria (see Figure 5)

MATO	СН	(hername	{name:	"Maria"})	RETURN	hername	
\$ MA	TCH (hername {name:	"Maria"}) RE	TURN hername			
() Graph	*(1)	Person(1)					
Table							
A Text							
کے Code							
						Maria	

Figure 5

2.2: Search by node and relationship

Search Maria's classmates (see Figure 6)

```
MATCH (Maria {name: "Maria"})-[:CLASSMATE_OF]->(classmates)
RETURN classmates
```

\$ M/	ATCH (Maria {name: "Maria"})-[:CLASSMATE_OF] $ ightarrow$ (classmates) RETURN classmates
Ø	*(2) Person(2)
Graph	
Ħ	
Table	
A Text	
	Juse
Code	
	Juan
	Displaying 2 nodes, 0 relationships.

Figure 6

2.3 Search by node and relationship

All people who study at UC3M (see Figure 7)

MATCH (people)-[:STUDY_AT]-> (UC3M {name: 'Universidad Carlos
III de Madrid'}) RETURN people.name

\$ MA	TCH (people)-[:STUDY_AT] \rightarrow (UC3M {name: 'Universidad Carlos III de Madrid'}) RETURN people.name
H Table	people.name
A Text	"Hugo"
>_	"Juan"
Code	"Maria"
Star	rted streaming 3 records after 1 ms and completed after 1 ms.

Figure 7

2.4. Search by two chained relationships

List of Maria's classmates (see Figure 8)

```
MATCH (Maria {name: 'Maria'})-[:CLASSMATE_OF]->()-
[:CLASSMATE_OF]->(classmates_of_classmate) RETURN
classmates_of_classmate.name
```

\$ M4	ATCH (Maria {name: 'Maria'})-[:CLASSMATE_OF]→()-[:CLASSMATE_OF]→(classmates_of_classmate) RETURN classmates_of_classmate.na…	÷
1 Table	classmates_of_classmate.name	
A Text	"Hugo"	
⊃_ Code		
St	arted streaming 1 records after 1 ms and completed after 1 ms.	

Figure 8

2.5. Search for a relationship

List of people and who study in universities (see Figure 9)

```
MATCH (person)-[:STUDY_AT]->(university) RETURN person.name,
university.name
```

\$ MA	<pre>\$ MATCH (person)-[:STUDY_AT]→(university) RETURN person.name, university.name</pre>						
Table	person.name	university.name					
A Text Code	"Rosa"	"Universidad Complutense de Madrid"					
	"Hugo"	"Universidad Carlos III de Madrid"					
	"Maria"	"Universidad Carlos III de Madrid"					
	"Juan"	"Universidad Carlos III de Madrid"					
Started streaming 4 records after 1 ms and completed after 1 ms.							

Figure 9

2.6: Search with conditions

People born after 1979 (see Figure 10)

MATCH (p:Person) WHERE p.born > 1979 RETURN p.name

\$ MATCH (p:Person) WHERE p.born > 1979 RETURN p.name

Table	p.name
A Text	"Rosa"
>_	"Hugo"
Code	"José"

Started streaming 3 records after 1 ms and completed after 6 ms.

Figure 10

PART3 Update elements of the graph

3.1. Update properties to a node (see Figure 11)

```
MERGE (p:Person {name: 'Maria'}) SET p.age = 28, p.hair =
'brown' RETURN p
```



Figure 11

3.2 Update properties to a relationship (see Figure 12)

MERGE (Maria)-[r:CLASSMATE_OF]->(Juan) SET r.ages =1 RETURN r

\$ MERGE (Maria)-[r:CLASSMATE_OF]→(Juan) SET r.ages =1 RETURN r

Table	"r"	
	{"ages":1,"role":["Automata theory and compilers course"]}
dt	{"ages":1,"role":["Automata theory and compilers course"]}
>_ Code	{"ages":1,"role":["Database course"]}	
	{"ages":1,"role":["Discrete mathematics course"]}	
	{"ages":1,"role":[" Discrete mathematics course"]}	



PART4: Aggregation functions

List of the years of birth of the people grouped and indicating the number. (See Figure 13) MATCH (p:Person) return p.born, count (*)

\$ MA	TCH (p:Person) return p.born,	count (*)	لك	\$2	е ⁷⁷	^	Q	×
Table	p.born	count (*)						
A	1977	2						
>_	1981	1						
Code	1980	1						
	1975	1						
	1982	1						

Started streaming 5 records after 14 ms and completed after 14 Activar Windows

Figure 13

MATCH (p:Person)--(u: University)RETURN u.central_office, count(*)

(see Figure 14)

\$ M4	<pre>\$ MATCH (p:Person)(u: University)RETURN u</pre>			∠ ⁷	\sim	Q	\times
Table	u.central_office	coun	t(*)				
A Text	"Leganés"	2					
∑_ Code	"Madrid"	1					
Started streaming 2 records after 11 ms and completed after 11 ms.							

Figure 14

PART4: Delete graph elements

4.1. Delete relationships between nodes

MATCH (Maria)-[:CLASSMATE_OF]->(Juan) DELETE r

4.2. Delete nodes

In order to delete the nodes, the relationships between them must be deleted.
MATCH (p:Person {name: 'Maria'}) DELETE p

Return error because the relationships between them must be deleted

MATCH (p:Person {name: 'Maria'}) -[r]-() DELETE p, r

4.3 Delete the entire graph

MATCH (n) OPTIONAL MATCH (n)-[r]-() DELETE n,r