

Протокол виконання Task 1 з курсу Distributed Databases 2021-2022

Навза: Робота з базовими функціями граф-орієнтованої БД на прикладі Neo4j

Слухач: Дмитро Дьомін (mr.diomin@gmail.com)

1. Моделювання предметної області онлайн-магазину:

Є: Items(id, name, price), Customers(id, name), Orders(id, date)

Customer може мати (bought) багато Orders

Item може входити (contains) в декілька Orders

Customer може переглядати (view), але при цьому не купувати Items

Запит:

```
// load books e-shop
```

```
// This is an initialization script for the online shop graph.
```

```
CREATE (Kohut:User {name:'Ivan Kohut', born:1961})
```

```
CREATE (Lysytsia:User {name:'Oksana Lysytsia', born:1960})
```

```
CREATE (Vovk:User {name:'Iryna Vovk', born:1967})
```

```
CREATE (Zozulia:User {name:'Taras Zozulia', born:1967})
```

```
CREATE (Piven:User {name:'Petro Piven', born:1967})
```

```
CREATE (Yenot:User {name:'Stepan Yenot', born:1967})
```

```
CREATE (DesDatIntApp:Book {title:'Designing Data-Intensive Applications', published:2020, price:49.99})
```

```
CREATE (DBInternals:Book {title:'Database Internals', published:2017, price:39.99})
```

```
CREATE (NoSQLDis:Book {title:'NoSQL Distilled', published:2015, price:24.99})
```

```
CREATE (BuildMicros:Book {title:'Building Microservices: Designing Fine-Grained Systems', published:2021, price:62.10})
```

```
CREATE (MicrosPatterns:Book {title:'Microservices patterns', published:2016, price:35.84})
```

```
CREATE (LearnSpark:Book {title:'Learning Spark: Lightning-Fast Data Analytics', published:2020, price:19.99})
```

```
CREATE (DAMA:Book {title:'DAMA-BOOK: Data Management Body of Knowledge', published:2017, price:33.99})
```

```
CREATE (DataWarTool:Book {title:'The Data Warehouse Toolkit', published:2013, price:54.99})
```

```
CREATE (Ord1:Order {id:1, date:2021-12-11, delivery_method:'bookshop'})
```

```
CREATE (Ord2:Order {id:2, date:2021-12-11, delivery_method:'post'})
```

```
CREATE (Ord3:Order {id:3, date:2021-12-19, delivery_method:'courier'})
```

```
CREATE (Ord4:Order {id:4, date:2021-12-19, delivery_method:'courier'})
```

```
CREATE (Ord5:Order {id:5, date:2021-12-19, delivery_method:'courier'})
```

```
CREATE (Ord6:Order {id:6, date:2021-12-25, delivery_method:'post'})
```

```
CREATE (Ord7:Order {id:7, date:2021-12-26, delivery_method:'bookshop'})
```

```
CREATE (Ord8:Order {id:8, date:2021-12-27, delivery_method:'bookshop'})
```

```
CREATE
```

```
(Ord1)-[:BOOKS]->(MicrosPatterns),
```

```
(Ord1)-[:BOOKS]->(BuildMicros),
```

```
(Ord2)-[:BOOKS]->(DAMA),
```

```
(Ord3)-[:BOOKS]->(DAMA),
(Ord3)-[:BOOKS]->(DataWarTool),
(Ord4)-[:BOOKS]->(DesDatIntApp),
(Ord5)-[:BOOKS]->(DesDatIntApp),
(Ord6)-[:BOOKS]->(DesDatIntApp),
(Ord7)-[:BOOKS]->(DesDatIntApp),
(Ord7)-[:BOOKS]->(DBInternals),
(Ord7)-[:BOOKS]->(NoSQLDis),
(Ord8)-[:BOOKS]->(LearnSpark)
```

CREATE

```
(Kohut)-[:ORDERED]->(Ord1),
(Kohut)-[:ORDERED]->(Ord4),
(Lysytsia)-[:ORDERED]->(Ord2),
(Lysytsia)-[:ORDERED]->(Ord8),
(Lysytsia)-[:ORDERED]->(Ord6),
(Vovk)-[:ORDERED]->(Ord5),
(Vovk)-[:ORDERED]->(Ord3),
(Zozulia)-[:ORDERED]->(Ord7)
```

CREATE

```
(Kohut)-[:VIEWED]->(MicrosPatterns),
(Kohut)-[:VIEWED]->(BuildMicros),
(Kohut)-[:VIEWED]->(DesDatIntApp),
(Kohut)-[:VIEWED]->(DBInternals),
(Kohut)-[:VIEWED]->(NoSQLDis),
(Lysytsia)-[:VIEWED]->(DAMA),
(Lysytsia)-[:VIEWED]->(LearnSpark),
(Lysytsia)-[:VIEWED]->(DesDatIntApp),
(Lysytsia)-[:VIEWED]->(DataWarTool),
(Lysytsia)-[:VIEWED]->(BuildMicros),
(Vovk)-[:VIEWED]->(DesDatIntApp),
(Vovk)-[:VIEWED]->(DAMA),
(Vovk)-[:VIEWED]->(DataWarTool),
(Vovk)-[:VIEWED]->(NoSQLDis),
(Vovk)-[:VIEWED]->(DBInternals),
(Zozulia)-[:VIEWED]->(DesDatIntApp),
(Zozulia)-[:VIEWED]->(DBInternals),
(Zozulia)-[:VIEWED]->(NoSQLDis),
(Piven)-[:VIEWED]->(DBInternals),
(Piven)-[:VIEWED]->(BuildMicros),
(Enot)-[:VIEWED]->(DesDatIntApp),
(Enot)-[:VIEWED]->(BuildMicros),
(Enot)-[:VIEWED]->(DBInternals)
```

Відповідь:

Added 22 labels, created 23 nodes, set 60 properties, created 43 relationships, completed after 83 ms.

2. Написання запитів:

2.1 Знайти Items які входять в конкретний Order (за Order id)

Запит:

```
MATCH (p:Order {id: 7})-[rel:BOOKS]->(b:Book) return b.title
```

Відповідь:



The screenshot shows the Neo4j query interface. The query entered is `MATCH (p:Order {id: 7})-[rel:BOOKS]->(b:Book) return b.title`. The results are displayed in a table with one column, `b.title`. There are three rows of data. The status bar at the bottom indicates that 3 records were streamed after 1 ms and completed after 2 ms.

b.title
"NoSQL Distilled"
"Database Internals"
"Designing Data-Intensive Applications"

2.2 Підрахувати вартість конкретного Order

Запит:

```
MATCH (p:Order {id: 7})-[rel:BOOKS]->(b:Book) return sum(b.price)
```

Відповідь:



The screenshot shows the Neo4j query interface. The query entered is `MATCH (p:Order {id: 7})-[rel:BOOKS]->(b:Book) return sum(b.price)`. The results are displayed in a table with one column, `sum(b.price)`. There is one row with the value 114.97. The status bar at the bottom indicates that 1 record was streamed after 2 ms and completed after 9 ms.

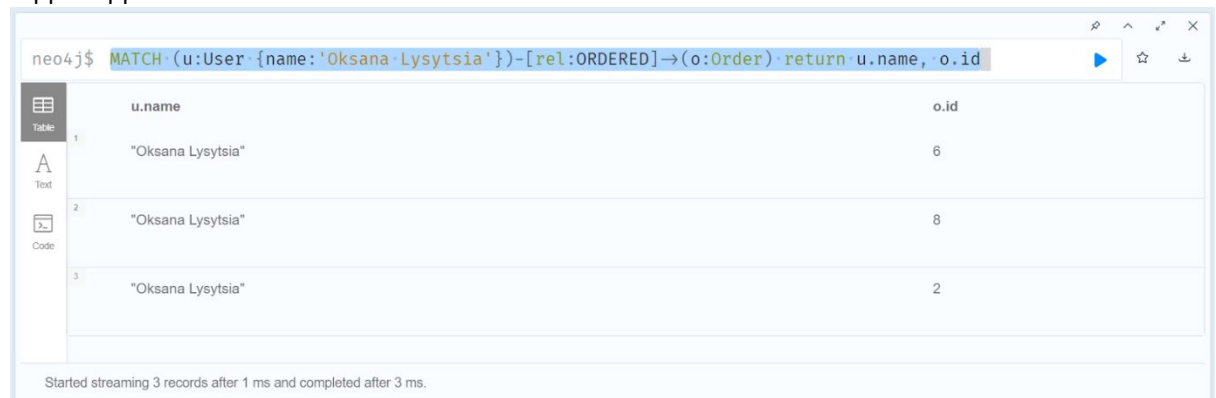
sum(b.price)
114.97

2.3 Знайти всі Orders конкретного Customer

Запит:

```
MATCH (u:User {name:'Oksana Lysytsia'})-[rel:ORDERED]->(o:Order) return u.name, o.id
```

Відповідь:



The screenshot shows the Neo4j query interface. The query entered is `MATCH (u:User {name:'Oksana Lysytsia'})-[rel:ORDERED]->(o:Order) return u.name, o.id`. The results are displayed in a table with two columns, `u.name` and `o.id`. There are three rows of data. The status bar at the bottom indicates that 3 records were streamed after 1 ms and completed after 3 ms.

u.name	o.id
"Oksana Lysytsia"	6
"Oksana Lysytsia"	8
"Oksana Lysytsia"	2

2.4 Знайти всі Items куплені конкретним Customer (через його Orders)

Запит:

```
MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, b.title
```

Відповідь:

neo4j\$ `MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, b.title`

	u.name	b.title
1	"Iryna Vovk"	"The Data Warehouse Toolkit"
2	"Iryna Vovk"	"DAMA-BOOK: Data Management Body of Knowledge"
3	"Iryna Vovk"	"Designing Data-Intensive Applications"

Started streaming 3 records after 1 ms and completed after 2 ms.

2.5 Знайти загальну кількість Items куплені конкретним Customer (через його Order)

Запит:

`MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, count(b.title)`

Відповідь:

neo4j\$ `MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, count(b.title)`

	u.name	count(b.title)
1	"Iryna Vovk"	3

Started streaming 1 records after 1 ms and completed after 4 ms.

2.6 Знайти для Customer на яку загальну суму він придбав товарів (через його Order)

Запит:

`MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, sum(b.price)`

Відповідь:

neo4j\$ `MATCH (u:User {name:'Iryna Vovk'})-[:ORDERED]->(o:Order)-[:BOOKS]->(b:Book) return u.name, sum(b.price)`

	u.name	sum(b.price)
1	"Iryna Vovk"	138.97

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

2.7 скільки разів кожен товар був придбаний, відсортувати за цим значенням

Запит:

`MATCH (o:Order)-[:BOOKS]->(b:Book) return b.title, count(b) ORDER BY count(b) DESC`

Відповідь:

neo4j\$ `MATCH (o:Order)-[:BOOKS]->(b:Book)-return b.title, count(b)-ORDER BY count(b)-DESC`

	b.title	count(b)
1	"Designing Data-Intensive Applications"	4
2	"DAMA-BOOK: Data Management Body of Knowledge"	2
3	"Database Internals"	1
4	"NoSQL Distilled"	1
5	"Building Microservices: Designing Fine-Grained Systems"	1
6	"Microservices patterns"	1
7	"Learning Spark: Lightning-Fast Data Analytics"	1
8	"The Data Warehouse Toolkit"	1

2.8 Знайти всі Items переглянуті (view) конкретним Customer

Запит:

`MATCH (u:User {name:'Iryna Vovk'})-[:VIEWED]->(b:Book) return u.name, b.title`

Відповідь:

neo4j\$ `MATCH (u:User {name:'Iryna Vovk'})-[:VIEWED]->(b:Book) return u.name, b.title`

	u.name	b.title
1	"Iryna Vovk"	"Database Internals"
2	"Iryna Vovk"	"NoSQL Distilled"
3	"Iryna Vovk"	"The Data Warehouse Toolkit"
4	"Iryna Vovk"	"DAMA-BOOK: Data Management Body of Knowledge"
5	"Iryna Vovk"	"Designing Data-Intensive Applications"

Started streaming 5 records after 2 ms and completed after 4 ms.

2.9 Знайти інші Items що купувались разом з конкретним Item (тобто всі Items що входять до Order-s разом з даними Item)

Запит:

`MATCH (b:Book {title:'Designing Data-Intensive Applications'})<-[:BOOKS]-(o:Order)-[:BOOKS*1]->(b2:Book) return b.title, b2.title`

Відповідь:

```
neo4j$ MATCH (b:Book {title:'Designing Data-Intensive Applications'})<-[:BOOKS]-(o:Order)-[:BOOKS*1]→(b2:Book)·return b.title, b2.title
```

	b.title	b2.title
1	"Designing Data-Intensive Applications"	"NoSQL Distilled"
2	"Designing Data-Intensive Applications"	"Database Internals"

Started streaming 2 records after 1 ms and completed after 26 ms.

2.10 Знайти Customers які купили даний конкретний Item

Запит:

```
MATCH (b:Book {title:'Designing Data-Intensive Applications'})<-[:BOOKS]-(o:Order)<-[:ORDERED]-(u:User) return b.title, u.name
```

Відповідь:

```
neo4j$ MATCH (b:Book {title:'Designing Data-Intensive Applications'})<-[:BOOKS]-(o:Order)<-[:ORDERED]...
```

	b.title	u.name
1	"Designing Data-Intensive Applications"	"Taras Zozulia"
2	"Designing Data-Intensive Applications"	"Oksana Lysytsia"
3	"Designing Data-Intensive Applications"	"Iryna Vovk"
4	"Designing Data-Intensive Applications"	"Ivan Kohut"

Started streaming 4 records after 1 ms and completed after 4 ms.

2.11 Знайти для певного Customer(а) товари, які він переглядав, але не купив

Запит:

```
MATCH (u:User)-[:VIEWED]→(b:Book) WHERE u.name='Iryna Vovk' WITH collect(b.title) as viewed MATCH (u:User)-[:ORDERED]→(o:Order)-[:BOOKS]→(b:Book) WHERE u.name = 'Iryna Vovk' WITH viewed, collect(b.title) as bought return [title IN viewed WHERE NOT title IN bought] AS viewed_and_not_bought
```

Відповідь:

```
neo4j$ MATCH (u:User)-[:VIEWED]→(b:Book) WHERE u.name='Iryna Vovk' WITH collect(b.title) as viewed MATCH (u:User)-[:ORDERED]→(o:Order)-[:BOOKS]→(b:Book) WHERE u.name = 'Iryna Vovk' WITH viewed, collect(b.title) as bought return [title IN viewed WHERE NOT title IN bought] AS viewed_and_not_bought
```

	viewed_and_not_bought
1	["Database Internals", "NoSQL Distilled"]

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