

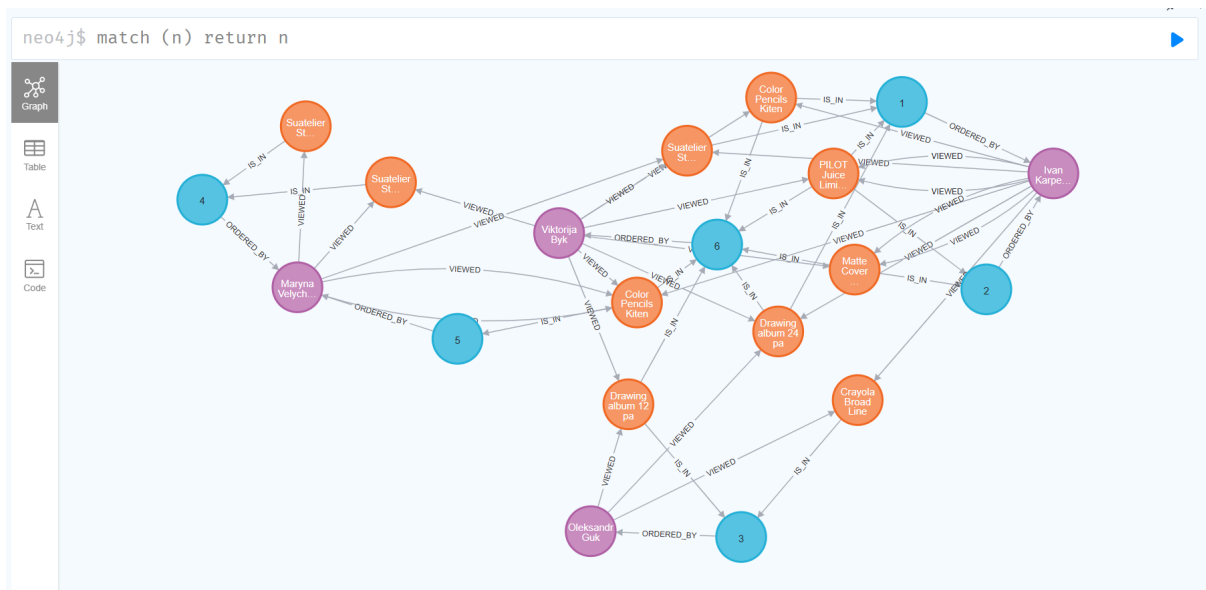
Task 3 – neo4j

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The source code may be reached by the link on GitHub

<https://github.com/AnnaBuchko/DistributedDatabases/tree/master/Task3-neo4j/Task3-neo4j>

- Modeled graph (the script can be found in file: https://github.com/AnnaBuchko/DistributedDatabases/blob/master/Task3-neo4j/Task3-neo4j/cypher_script/create_graph.cypher)



- Query the graph:
 - Знайти Items які входять в конкретний Order

```
1 MATCH (item:Item)-[r:IS_IN]→(order:Order{id: 6})
2 RETURN item.title, item.price, r.count
```

item.title	item.price	r.count
"Matte Cover Spiral Notebook - A5 - Dot Line"	1.5	30
"PILOT Juice Limited Edition Gel Pen "	2.0	100
"Drawing album 12 pages"	10.0	20
"Color Pencils Kiten, 18 Colors"	9.0	10
"Color Pencils Kiten, 12 Colors"	7.0	20
"Drawing album 24 pages"	13.5	10

- Підрахувати вартість конкретного Order

o.id	item.title	item.price	r.count
1	"PILOT Juice Limited Edition Gel Pen "	2.0	1
1	"Suatelier Deco Stickers Spiderman"	1.4	1
1	"Drawing album 24 pages"	13.5	1
1	"Color Pencils Kiten, 12 Colors"	7.0	1

X COLUMN WIDTH:

```
MATCH (item:Item)-[r:IS_IN]→(o:Order{id: 1})
RETURN o.id, SUM(r.count * item.price)
```

o.id	SUM(r.count * item.price)
1	23.9

- Знайти всі Orders конкретного Customer

```
MATCH (o:Order)-[r:ORDERED_BY]→(c:Customer{name:'Ivan Karpenko'})
RETURN o.id, r.created_at ORDER BY r.created_at
```

o.id	r.created_at
1	"2025-01-31"
2	"2025-02-24"

- Знайти всі Items куплені конкретним Customer (через Order)

```
MATCH (i:Item)-[r1:IS_IN]→(o:Order)-[r2:ORDERED_BY]→(c:Customer{name:'Ivan Karpenko'})
RETURN DISTINCT i.title
```

i.title
"PILOT Juice Limited Edition Gel Pen "
"Matte Cover Spiral Notebook - A5 - Dot Line"
"Suatelier Deco Stickers Spiderman"
"Drawing album 24 pages"
"Color Pencils Kiten, 12 Colors"

- Знайти кількість Items куплені конкретним Customer (через Order)

```
MATCH (i:Item)-[r1:IS_IN]→(o:Order)-[r2:ORDERED_BY]→(c:Customer {name: 'Ivan Karpenko'})
RETURN i.title,COUNT(i.title) AS no_times_was_ordered, SUM(r1.count) AS no_items
```

i.title	no_times_was_ordered	no_items
"PILOT Juice Limited Edition Gel Pen "	2	5
"Matte Cover Spiral Notebook - A5 - Dot Line"	1	2
"Suatelier Deco Stickers Spiderman"	1	1
"Drawing album 24 pages"	1	1
"Color Pencils Kiten, 12 Colors"	1	1

- Знайти для Customer на яку суму він придбав товарів (через Order)

i.title	no_items	i.price	SUM(r1.count * i.price)
"PILOT Juice Limited Edition Gel Pen "	5	2.0	10.0
"Matte Cover Spiral Notebook - A5 - Dot Line"	2	1.5	3.0
"Suatelier Deco Stickers Spiderman"	1	1.4	1.4
"Drawing album 24 pages"	1	13.5	13.5
"Color Pencils Kiten, 12 Colors"	1	7.0	7.0

```
MATCH (i:Item)-[r1:IS_IN]→(o:Order)-[r2:ORDERED_BY]→(c:Customer {name: 'Ivan Karpenko'})
RETURN SUM(r1.count * i.price)
```

SUM(r1.count * i.price)
34.9

- Знайти скільки разів кожен товар був придбаний, відсортувати за цим значенням

```
MATCH (i:Item)-[r1:IS_IN]→(o:Order)
RETURN i.title, COUNT(i) AS no_was_ordered
ORDER BY COUNT(i)
```

i.title	no_was_ordered
"Crayola Broad Line Markers, Assorted Classic Colors, Box Of 10, 18 Colors"	1
"Suatelier Deco Stickers Unicorns"	1
"Suatelier Deco Stickers Paw Patrol"	1
"Suatelier Deco Stickers Spiderman"	1
"Color Pencils Kiten, 12 Colors"	2

"Color Pencils Kiten, 18 Colors"	2
"Drawing album 12 pages"	2
"Drawing album 24 pages"	2
"Matte Cover Spiral Notebook - A5 - Dot Line"	2
"PILOT Juice Limited Edition Gel Pen "	3

- Знайти всі Items переглянуті (view) конкретним Customer

```
MATCH (c:Customer{name: 'Maryna Velychko'})-[r:VIEWED]→(i:Item) RETURN i.title, r.viewed_at
```

i.title	r.viewed_at
"Color Pencils Kiten, 18 Colors"	"2025-03-03"
"Color Pencils Kiten, 18 Colors"	"2025-03-01"
"Suatelier Deco Stickers Unicorns"	"2025-03-01"
"Suatelier Deco Stickers Paw Patrol"	"2025-03-01"
"Suatelier Deco Stickers Spiderman"	"2025-03-01"

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

```
MATCH (o1:Order)←[:IS_IN]-(i: Item {title: 'Drawing album 12 pages'})
MATCH (i: Item)-[:IS_IN]→(o2:Order)
WHERE o2 = o1
RETURN i.title, o2.id
```

i.title	o2.id
"Color Pencils Kiten, 12 Colors"	6
"Color Pencils Kiten, 18 Colors"	6
"Drawing album 12 pages"	6
"Drawing album 24 pages"	6
"PILOT Juice Limited Edition Gel Pen "	6
"Matte Cover Spiral Notebook - A5 - Dot Line"	6
"Crayola Broad Line Markers, Assorted Classic Colors, Box Of 10, 18 Colors"	3
"Drawing album 12 pages"	3

- Знайти Customers які купили даний конкретний Item

```
MATCH (i:Item WHERE i.title CONTAINS 'Gel Pen')-[r1:IS_IN]→(o:Order)-[r2:ORDERED_BY]→(c:Customer)
RETURN c.name, SUM(r1.count)
```

c.name	SUM(r1.count)
"Viktorija Byk"	100
"Ivan Karpenko"	5

- Знайти для певного Customer(a) товари, які він переглядав, але не купив

Ordered Items

i.title	o.id
"PILOT Juice Limited Edition Gel Pen "	2
"Matte Cover Spiral Notebook - A5 - Dot Line"	2
"PILOT Juice Limited Edition Gel Pen "	1
"Suatelier Deco Stickers Spiderman"	1
"Drawing album 24 pages"	1
"Color Pencils Kiten, 12 Colors"	1

Viewed

i.title	r.viewed_at
"Crayola Broad Line Markers, Assorted Classic Colors, Box Of 10, 18 Colors"	"2025-02-24"
"Matte Cover Spiral Notebook - A5 - Dot Line"	"2025-02-24"
"PILOT Juice Limited Edition Gel Pen "	"2025-02-24"
"PILOT Juice Limited Edition Gel Pen "	"2025-01-31"
"Matte Cover Spiral Notebook - A5 - Dot Line"	"2025-01-31"
"Suatelier Deco Stickers Spiderman"	"2025-01-31"
"Drawing album 24 pages"	"2025-01-31"
"Color Pencils Kiten, 18 Colors"	"2025-01-31"
"Color Pencils Kiten, 12 Colors"	"2025-01-31"

viewed but not bought

```
MATCH (c:Customer {name: 'Ivan Karpenko'})-[r:VIEWED]→(i:Item)
WHERE NOT (i)-[:IS_IN]→(:Order)-[:ORDERED_BY]→(c)
RETURN i.title
```

i.title
"Crayola Broad Line Markers, Assorted Classic Colors, Box Of 10, 18 Colors"
"Color Pencils Kiten, 18 Colors"

Update field task. For update used node:

```
CREATE (pencils12:Item {id: 4, title: 'Color Pencils Kiten, 12 Colors', price: 7.0, no_like:0})
```

there was running 10 connection simultaneously:

Database	User	Query	Params	Meta	Elapsed time	Kill
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	288 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	189 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	1610 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	90 ms	⊖
neo4j	neo4j	SHOW TRANSACTIONS YIELD currentQ...	{}	{ "app": "neo4j-browser_v2025.2....	7 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	239 ms	⊖
neo4j	neo4j		{}	{}	541 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	39 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	1333 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	890 ms	⊖
neo4j	neo4j	MATCH (n:Item) WHERE n.id = 4 SE...	{}	{}	141 ms	⊖

the execution time for 10 clints and 10 000 updates each was: 4473 seconds

```
2025-03-08 17:51:10,743 - INFO - Running update|
2025-03-08 19:05:43,873 - INFO - Execution Time: 4473.129229 seconds
```

```
4j$ MATCH (n:Item) WHERE n.id = 4 RETURN n.no_like
+-----+
|n.no_like|
+-----+
|100000    |
+-----+
```