

Knowledge Querying (II)

一、Neo4j安装

若电脑没有java11环境，请查阅Knowledge Querying(1) Java安装教程

Neo4j 安装

官网下载链接：<https://neo4j.com/download-center>
(已提供安装文件)。

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Get Started

Neo4j Download Center

Download Neo4j Desktop ↓

Current Releases

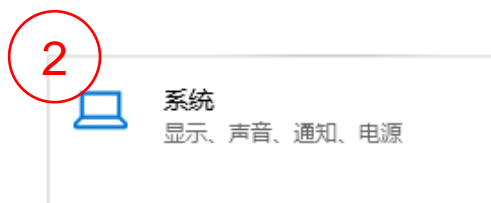
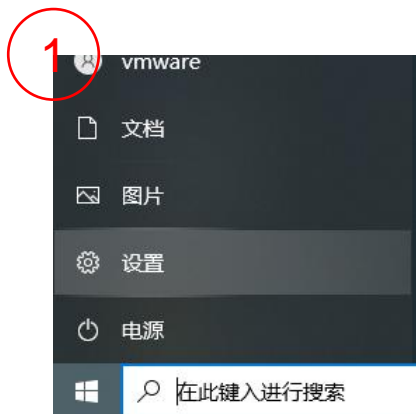
选择社区版

Enterprise Server	Community Server	Neo4j Desktop
Neo4j Community Edition 4.4.1 14 December 2021 Release Notes Read More		
OS	Download	
Linux/Mac	Neo4j 4.4.1 (tar) SHA-256	
Windows	Neo4j 4.4.1 (zip) SHA-256	

根据系统选择对应的安装包

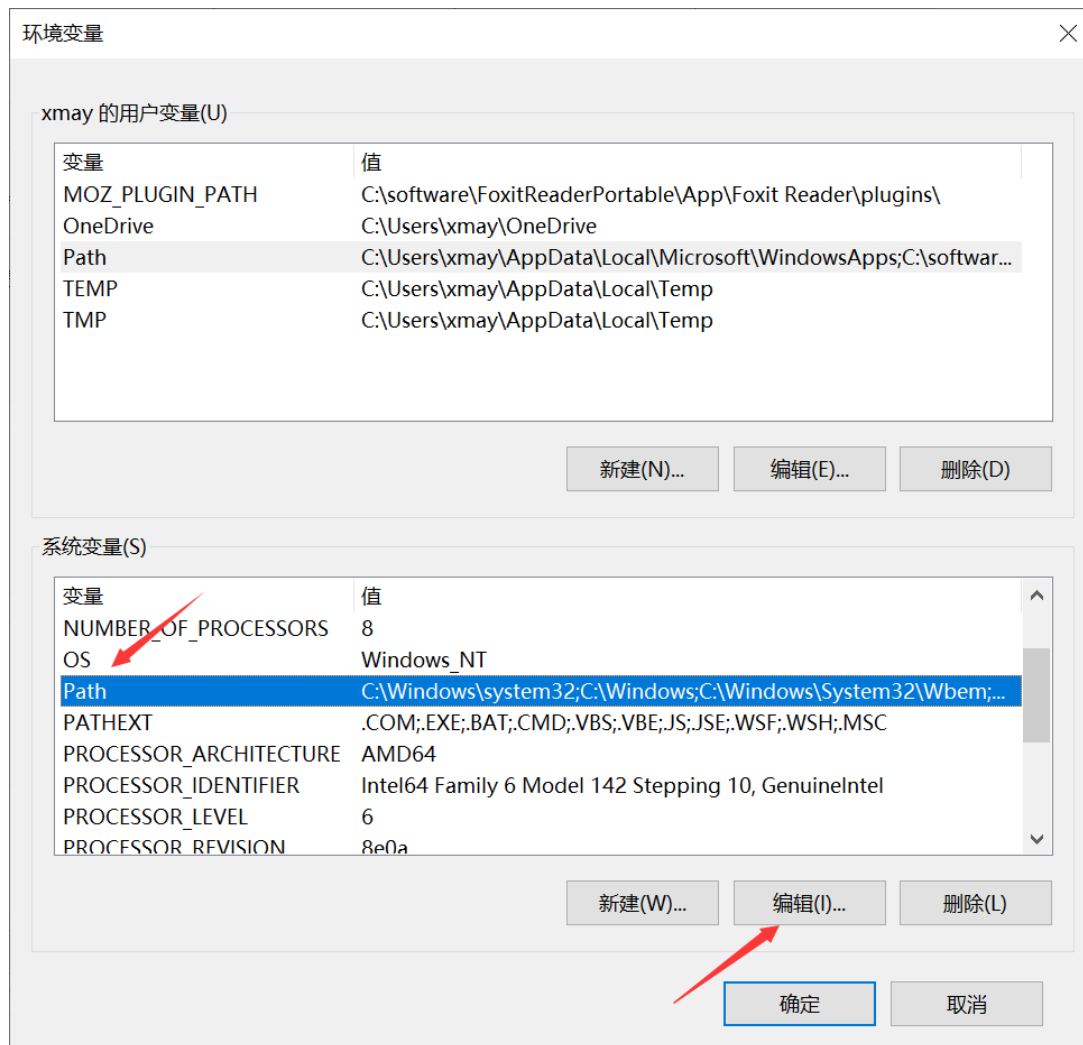
环境配置

打开 设置 --> 系统 --> 关于 --> 高级系统设置 --> 环境变量



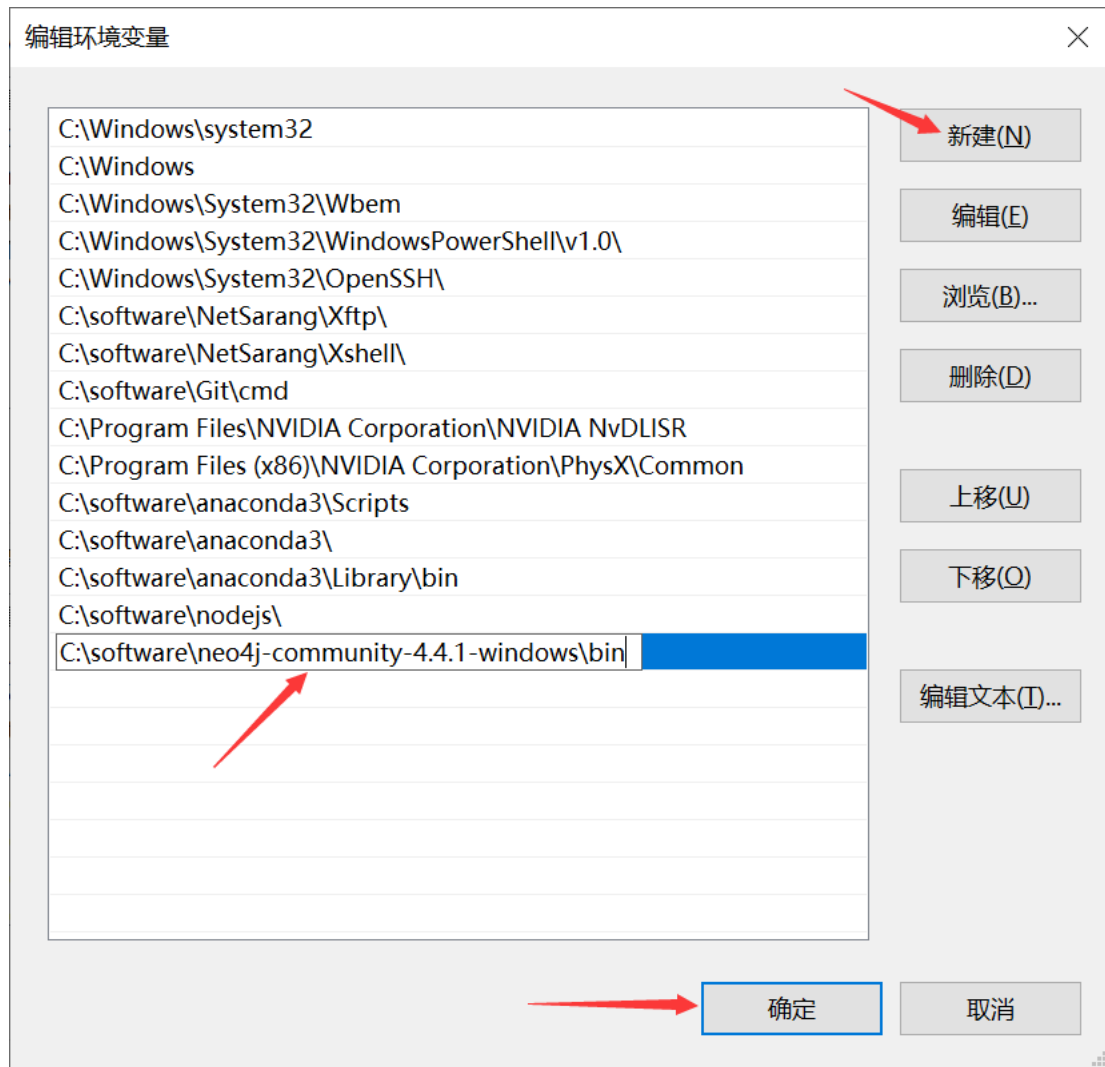
环境配置

- 选择Path系统环境变量，点击编辑。



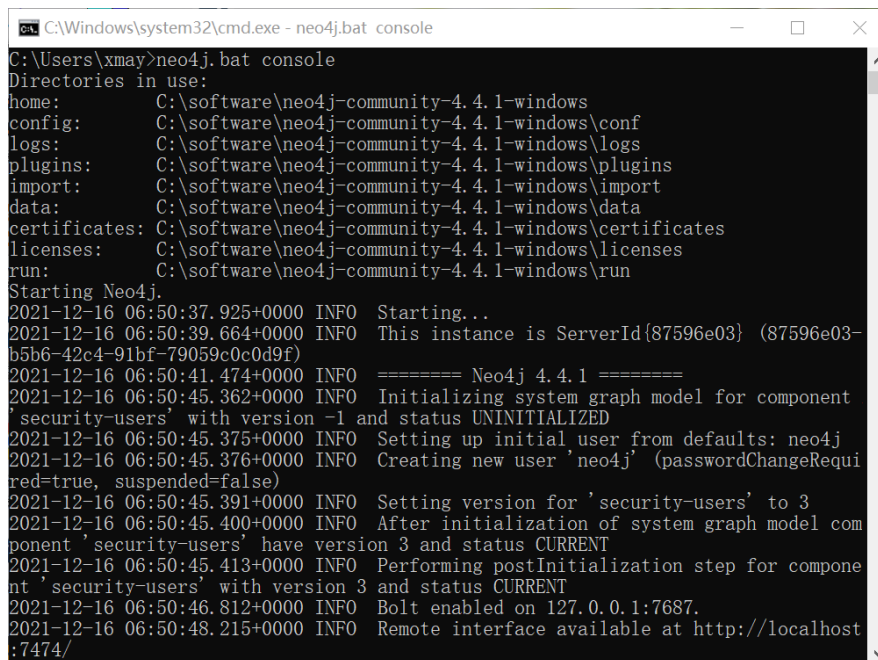
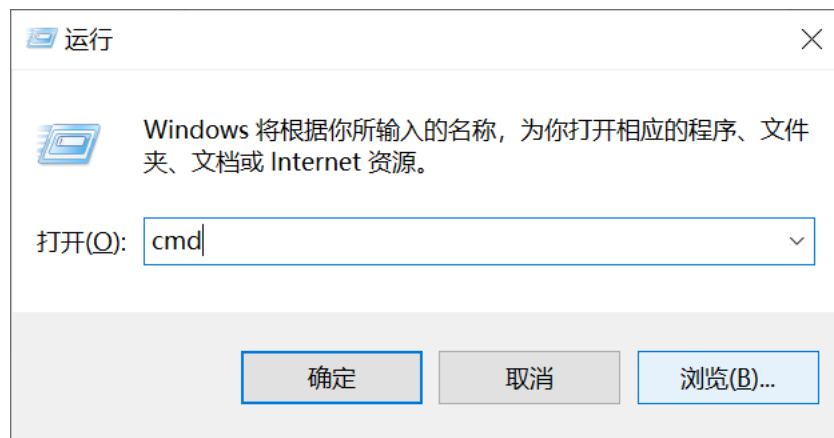
环境配置

- 解压下载好的Neo4j压缩包；
- 点击新建；
- 进入到解压后的Neo4j\bin所在文件夹，复制该路径粘贴到新的一行；
- 点击确定。



环境配置

- Win+R 打开运行窗口，打开cmd；
- 输入neo4j.bat console，执行命令；
- 出现右边第二张图即成功；
- 关闭cmd窗口。

A screenshot of a Windows command prompt window titled 'C:\Windows\system32\cmd.exe - neo4j.bat console'. The prompt shows the command 'C:\Users\xmay>neo4j.bat console' and its output. The output lists directories in use, including home, config, logs, plugins, import, data, certificates, licenses, and run. It then shows the startup sequence for Neo4j 4.4.1, including initializing the system graph model, setting up the initial user, creating a new user, and enabling the Bolt interface. The final output is 'Remote interface available at http://localhost:7474/'.

```
C:\Windows\system32\cmd.exe - neo4j.bat console
C:\Users\xmay>neo4j.bat console
Directories in use:
home:      C:\software\neo4j-community-4.4.1-windows
config:    C:\software\neo4j-community-4.4.1-windows\conf
logs:      C:\software\neo4j-community-4.4.1-windows\logs
plugins:   C:\software\neo4j-community-4.4.1-windows\plugins
import:    C:\software\neo4j-community-4.4.1-windows\import
data:      C:\software\neo4j-community-4.4.1-windows\data
certificates: C:\software\neo4j-community-4.4.1-windows\certificates
licenses:  C:\software\neo4j-community-4.4.1-windows\licenses
run:       C:\software\neo4j-community-4.4.1-windows\run
Starting Neo4j.
2021-12-16 06:50:37.925+0000 INFO  Starting...
2021-12-16 06:50:39.664+0000 INFO  This instance is ServerId{87596e03} (87596e03-b5b6-42c4-91bf-79059c0c0d9f)
2021-12-16 06:50:41.474+0000 INFO  ===== Neo4j 4.4.1 =====
2021-12-16 06:50:45.362+0000 INFO  Initializing system graph model for component 'security-users' with version -1 and status UNINITIALIZED
2021-12-16 06:50:45.375+0000 INFO  Setting up initial user from defaults: neo4j
2021-12-16 06:50:45.376+0000 INFO  Creating new user 'neo4j' (passwordChangeRequired=true, suspended=false)
2021-12-16 06:50:45.391+0000 INFO  Setting version for 'security-users' to 3
2021-12-16 06:50:45.400+0000 INFO  After initialization of system graph model component 'security-users' have version 3 and status CURRENT
2021-12-16 06:50:45.413+0000 INFO  Performing postInitialization step for component 'security-users' with version 3 and status CURRENT
2021-12-16 06:50:46.812+0000 INFO  Bolt enabled on 127.0.0.1:7687.
2021-12-16 06:50:48.215+0000 INFO  Remote interface available at http://localhost:7474/
```

环境配置-可能遇到的问题

- 如果在安装后报错java jdk版本问题
 - 建议重新在官网下载对应版本Neo4j版本
 - 下载链接: <https://neo4j.com/download-center>
- 如果在安装后报错: powershell命令提示符出现“不是内部或外部命令, 也不是可运行的程序或批处理”
 - 将如下三个路径添加到环境变量中
C:\Windows\System32\WindowsPowerShell\v1.0
C:\Windows\System32\wbem
C:\Windows
 - 重启cmd, 再次输入neo4j.bat console

安装服务

- 新打开一个cmd窗口
- cd 进入到neo4j根目录，示例：cd C:\software\neo4j-community-4.4.1-windows\bin
- 执行neo4j install-service，将neo4j安装为服务

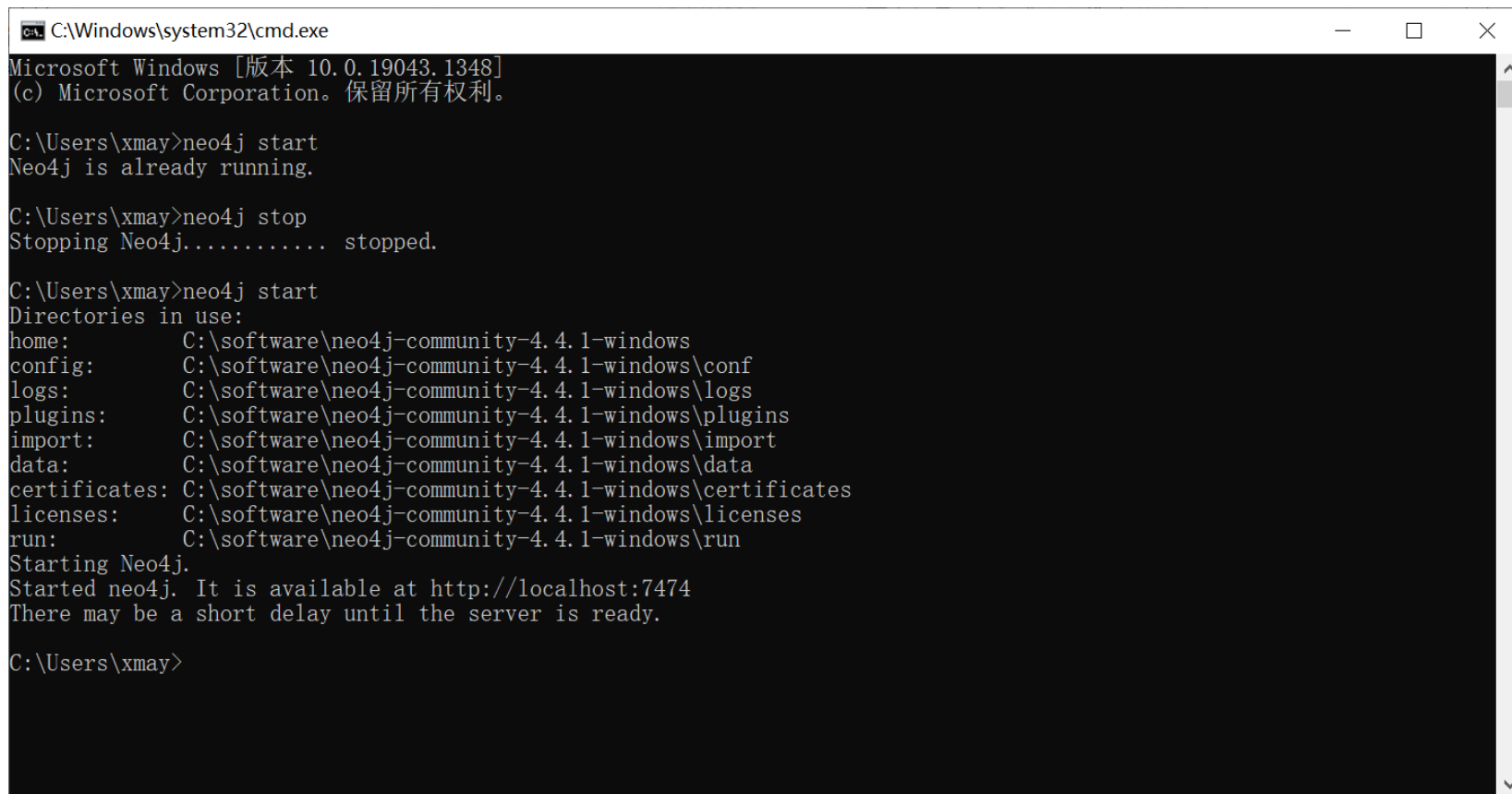
```
C:\Users\xmay>cd C:\software\neo4j-community-4.4.1-windows\bin  
C:\software\neo4j-community-4.4.1-windows\bin>neo4j install-service  
Neo4j service is already installed  
C:\software\neo4j-community-4.4.1-windows\bin>start neo4j  
C:\software\neo4j-community-4.4.1-windows\bin>
```

使用neo4j服务

新打开一个cmd窗口，开始使用neo4j服务

启动服务：neo4j start

关闭服务：neo4j stop



```
C:\Windows\system32\cmd.exe
Microsoft Windows [版本 10.0.19043.1348]
(c) Microsoft Corporation. 保留所有权利。

C:\Users\xmay>neo4j start
Neo4j is already running.

C:\Users\xmay>neo4j stop
Stopping Neo4j..... stopped.

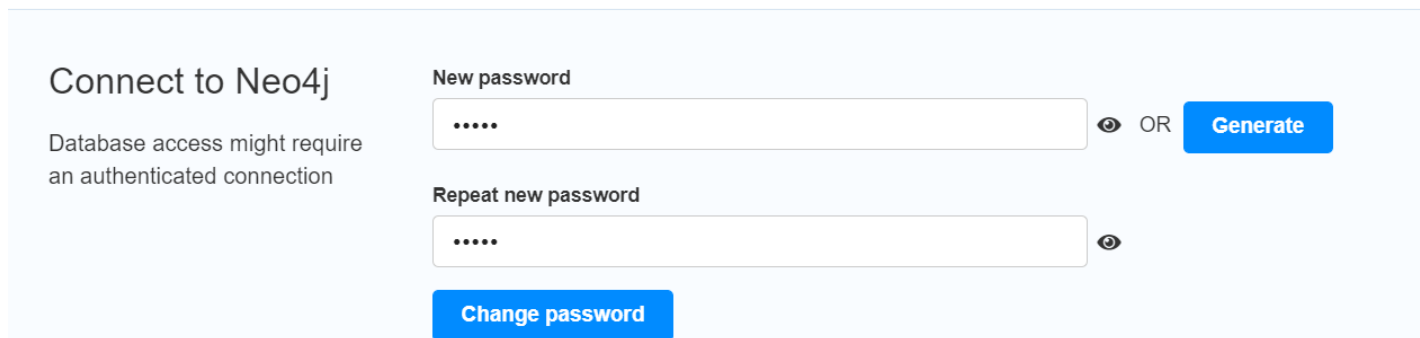
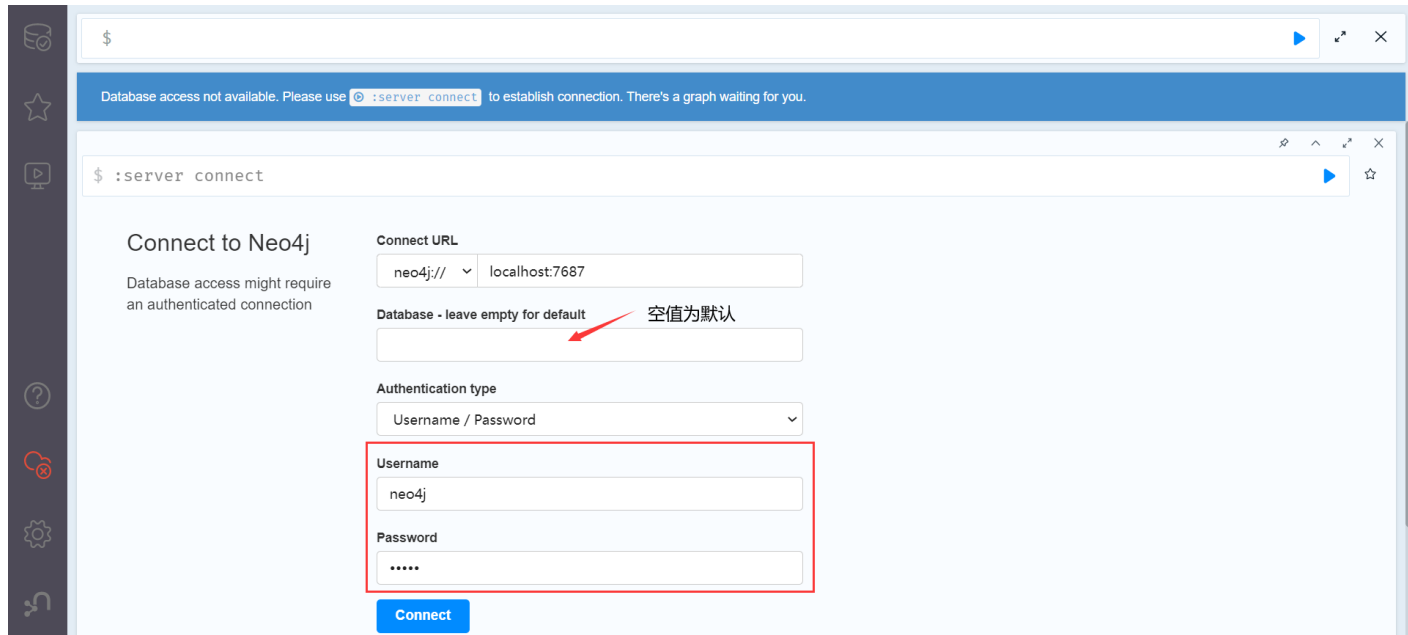
C:\Users\xmay>neo4j start
Directories in use:
home:          C:\software\neo4j-community-4.4.1-windows
config:        C:\software\neo4j-community-4.4.1-windows\conf
logs:          C:\software\neo4j-community-4.4.1-windows\logs
plugins:       C:\software\neo4j-community-4.4.1-windows\plugins
import:        C:\software\neo4j-community-4.4.1-windows\import
data:          C:\software\neo4j-community-4.4.1-windows\data
certificates:  C:\software\neo4j-community-4.4.1-windows\certificates
licenses:     C:\software\neo4j-community-4.4.1-windows\licenses
run:           C:\software\neo4j-community-4.4.1-windows\run
Starting Neo4j.
Started neo4j. It is available at http://localhost:7474
There may be a short delay until the server is ready.

C:\Users\xmay>
```

二、Neo4j使用

Neo4j 使用

- 打开浏览器，输入<http://localhost:7474/>
- neo4j的原始账号密码都是：neo4j，登录后会提示修改密码（记住修改后的密码）。



Neo4j 使用

- 1. Node Labels: 展示数据库中的Labels;
- 2. Relationship Types: 展示数据库中的所有关系类型;
- 3. Property Keys: 展示所有属性名称。

The screenshot displays the Neo4j Browser interface. On the left, a dark sidebar contains the 'Database Information' panel. This panel has sections for 'Use database' (showing 'neo4j' selected), 'Node Labels' (with a red arrow pointing to it and the text 'There are no labels in database'), 'Relationship Types' (with a red arrow pointing to it and the text 'No relationships in database'), 'Property Keys' (with a red arrow pointing to it and the text 'There are no properties in database'), and 'Connected as' (showing 'Username: neo4j', 'Roles: -', and 'Disconnect: server disconnected'). Below these is a 'DBMS' section with details like 'Version: 4.4.1', 'Edition: Community', 'Name: neo4j', 'Databases: db', 'Information: sysinfo', and 'Query List: queries'.

The main area of the browser shows a query editor with the text 'neo4j\$' and a command prompt '\$:play start'. Below the editor, three cards are displayed: 'Getting started with Neo4j Browser' (with a 'Get started' button), 'Try Neo4j with live data' (with an 'Open guide' button), and 'Cypher basics' (with a 'Start querying' button). Red numbers 1, 2, and 3 are placed to the left of these cards, corresponding to the list items in the slide above.

At the bottom, a second query editor shows '\$:server status'. Below it, the 'Connection status' section indicates 'You are connected as user neo4j to neo4j://localhost:7687' and notes that 'Connection credentials are stored in your web browser.'

Neo4j 导入图谱数据

- 导入数据前需要先关闭数据库，在cmd中执行neo4j stop;
- 将数据库文件movies-43.dump 放在neo4j根目录import文件夹下;
- cd 进入到neo4j根目录，示例为：cd C:\software\neo4j-community-4.4.1-windows;
- 执行如下导入命令，将数据导入到图谱中

neo4j-admin load --from=import\movies-43.dump --database=neo4j --force

命令说明：

neo4j-admin: noe4j管理命令，我们当前是导入，所以参数为load

--from: 导入数据源路径， import\movies-43.dump

--database: 导入到哪个数据库， neo4j

--force: 若数据库不为空，则强制覆盖原有数据库中的数据

C:\Windows\system32\cmd.exe

Microsoft Windows [版本 10.0.19043.1415]
(c) Microsoft Corporation。保留所有权利。

C:\Users\xmay>cd C:\software\neo4j-community-4.4.1-windows

C:\software\neo4j-community-4.4.1-windows>neo4j stop
Neo4j is not running.

C:\software\neo4j-community-4.4.1-windows>neo4j-admin load --from=import\movies-43.dump --database=neo4j --force
Selecting JVM - Version:11.0.13+10-LTS-370, Name:Java HotSpot(TM) 64-Bit Server VM, Vendor:Oracle Corporation
Done: 78 files, 1.209MiB processed.

Neo4j 检查数据库文件

- 出现Done , Processed之后表示数据导入成功;
- 进入neo4j根目录data\databases文件夹下, 出现了新创建的数据库文件: neo4j;
- 如果出现导入错误, 可将数据库文件夹删除再重新执行导入命令。

注:

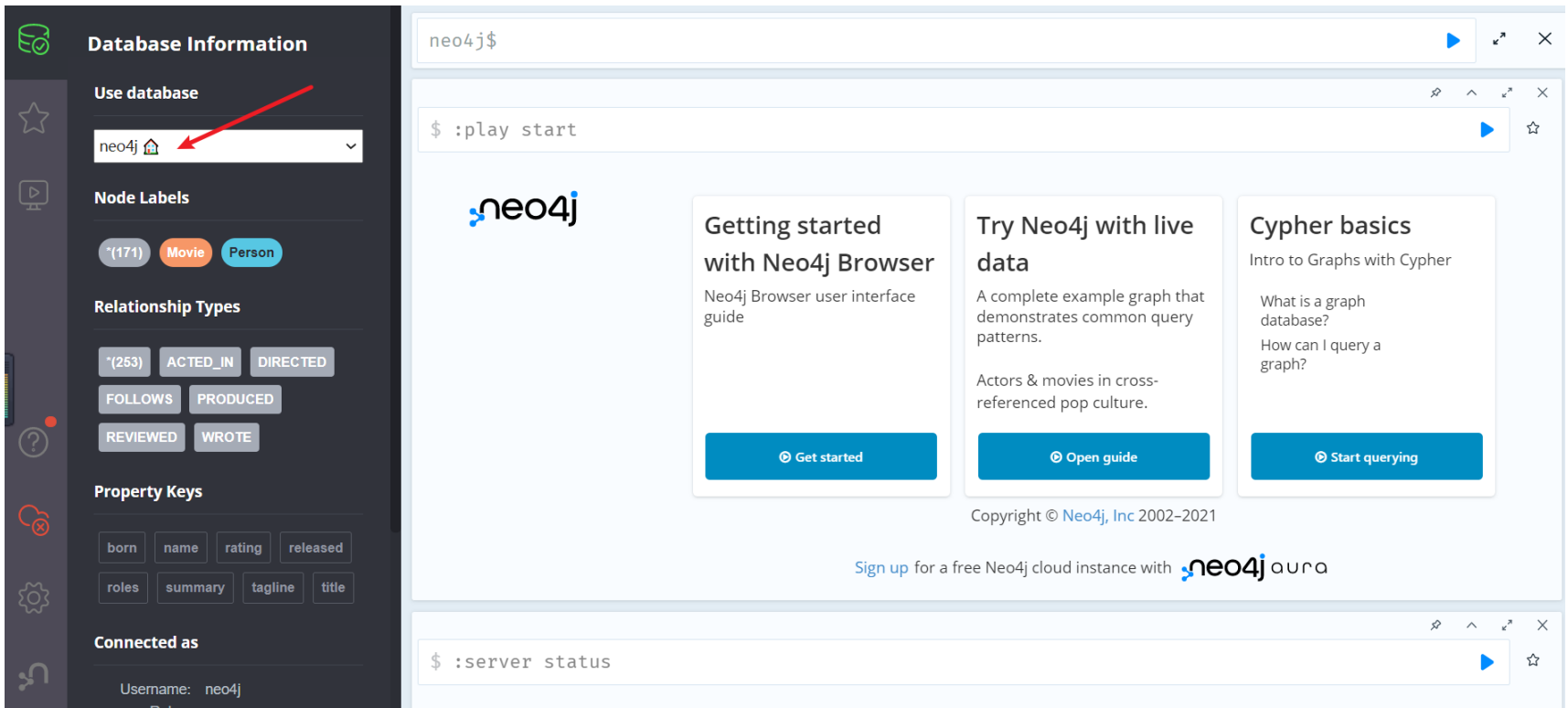
neo4j-admin导入命令要求数据库为空或数据库未创建, 因此使用前应先清空数据库;

如果数据库不为空, 可使用--force强制覆盖原有数据库, 因此使用时需要确保原数据库不再使用, 在工程中谨慎使用。

名称	修改日期	类型
profiles	2021/12/16 19:51	文件夹
schema	2021/12/16 19:51	文件夹
database_lock	2021/12/16 19:51	文件
neostore	2021/12/16 19:51	文件
neostore.counts.db	2021/12/16 19:56	Data Ba
neostore.id	2021/12/16 19:51	ID 文件
neostore.indexstats.db	2021/12/16 19:56	Data Ba
neostore.labelsstore.db	2021/12/16 19:56	Data Ba
neostore.labeltokenstore.db	2021/12/16 19:51	Data Ba
neostore.labeltokenstore.db.id	2021/12/16 19:56	ID 文件
neostore.labeltokenstore.db.names	2021/12/16 19:51	NAMES
neostore.labeltokenstore.db.names.id	2021/12/16 19:56	ID 文件
neostore.nodestore.db	2021/12/16 19:51	Data Ba
neostore.nodestore.db.id	2021/12/16 19:56	ID 文件
neostore.nodestore.db.labels	2021/12/16 19:51	LABELS
neostore.nodestore.db.labels.id	2021/12/16 19:56	ID 文件
neostore.propertystore.db	2021/12/16 19:51	Data Ba
neostore.propertystore.db.arrays	2021/12/16 19:51	ARRAYS
neostore.propertystore.db.arrays.id	2021/12/16 19:56	ID 文件

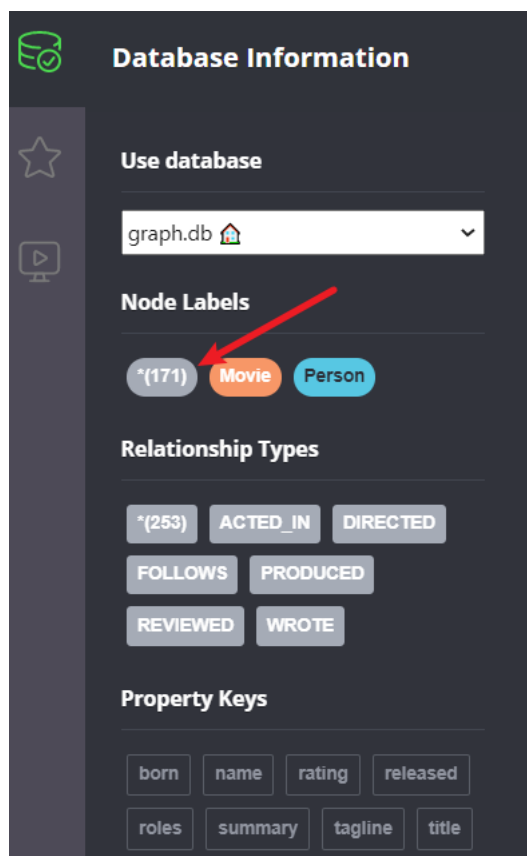
Neo4j启动服务

- 通过cmd执行neo4j start启动数据库服务；
- 通过浏览器访问数据库，<http://localhost:7474/browser/>；
- 点击数据库图标，选择下拉框neo4j作为本次实验的数据库。

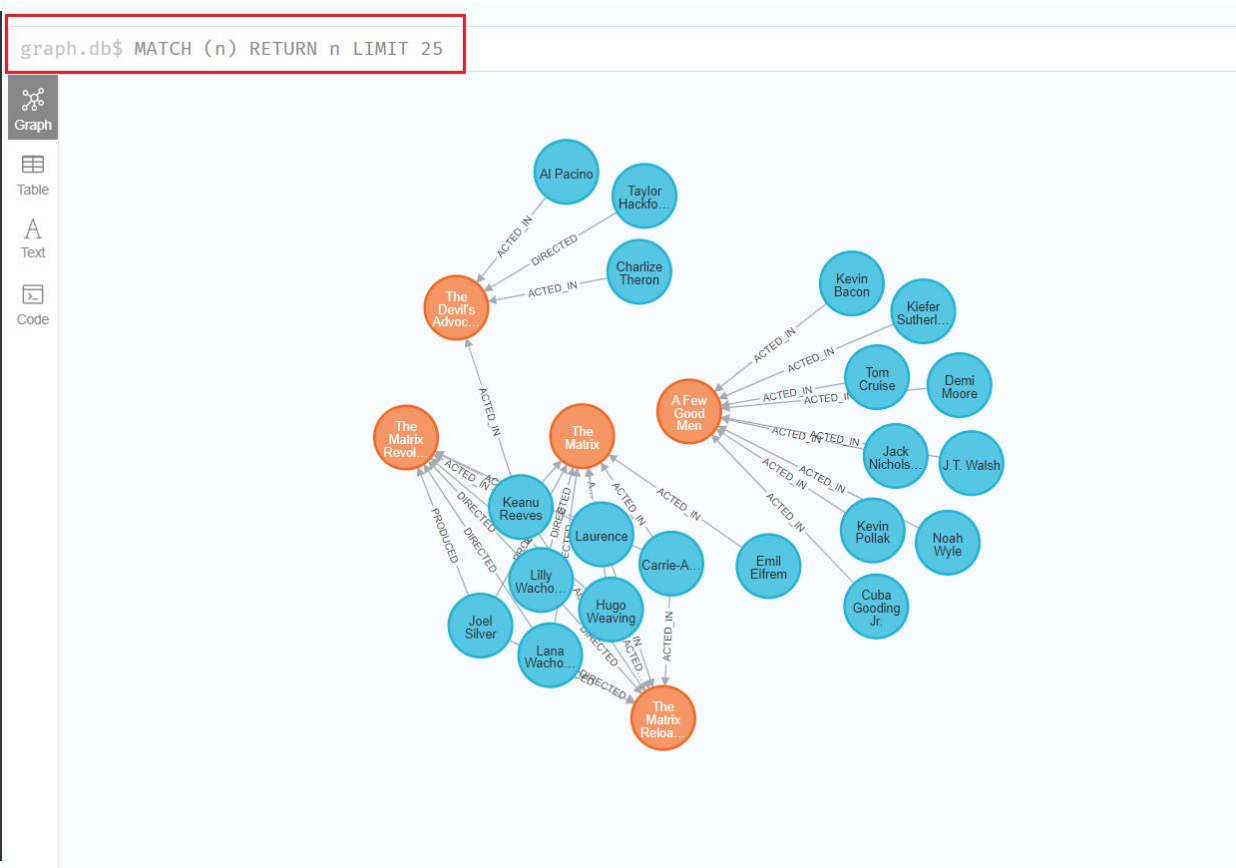


Neo4j启动服务

- 可看到左侧节点、关系、属性已有数据；
- 通过鼠标点击图标，可以快速获取到相关节点、关系或属性信息；
- 点击左侧*(171)（表示当前数据库所有节点数量），可快速浏览当前数据库的节点信息，红色框选中是自动生成的cypher语句。

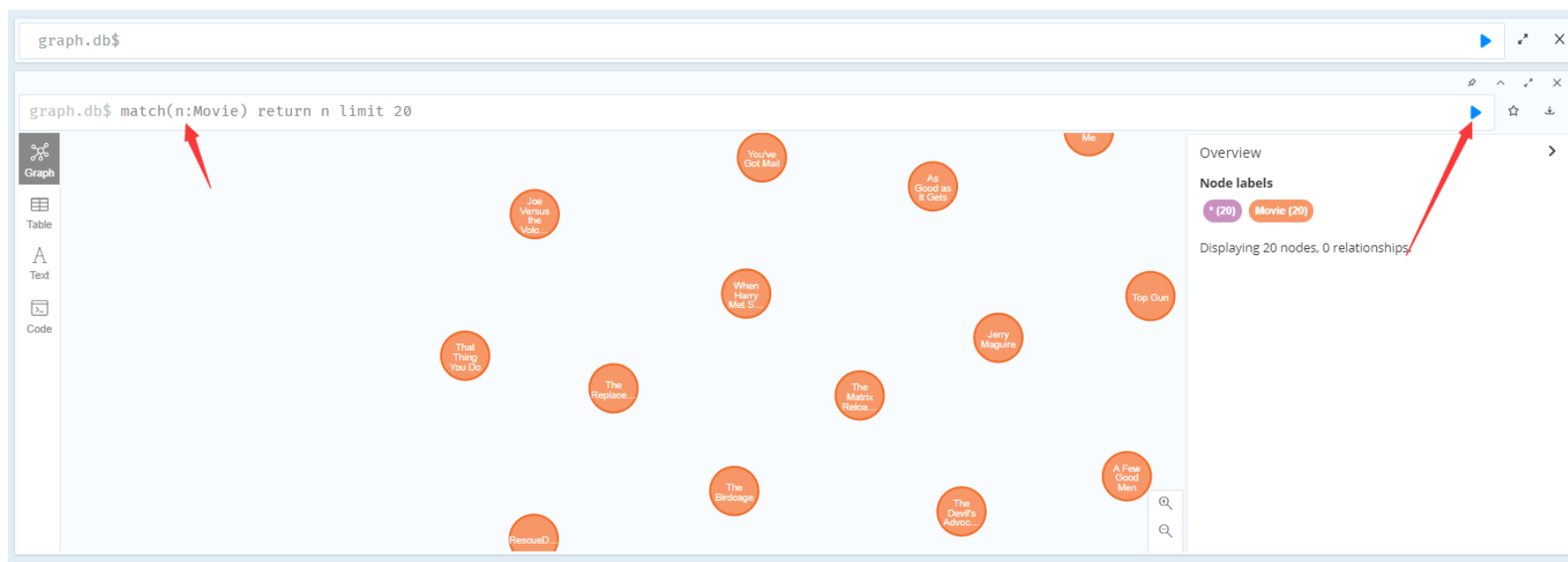


The screenshot shows the 'Database Information' panel in Neo4j Desktop. The 'Use database' section shows 'graph.db' selected. Under 'Node Labels', the label '* (171)' is highlighted with a red arrow, indicating the total number of nodes in the database. Other labels shown are 'Movie' and 'Person'. The 'Relationship Types' section lists various types like 'ACTED_IN', 'DIRECTED', 'PRODUCED', 'FOLLOWS', 'REVIEWED', and 'WROTE'. The 'Property Keys' section lists properties like 'born', 'name', 'rating', 'released', 'roles', 'summary', 'tagline', and 'title'.



Cypher的使用

- 键入cypher语句：
match(n:Movie) return n limit 20
查询电影节点，并返回前20个；
- 点击右侧蓝色按钮运行，可以看到结果；
- 单击节点可看到节点相关属性，双击节点可看到节点相关联的关系（请自行探索）。

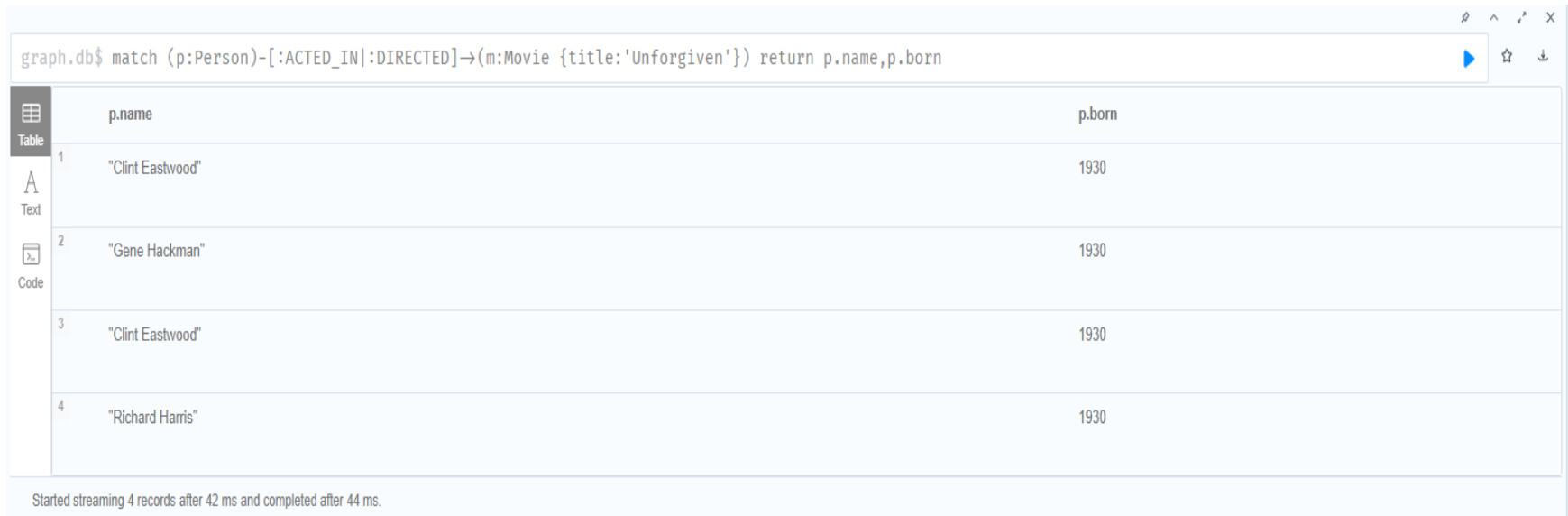


Cypher的使用

- 示例

出演或导演电影Unforgiven的人物姓名和出生时间：

```
match (p:Person)-[:ACTED_IN|DIRECTED]->(m:Movie {title:'Unforgiven'}) return p.name,p.born
```



```
graph.db$ match (p:Person)-[:ACTED_IN|DIRECTED]->(m:Movie {title:'Unforgiven'}) return p.name,p.born
```

	p.name	p.born
1	"Clint Eastwood"	1930
2	"Gene Hackman"	1930
3	"Clint Eastwood"	1930
4	"Richard Harris"	1930

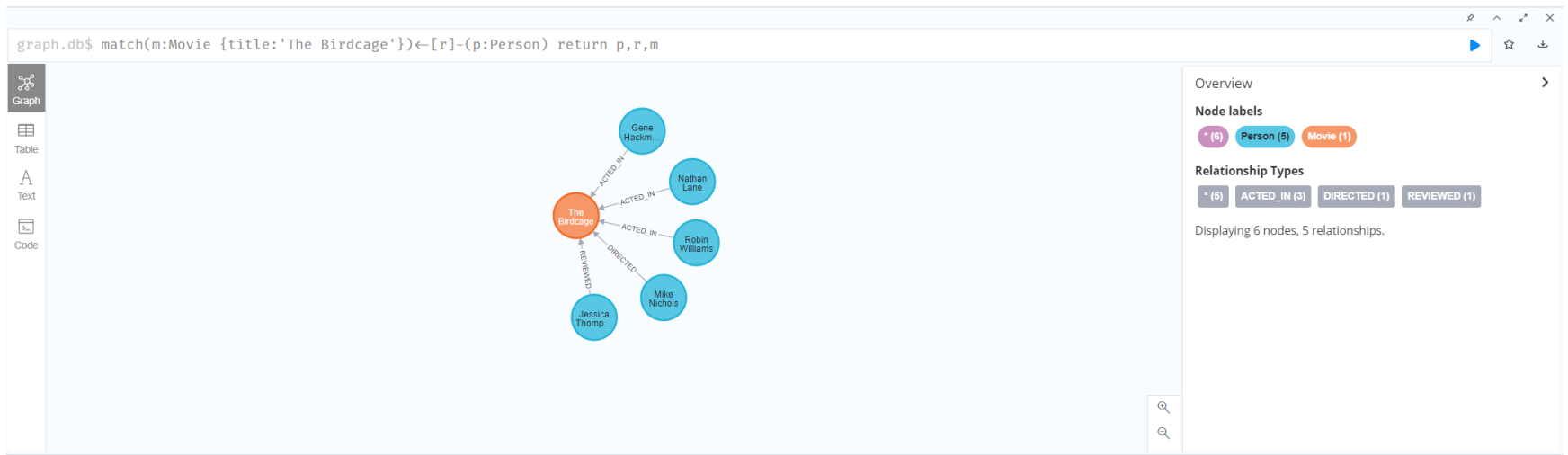
Started streaming 4 records after 42 ms and completed after 44 ms.

Cypher的使用

- 示例:

查询与电影The Birdcage相关联的所有人物和电影信息，返回所有相关联的信息

```
match(m:Movie {title:'The Birdcage'})<-[r]-(p:Person) return p,r,m
```

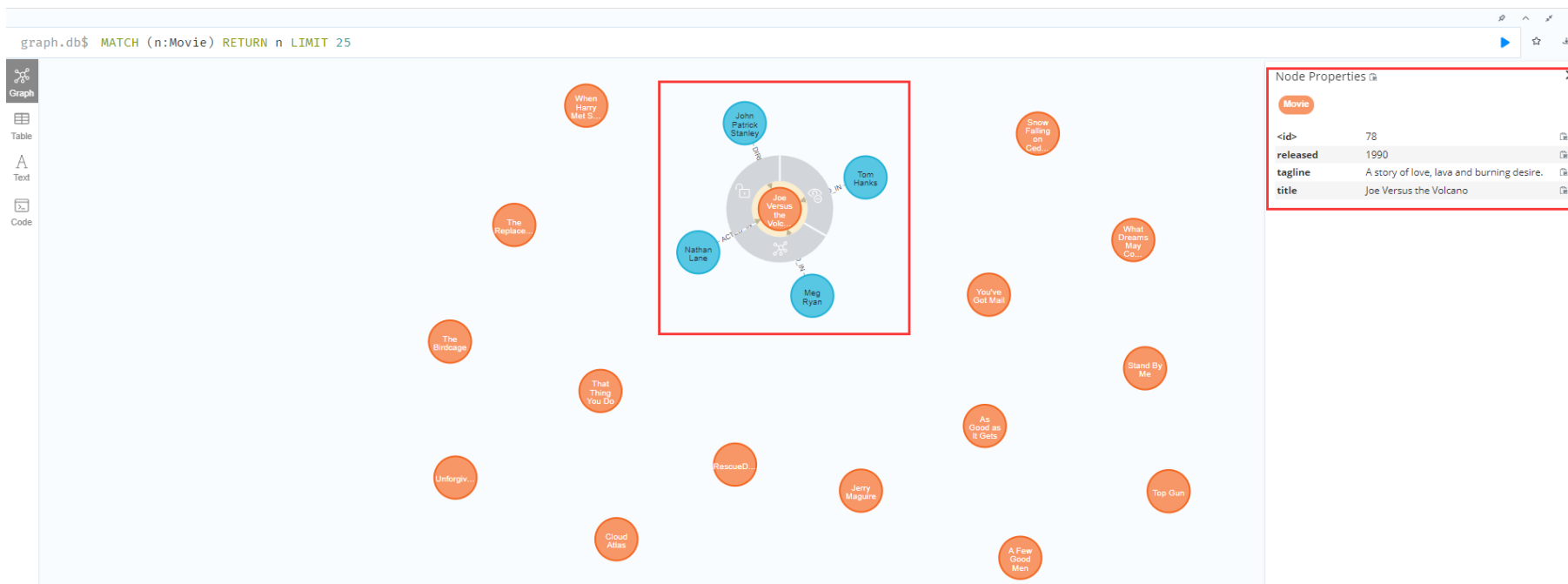


Cypher的使用

- 任意选择一个电影节点；
- 单击节点查看其属性信息；
- 双击节点查看其关系信息；

本示例所选节点可通过以下语句查询：

```
match (m:Movie{title:'Joe Versus the Volcano'}) return m
```



Cypher的使用

记录下选择节点的信息

- 属性信息

Key	value
released	1990
tagline	A story of love, lava and burning desire.
title	Joe Versus the Volcano

Cypher的使用

记录下选择节点的信息

- 关系信息

Start_node_Label	Start_node_name	Relation_type	End_node_Label	End_node_title	Relation Properties
Person	John Patrick Stanley	DIRECTED	Movie	Joe Versus the Volcano	NULL
Person	Tom Hanks	ACTED_IN	Movie	Joe Versus the Volcano	NULL
Person	Nathan Lane	ACTED_IN	Movie	Joe Versus the Volcano	NULL
Person	Meg Ryan	ACTED_IN	Movie	Joe Versus the Volcano	NULL

Cypher的使用

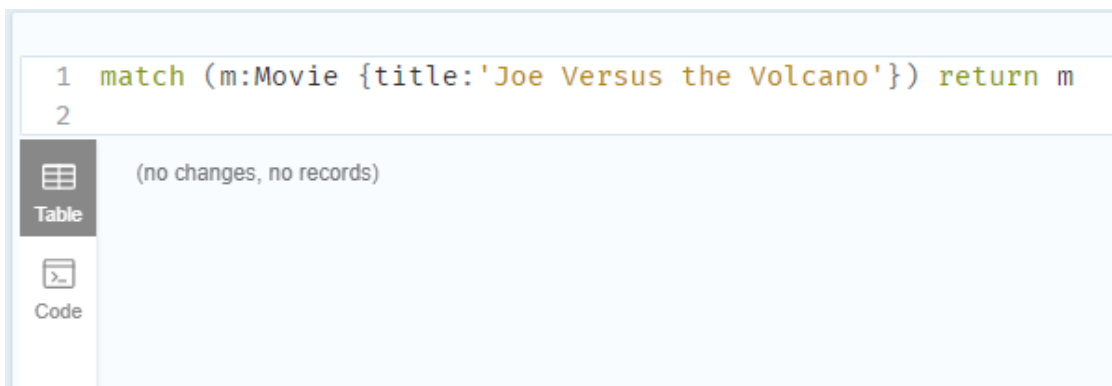
- 删除该节点及其相连接的关系

`match (m:Movie {title:'Joe Versus the Volcano'}) detach delete m`



- 查询该节点是否删除成功

`match (m:Movie {title:'Joe Versus the Volcano'}) return m`



Cypher的使用

- 将上一步删除的节点及其节点属性重新导入到图谱中

Create

(m:Movie

{ title:'Joe Versus the Volcano',released:1990,tagline:'A story of love, lava and burning desire.'}

)

return m



The screenshot shows the Neo4j Cypher query editor interface. The query entered is:

```
graph.db$ create (m:Movie{title:'Joe Versus the Volcano',released:1990,tagline:'A story of love, lava and burning desire.'}) return m
```

The query has been executed successfully. The graph view displays a single node labeled "Joe Versus the Volcano" with a red background. The node properties are shown in the right-hand panel:

Node Properties	
<id>	78
released	1990
tagline	A story of love, lava and burning desire.
title	Joe Versus the Volcano

Cypher的使用

- 增加前面删除的节点相连的边添加到图谱中

Start_node_Label	Start_node_name	Relation_type	End_node_Label	End_node_title	Relation Properties
Person	John Patrick Stanley	DIRECTED	Movie	Joe Versus the Volcano	NULL

match

(p:Person{name:'John Patrick Stanley'}),(m:Movie{title:'Joe Versus the Volcano'})

create

(p)-[r:DIRECTED]->(m)

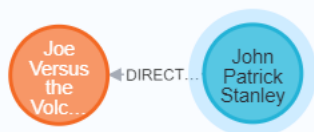
return p,r,m

```
graph.db$ match (p:Person{name:'John Patrick Stanley'}) with p match  
(m:Movie{title:'Joe Versus the Volcano'}) create (p)-[r:DIRECTED]->(m)  
return p,r,m
```

Graph

Table

Text



Node Properties

Person

<id>	79	
born	1950	
name	John Patrick Stanley	

Cypher的使用

- 更新电影的名称为” Joe Versus the Volcano2”

```
match
(m:Movie{title:'Joe Versus the Volcano'})
set
m.title= 'Joe Versus the Volcano2'
return m
```

The screenshot displays a Cypher query interface. At the top, a query editor contains the following code:

```
1 match (m:Movie{title:'Joe Versus the Volcano'}) set m.title= 'Joe Versus the Volcano2' return m
2
```

Below the query editor, a sidebar on the left shows four views: Graph (selected), Table, Text, and Code. The main area displays a graph visualization with a central orange node labeled "Joe Versus the Volcano2". The node is surrounded by a circular menu with icons for lock, refresh, and other actions.

On the right side, a "Node Properties" panel is open, showing the following details for the selected node:

Property	Value
<id>	78
released	1990
tagline	A story of love, lava and burning desire.
title	Joe Versus the Volcano2

The "title" property is highlighted with a red border.

三、作业

作业

1. 导入contact-tracing-43.dump文件到数据库neo4j中；
2. 查询名叫Madison Odonnell的人物节点，并记录下该节点的healthstatus、name、confirmedtimes属性和属性值；
3. 将该人物节点及与其相连的关系删除，并检查是否删除成功；
4. 重新创建该节点以及第2步记录下来的节点属性；
5. 重新创建关系： Madison Odonnell的人物节点与名为‘Place nr 40’的Place节点间的关系，不考虑关系属性；
6. Madison Odonnell不幸被确诊为新冠（healthstatus=‘sick’），对图谱进行更新。

完成以上问题并检验形成实验报告

参考资料

<https://neo4j.com/docs/cypher-manual/current/syntax/>

<https://neo4j.com/docs/cypher-manual/current/clauses/>