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Create a Graph-Backed App from Scratch

Agenda

- Logistics
- Introduction
- Use Case Explanation
- Modeling

- BREAK

- Building the solution
- Q & A

Logistics

WIFI Access:	
Restrooms:	
Chargers/Sockets:	
Material for the workshop:	https://github.com/neo4j-field/gsummit2024
More training:	sales@neo4j.com

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What is a Property Graph?

Introduction

Good News!

you only need to know

4

things

Graph components

Node (Vertex)

- The main data element from which graphs are constructed

Graph components

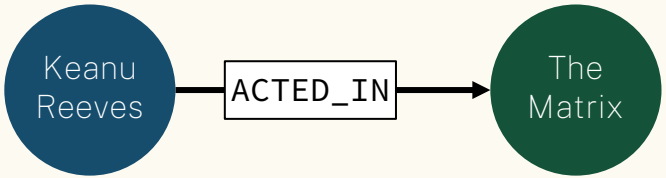
A node without relationships is permitted, a relationship without nodes is **not**

Node (Vertex)

- The main data element from which graphs are constructed

Relationship (Edge)

- A link between two nodes
  - Direction
  - Type



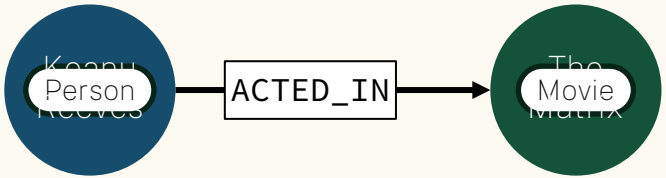
Property graph database

Node (Vertex)

Relationship (Edge)

Label

- Define node role (optional)



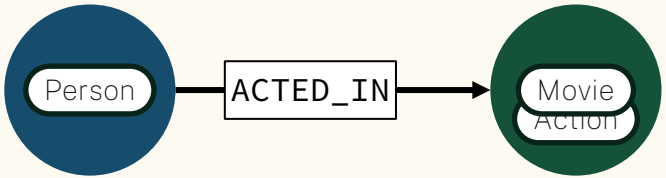
Property graph database

Node (Vertex)

Relationship (Edge)

Label

- Define node role (optional)
- Can have more than one



Property graph database

Node (Vertex)

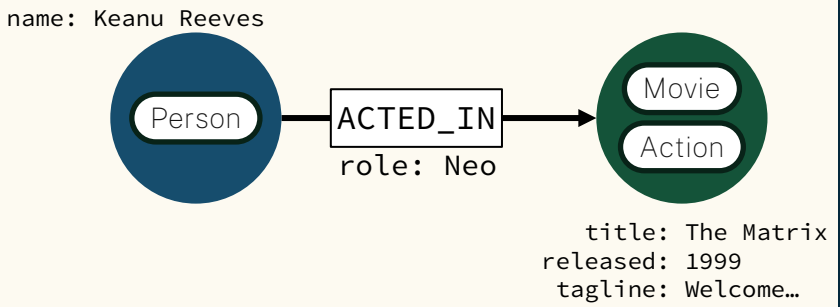
Relationship (Edge)

Label

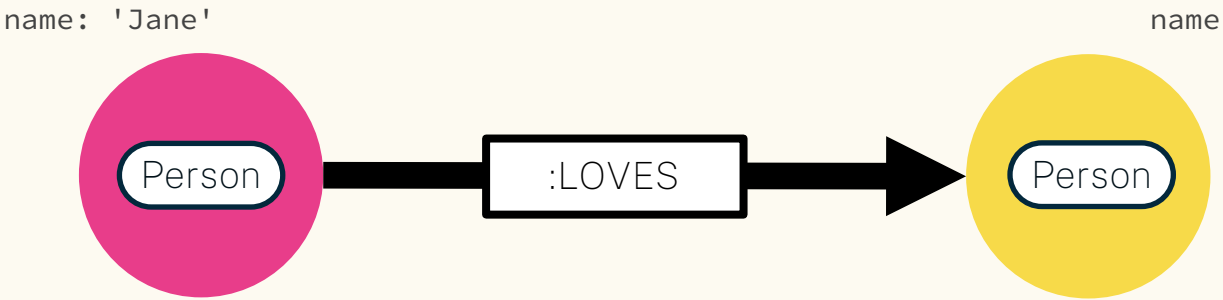
- Define node role (optional)
- Can have more than one

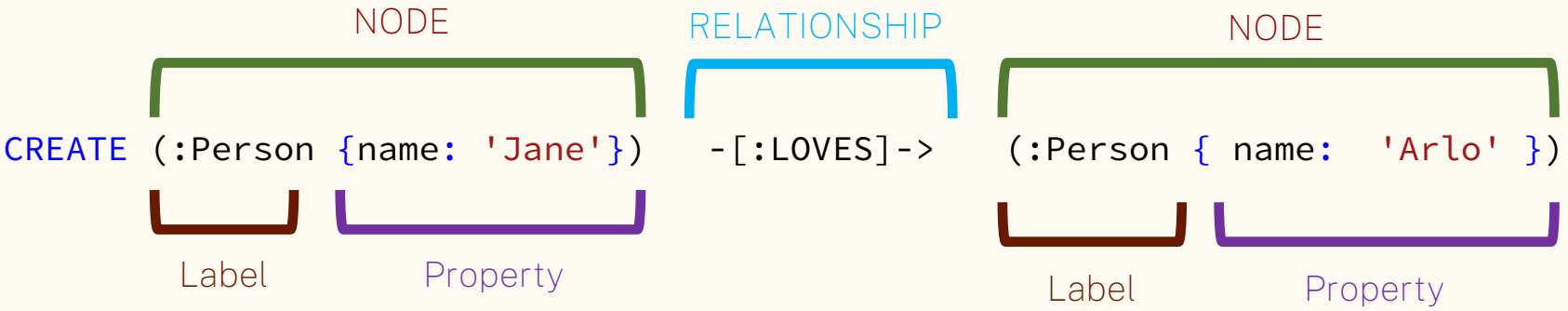
Properties

- Enrich
  - nodes
  - relationships

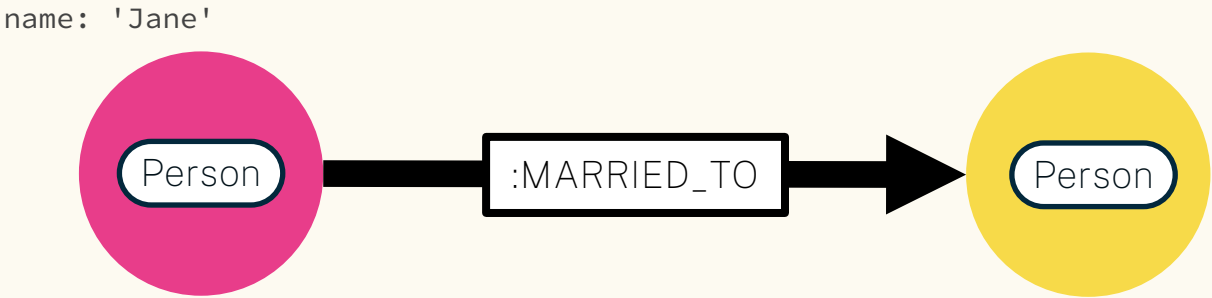


Cypher: powerful and expressive query language





Cypher: Matching



NODE RELATIONSHIP NODE

```
MATCH (p:Person {name: 'Jane'}) -[:MARRIED_TO]->(spouse:Person)
RETURN p, spouse
```

Variable Label Property Variable

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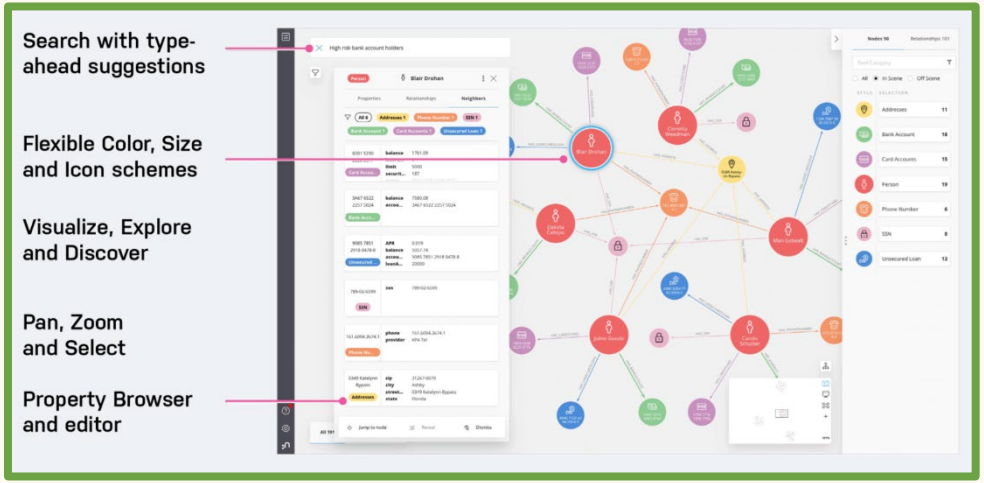
Visualisation

Data Visualization with Neo4j Bloom

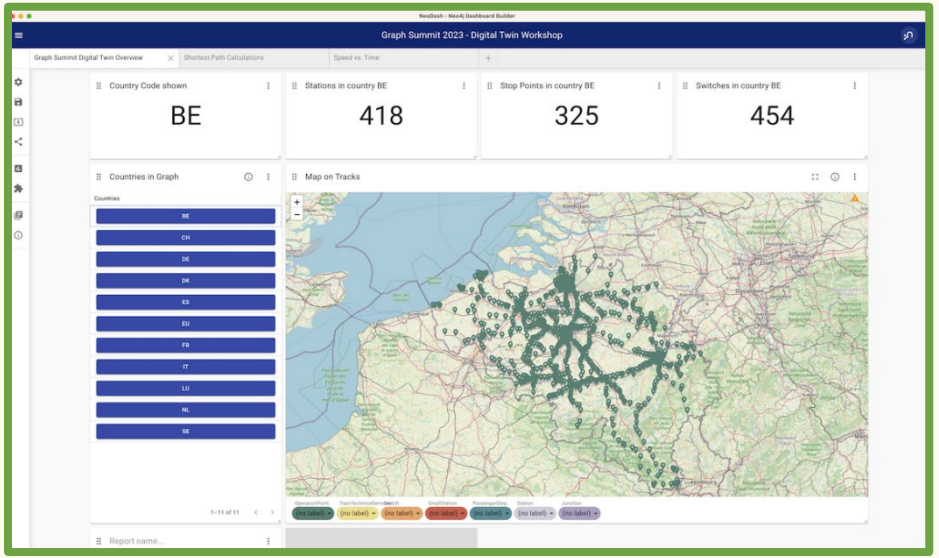
Neo4j's user-friendly graph database visualization, exploration and collaboration tool.

- Visually explore graphs
- Prototype faster
- Visualize and discover
- Easy for non-technical users



NeoDash

- Fully open source
  - https://github.com/neo4j-labs/neodash
  - Extensible
- Can be integrated in existing portal
- Supported through Neo4j's Professional Services team



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Use Case Explanation

Digital Twin - An Overview

What is a Digital Twin?

A Digital Twin is a digital representation of a [...] real-world physical product, system, or process [...] that serves as the effectively indistinguishable digital counterpart of it for practical purposes, such as simulation, integration, testing, monitoring and maintenance.

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Modeling a solution

What is graph data modeling?

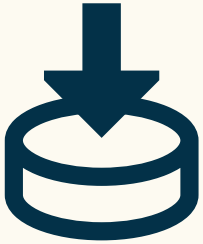
A *collaborative* effort where the application domain is analysed by stakeholders and developers to come up with the optimal model for use with Neo4j.

Stakeholders include:

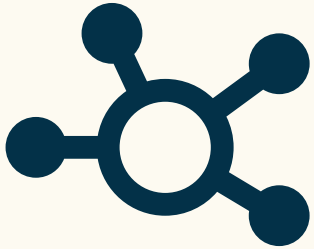
- Business analysts
- Architects
- Managers
- Project leaders
- Data Scientists

The Modeling Workflow

1. Derive the question



2. Obtain the data



3. Develop a model

4. Ingest the data

5. Query/Prove the model

don’t worry

no one

EVER

gets it right

FIRST

time

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Modeling – Step 1

Domain knowledge – High level requirements

We've already got this!

- (Normally)
- In this case we've talked about the Domain
- You will have the knowledge of your own Domain

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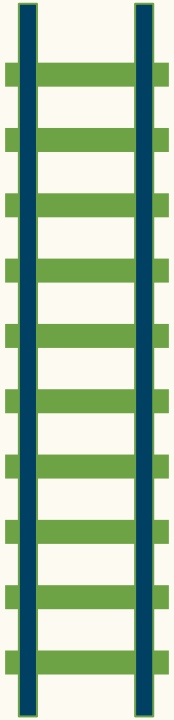
Modeling – Step 2

Sample Data

Get Sample Data

Static Rail Network*

- Sections of lines
  - Length,
  - Speed
- Operational Points (Stations etc)
  - Geolocation information,
- Points of Interest (POI) along lines



Source: Register of Infrastructure (RINF) – https://data-interop.era.europa.eu/

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Modeling – Step 3

Domain Questions

Data Modeling – Example Domain Questions

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?
2. What is an alternative route if an Operational Point on a route is close
   - A Switch is broken and we need to reroute Trains
3. How many routes are affected if I need to upgrade an Operational Point?
   - A Switch needs to be upgraded to support the network
4. What POIs are along a route?
   - Can we make revenue from referral commissions? Find busier routes during tourism season?

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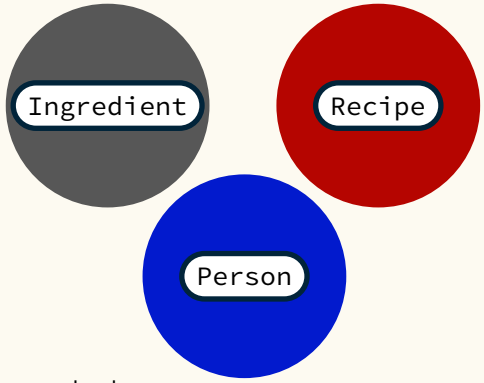
Modeling – Step 4

Identifying entities and connections

Identify Entities from Questions

Entities are the nouns in the domain questions:

1. What ingredients are used in a recipe?
2. Who is married to this person?

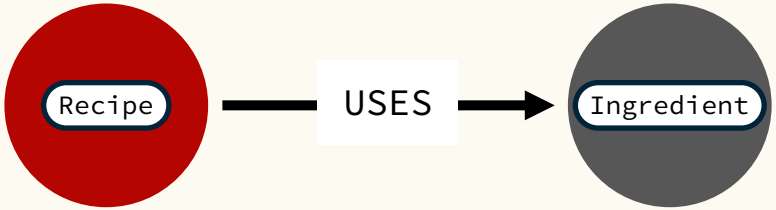


- The generic *nouns* often become labels in the model
- Use *domain knowledge* deciding how to further group or differentiate entities

Identify Connections between Entities

Connections are the verbs in the domain questions:

- What ingredients are used in a recipe?



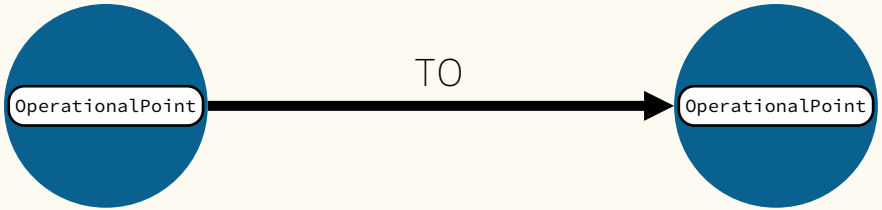
- Who is married to this person?

Using our Questions – Question 1

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?
2. What is an alternative route if an Operational Point on a Section is closed?
   - A Switch is broken, and we need to reroute Trains
3. How many routes are affected if I need to upgrade an Operational Point?
   - A Switch needs to be upgraded to support the network
4. What POIs are near Station Operational Points on a Section?
   - Can we make revenue from referral commissions? Find busier routes during tourism season?

Using our Questions – Question 1 – Model

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?



Using our Questions – Question 2

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?
2. What is an alternative route if an Operational Point on a Section is closed?
   - A Switch is broken, and we need to reroute Trains
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Using our Questions – Question 2 – Model

2. What is an alternative route if an Operational Point on a Section is closed?
   - A Switch is broken and we need to reroute Trains

Using our Questions – Question 3

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?
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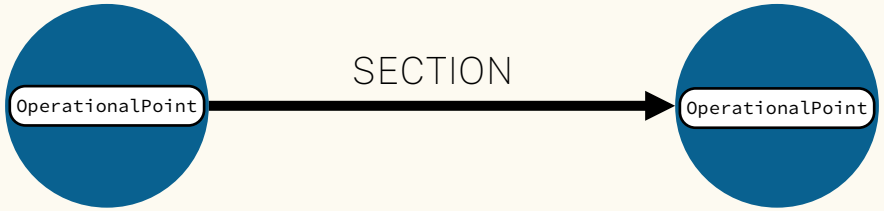
Using our Questions – Question 3 – Model

3. How many routes are affected if I need to upgrade an Operational Point?
   - A Switch needs to be upgraded to support the network



Using our Questions – Question 4

1. What is the route from Operational Point X to Operational Point Y?
   - What's the quickest way to get a repair crew from Technical Services to a given Switch?
2. What is an alternative route if an Operational Point on a Section is closed?
   - A Switch is broken, and we need to reroute Trains
3. How many routes are affected if I need to upgrade an Operational Point?
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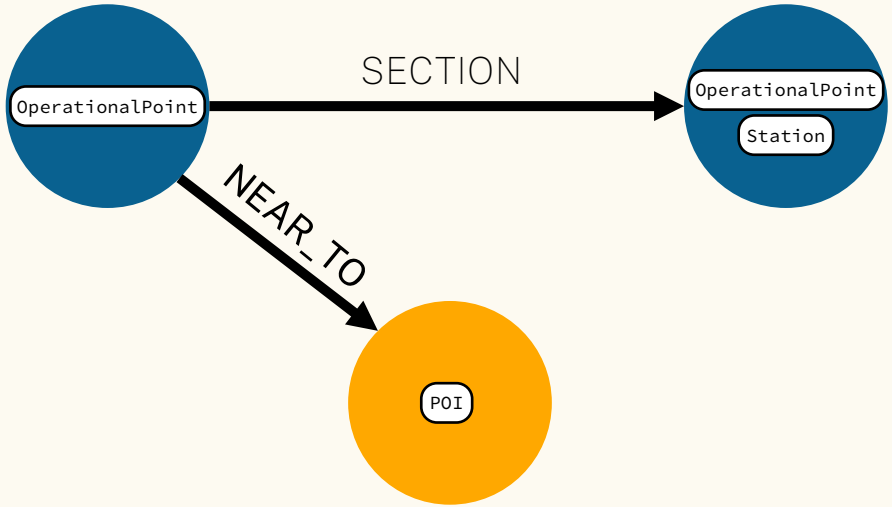
4. What POIs are near Station Operational Points on a Section?
   - Can we make revenue from referral commissions? Find busier routes during tourism season?

Using our Questions – Question 4 – Model

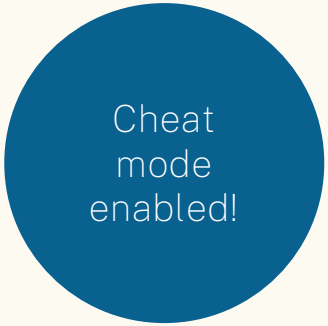
4. What POIs are near Station Operational Points on a Section?
   - Can we make revenue from referral commissions? Find busier routes during tourism season?



Added 'Station' as a label

Whilst we're here, let's talk countries

- Multiple ways to model
  - Properties
  - Labels
- What should we choose?



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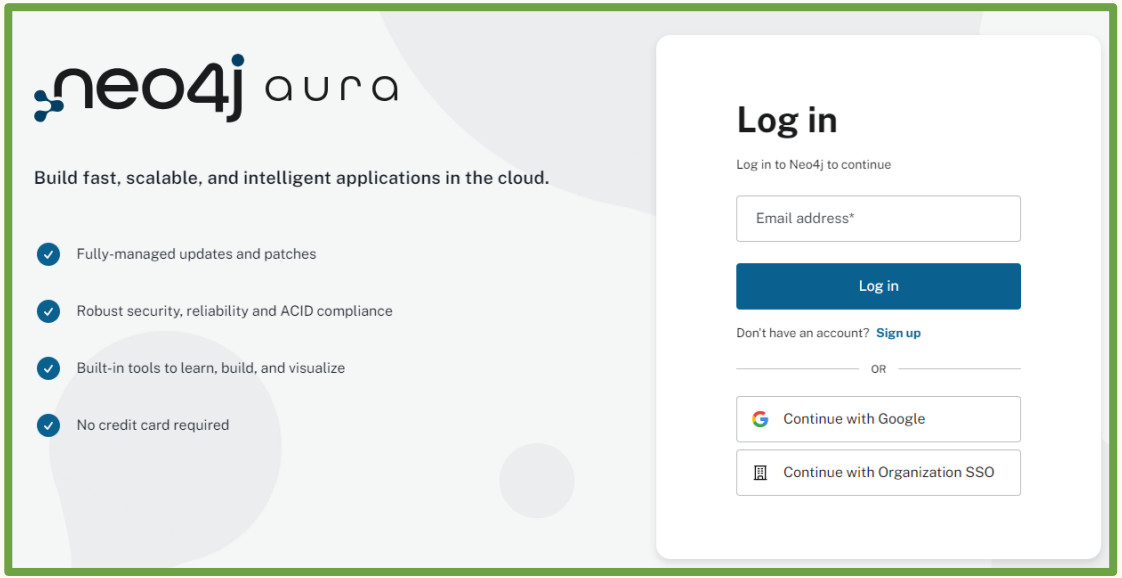
Environment for later

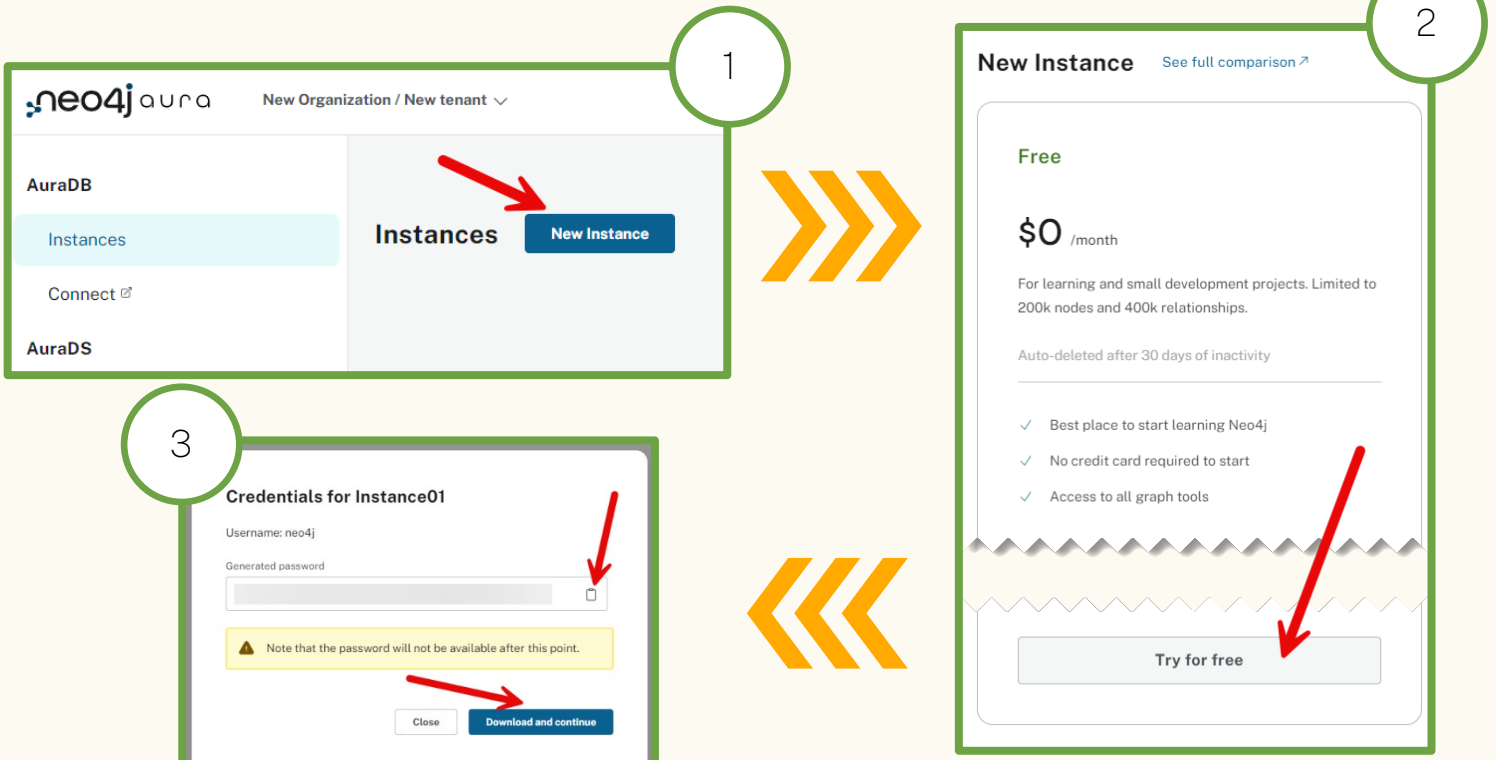
Before we go further

Neo4j Aura Login

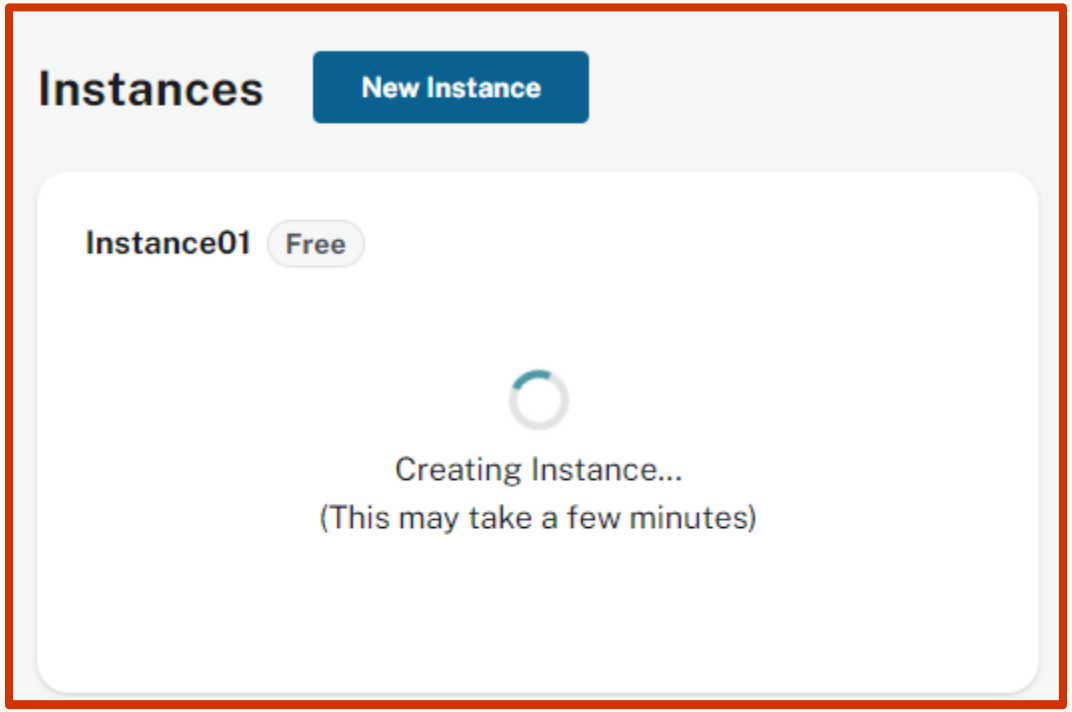
- Create a FREE instance for later
  - https://console.neo4j.io/



Neo4j Aura – Create Instance



Neo4j Aura - Created



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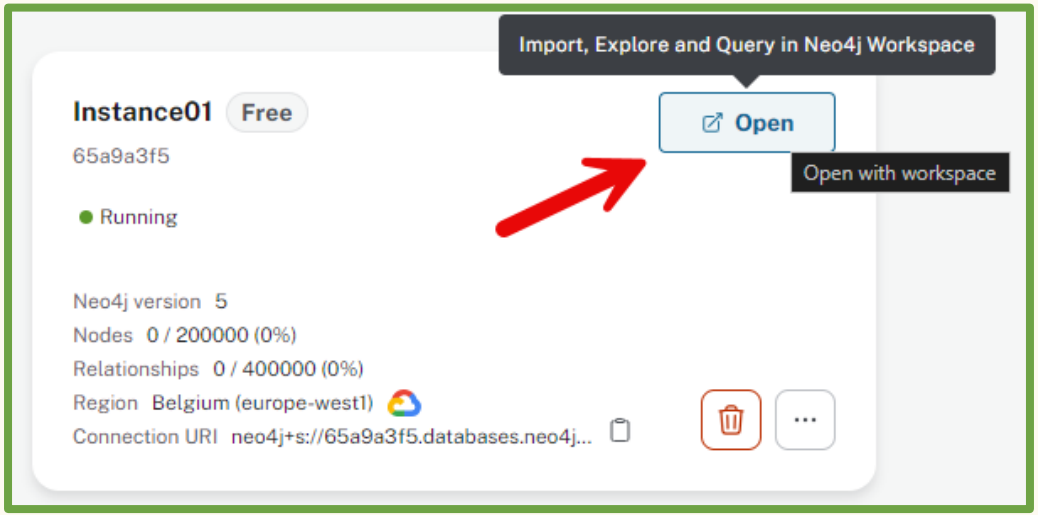
Workshop

Examples

- Go to the Neo4j Aura instance you created earlier
  - https://console.neo4j.io/
- ‘Open with workspace’



Get the code

- Open the Github page:
- https://github.com/neo4j-field/gsummit2024

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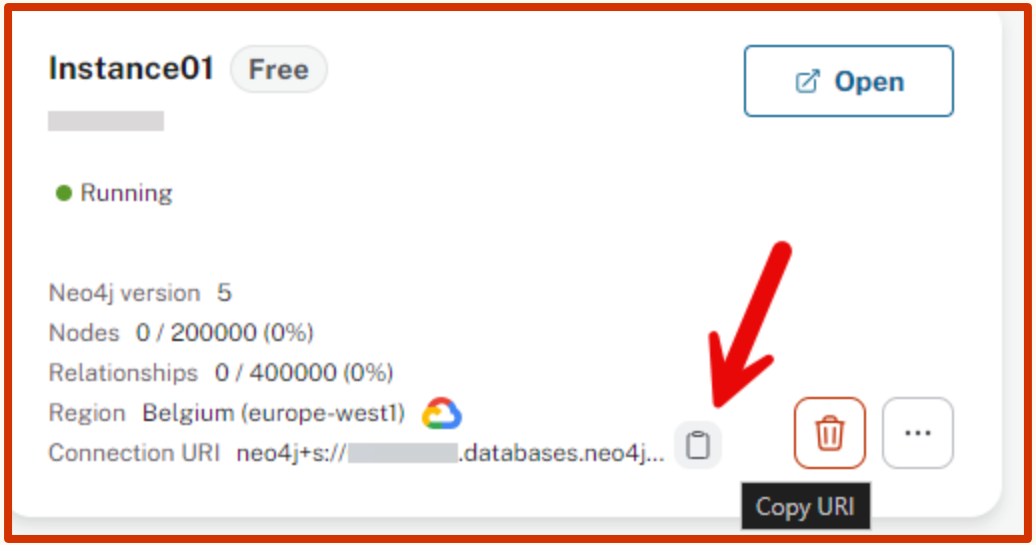
Visualisation - NeoDash

NeoDash

- Open NeoDash:
  - http://neodash.graphapp.io/

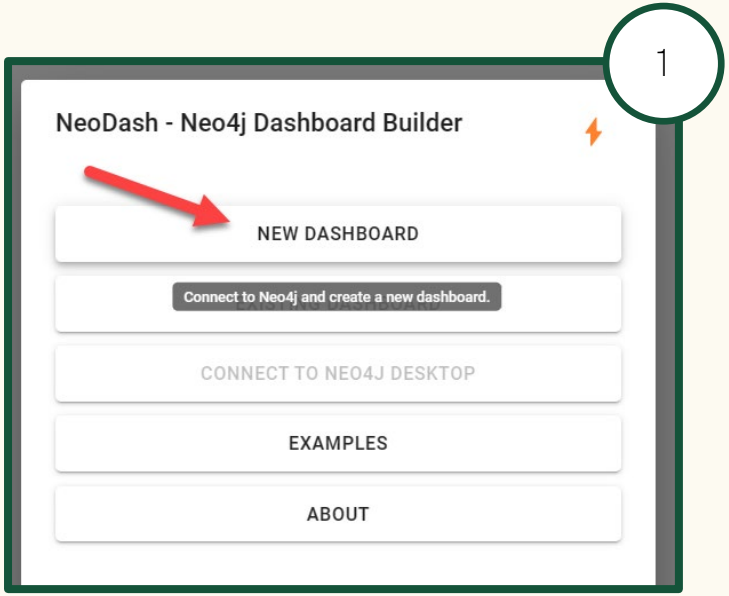
NeoDash - Aura

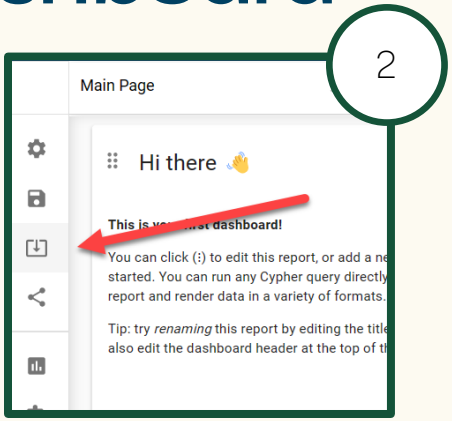
- Copy URI from Aura
- Username: neo4j
- Password:
  - Copied earlier or
  - In the file you downloaded

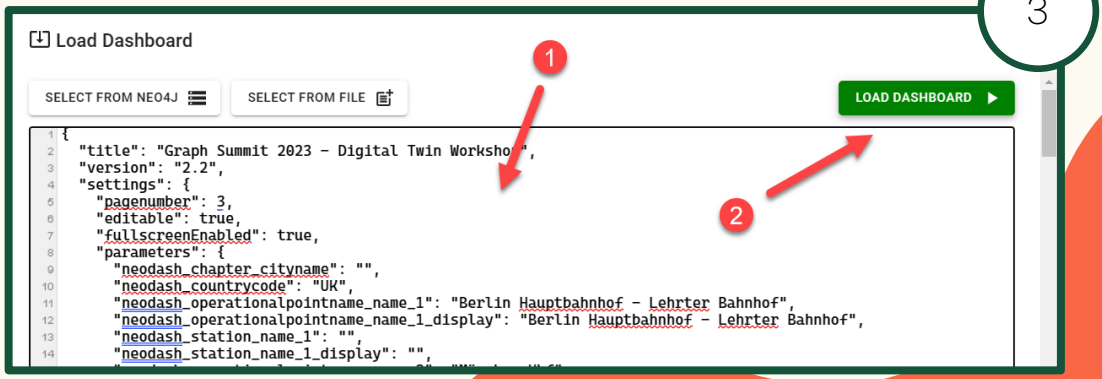


NeoDash – Import Dashboard

- Create New Dashboard
- Import from Source files







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Q & A

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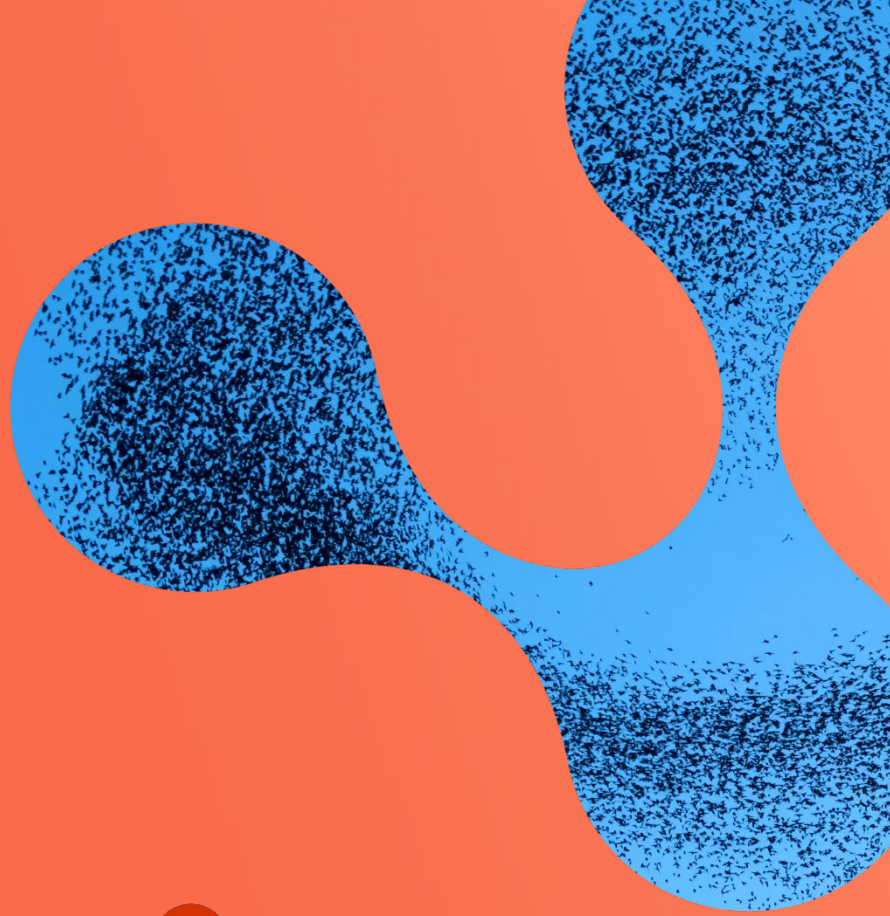
Thank you!

Contact us at
sales@neo4j.com