Star-Wars® Jedi Workshop

Version 0.8

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Neo4j Star-Wars® Jedi Workshop Agenda

- Quick review of Neo4j
- Creating a Jedi data model using Arrows
- Using AuraDB - Neo4j's Cloud DB
- Creating a Star-Wars® graph using Importer
- Exploring the graph visually using Bloom
- Cypher Queries to read, write, update and delete
- Loading Jedi data into Neo4j using Python
- Creating Jedi DataFrames using Jupyter notebooks
- Analyzing characters using Graph Data Science algorithms

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The World's Most Popular Property Graph DB

100m+ Neo4j Downloads
250k+ Community Members

7 **Retailers** of the Top 10

7 **Telcos** of the Top 10

8 **Automakers** of the Top 10

75+

FORTUNE 100

5 **Pharmaceuticals** of the Top 5

8 **Insurance** of the Top 10

3 **Hotels** of the Top 5

20 **Banks** of the Top 20 North American

3 **Aircraft Manufacturers** of the Top 5

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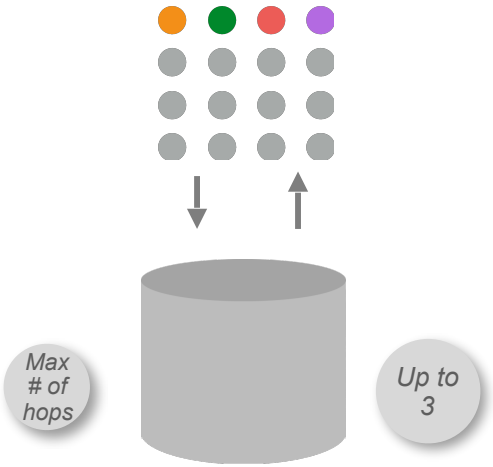
Data Platform Evolution

TRADITIONAL DATABASES

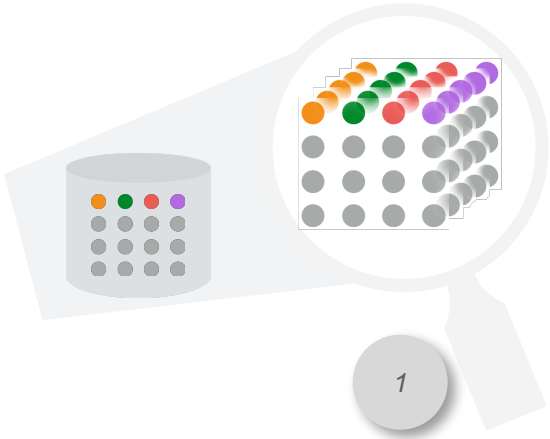
Store and retrieve data



Real time storage & retrieval for simple tabular data

BIG DATA TECHNOLOGY

Aggregate and filter data



Long running queries, Aggregation & filtering

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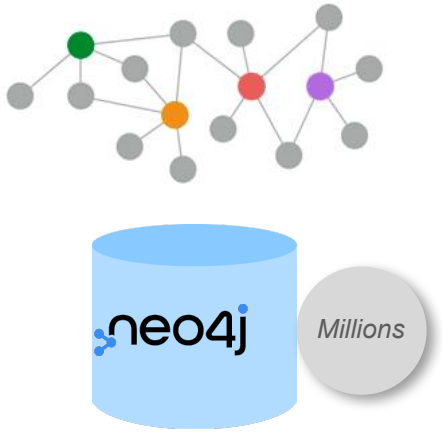
Exploit connections in data



Real-time graph queries & algorithms for contextual insights

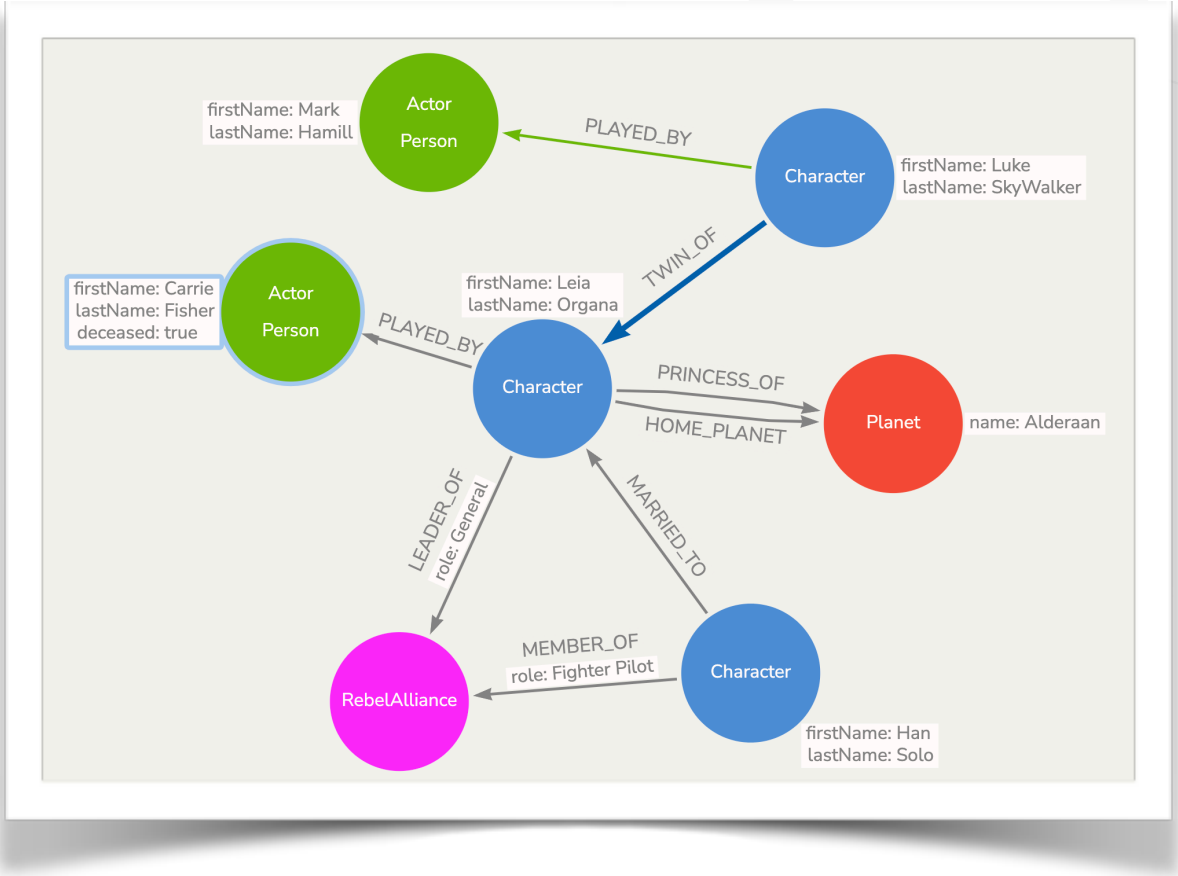
"Our **Neo4j** solution is literally **thousands of times faster** than the prior MySQL solution, with queries that require **10-100 times less code**"
Volker Pacher, Senior Developer

the Labeled Property Graph Model

Nodes
- Define the nouns/entities
- Can have multiple labels

Relationships
- Verbs that relate nodes by type and direction
- Nodes can have multiple relationships

Properties
- Attributes of Nodes and Relationships
- Stored as name/value pairs



- New labels, relationship types and properties can be added w/o schema change

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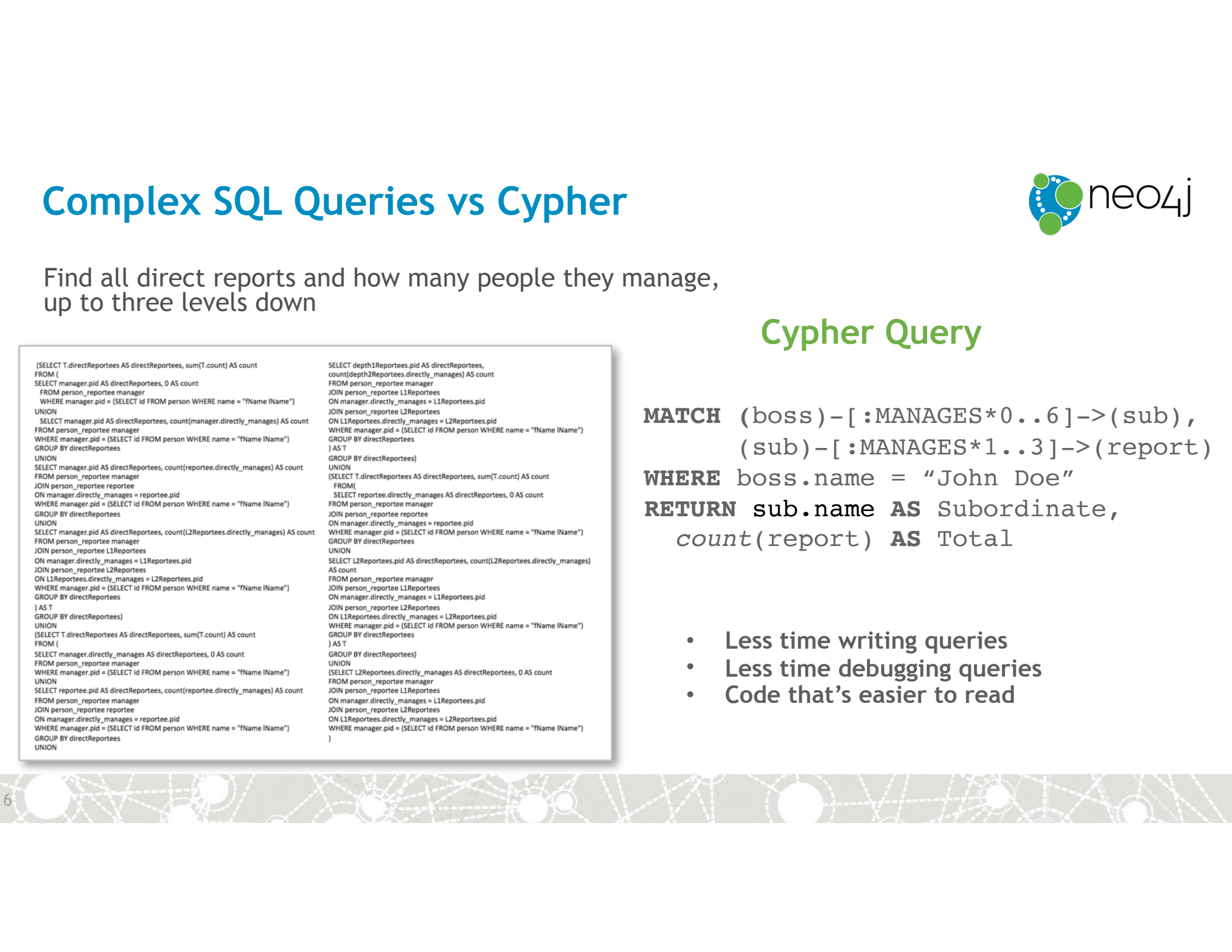
Complex SQL Queries vs Cypher



Find all direct reports and how many people they manage, up to three levels down

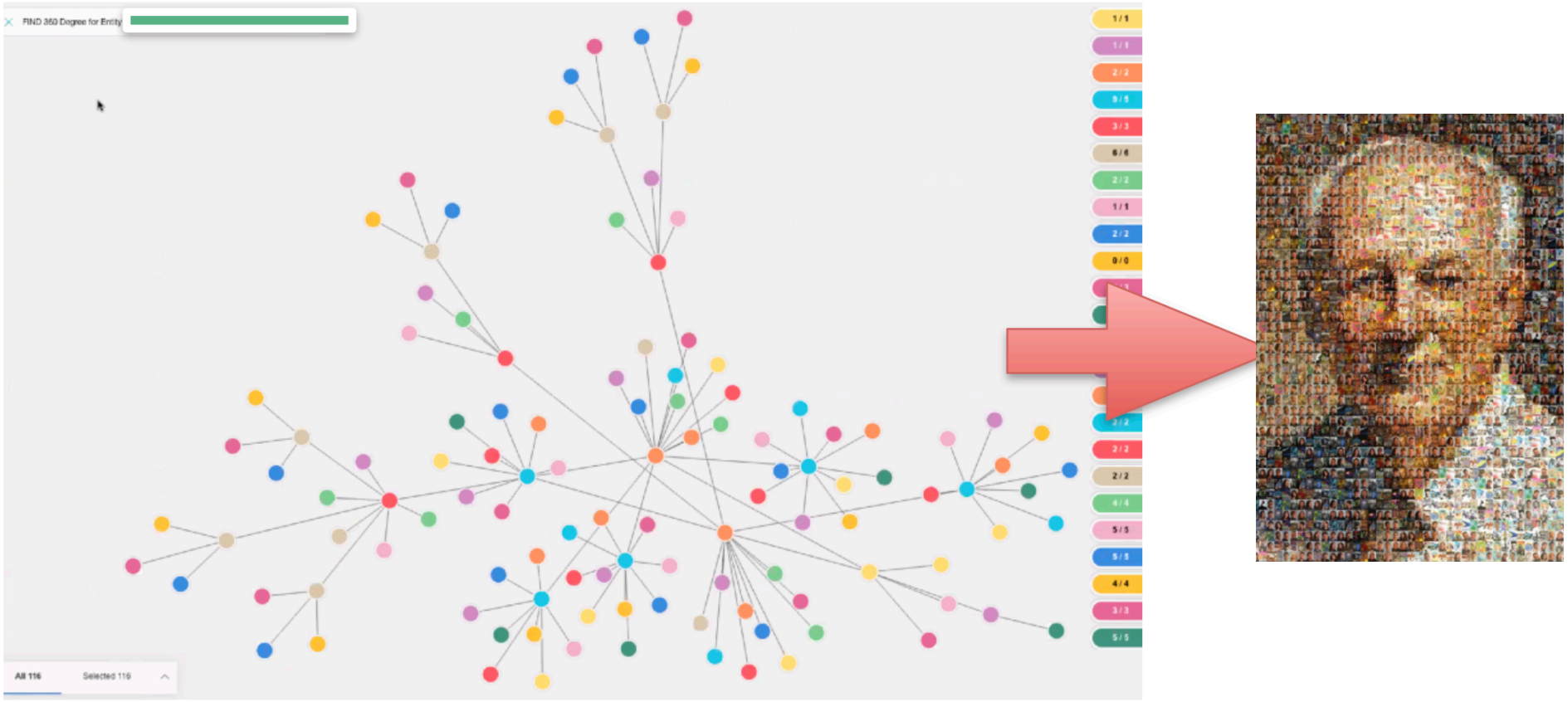
```
(SELECT T.directReportees AS directReportees, sum(T.count) AS count
FROM (
SELECT manager.pid AS directReportees, 0 AS count
  FROM person_reportee manager
  WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
UNION
  SELECT manager.pid AS directReportees, count(manager.directly_manages) AS count
FROM person_reportee manager
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
UNION
SELECT manager.pid AS directReportees, count(reportee.directly_manages) AS count
FROM person_reportee manager
JOIN person_reportee reportee
ON manager.directly_manages = reportee.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
UNION
SELECT manager.pid AS directReportees, count(L2Reportees.directly_manages) AS count
FROM person_reportee manager
JOIN person_reportee L1Reportees
ON manager.directly_manages = L1Reportees.pid
JOIN person_reportee L2Reportees
ON L1Reportees.directly_manages = L2Reportees.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
) AS T
GROUP BY directReportees)
UNION
(SELECT T.directReportees AS directReportees, sum(T.count) AS count
FROM (
SELECT manager.directly_manages AS directReportees, 0 AS count
FROM person_reportee manager
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
UNION
SELECT reportee.pid AS directReportees, count(reportee.directly_manages) AS count
FROM person_reportee manager
JOIN person_reportee reportee
ON manager.directly_manages = reportee.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
UNION
SELECT depth1Reportees.pid AS directReportees,
count(depth2Reportees.directly_manages) AS count
FROM person_reportee manager
JOIN person_reportee L1Reportees
ON manager.directly_manages = L1Reportees.pid
JOIN person_reportee L2Reportees
ON L1Reportees.directly_manages = L2Reportees.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
) AS T
GROUP BY directReportees)
UNION
(SELECT T.directReportees AS directReportees, sum(T.count) AS count
  FROM(
  SELECT reportee.directly_manages AS directReportees, 0 AS count
FROM person_reportee manager
JOIN person_reportee reportee
ON manager.directly_manages = reportee.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
UNION
SELECT L2Reportees.pid AS directReportees, count(L2Reportees.directly_manages)
AS count
FROM person_reportee manager
JOIN person_reportee L1Reportees
ON manager.directly_manages = L1Reportees.pid
JOIN person_reportee L2Reportees
ON L1Reportees.directly_manages = L2Reportees.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
GROUP BY directReportees
) AS T
GROUP BY directReportees)
UNION
(SELECT L2Reportees.directly_manages AS directReportees, 0 AS count
FROM person_reportee manager
JOIN person_reportee L1Reportees
ON manager.directly_manages = L1Reportees.pid
JOIN person_reportee L2Reportees
ON L1Reportees.directly_manages = L2Reportees.pid
WHERE manager.pid = (SELECT id FROM person WHERE name = "fName lName")
)
```

Cypher Query

```
MATCH (boss)-[:MANAGES*0..6]->(sub),
      (sub)-[:MANAGES*1..3]->(report)
WHERE boss.name = “John Doe”
RETURN sub.name AS Subordinate,
  count(report) AS Total
```

- Less time writing queries
- Less time debugging queries
- Code that’s easier to read

Real-time Joins of Data From Myriad Sources to Provide 360°View



Hybrid Scoring-Based Approach is More Contextual

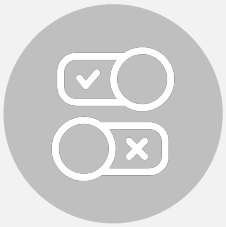
Graph technology enables you to make recommendations that weight multiple methods

Collaborative Filtering

Based on similar users or products

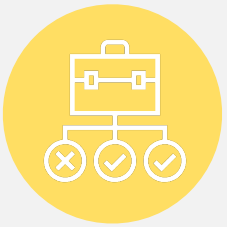
Content Filtering

Based on user history and profile



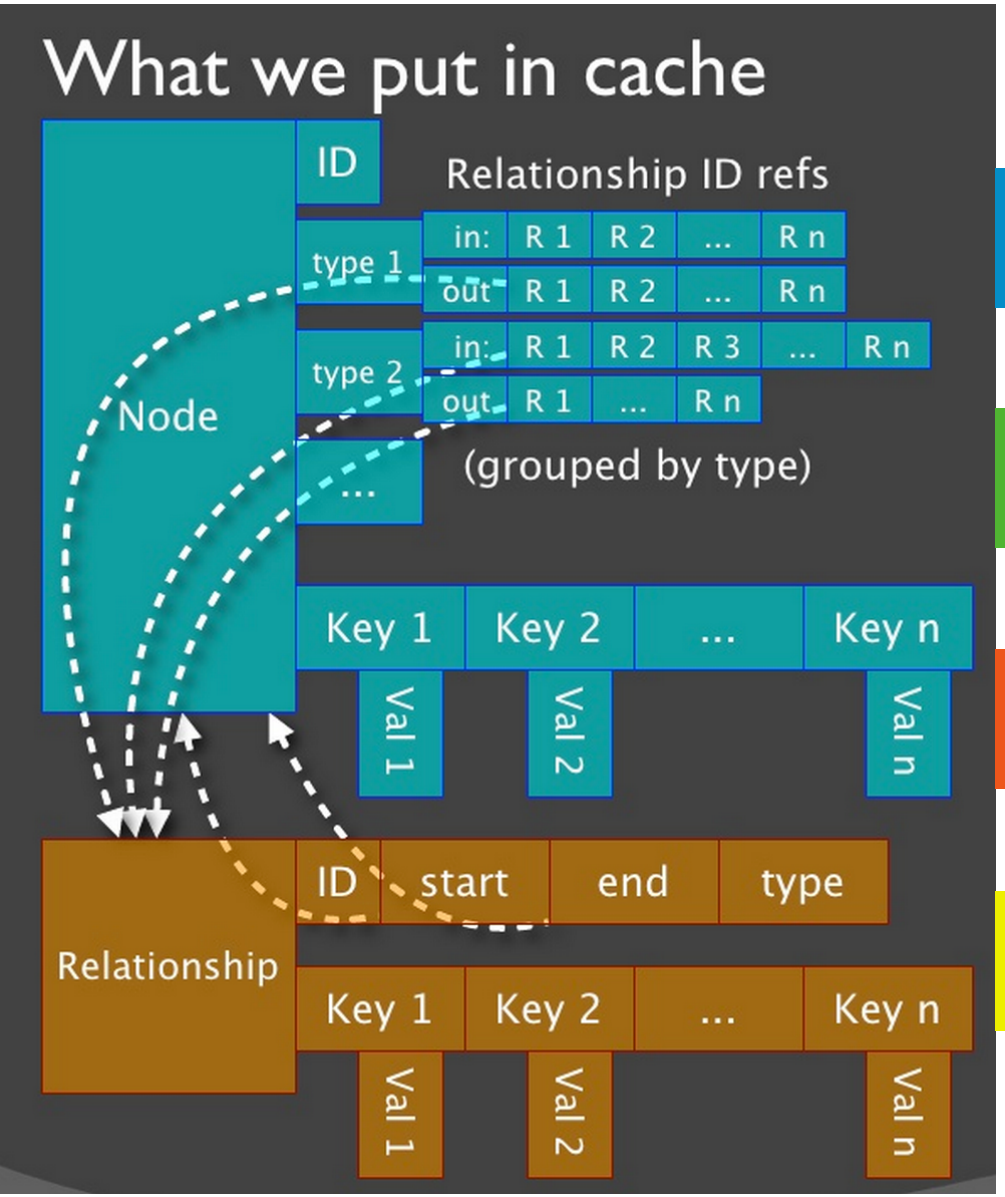
Rules-Based Filtering

Based on predefined rules and criteria



Business Strategy

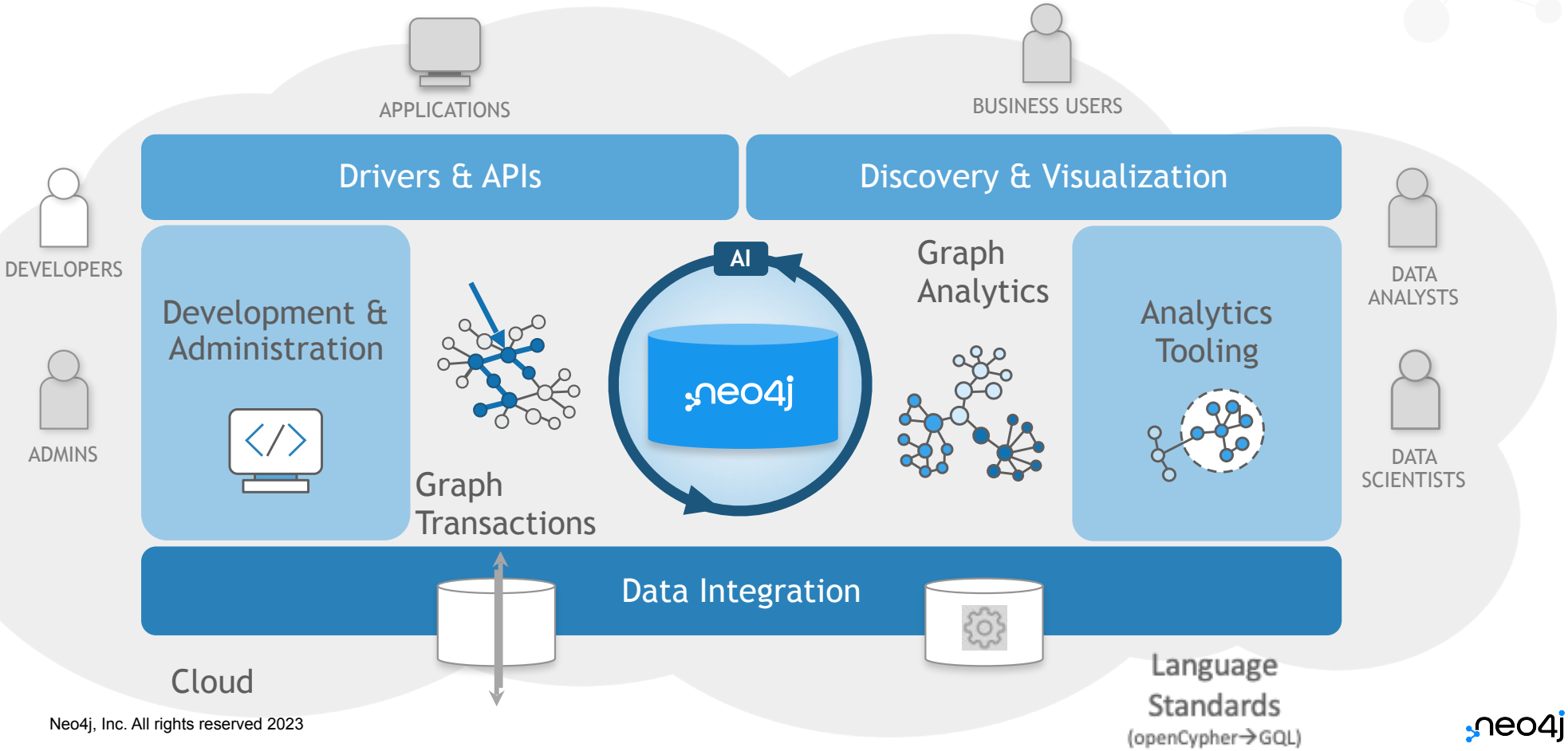
Based on promotions, margins, inventory



Neo4j Secret Sauce

1. Pointers instead of Lookups
2. Fixed Sized Records
3. “Joins” on Creation
4. Spin Spin Spin through this data structure

Neo4j Graph Platform

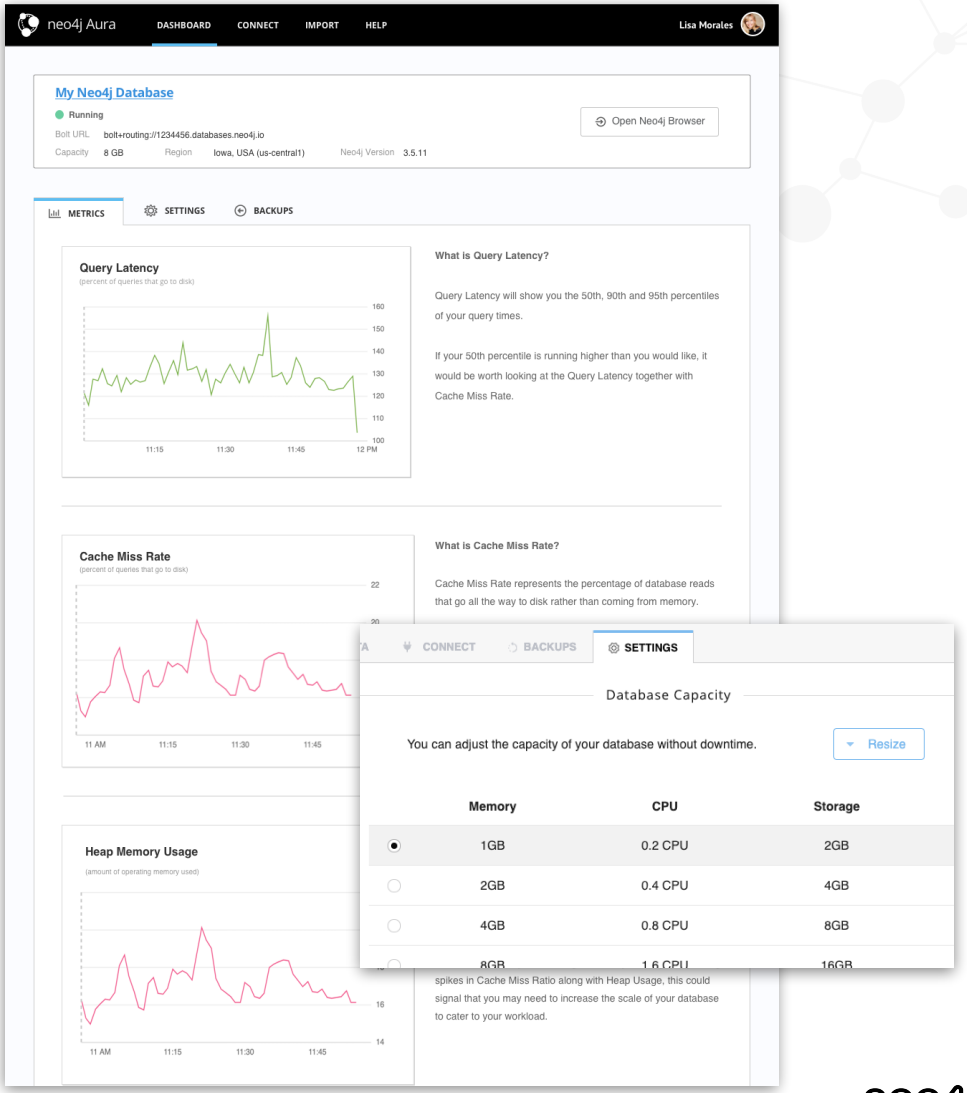


Neo4j in the Cloud

neo4j aura

The world's most popular graph database, as a cloud service

- Fully automated with zero administration
- Faster innovation with the power of graphs
- Scalable on-demand dynamically
- Worry-free security and reliability
- Simple pay-as-you-go pricing



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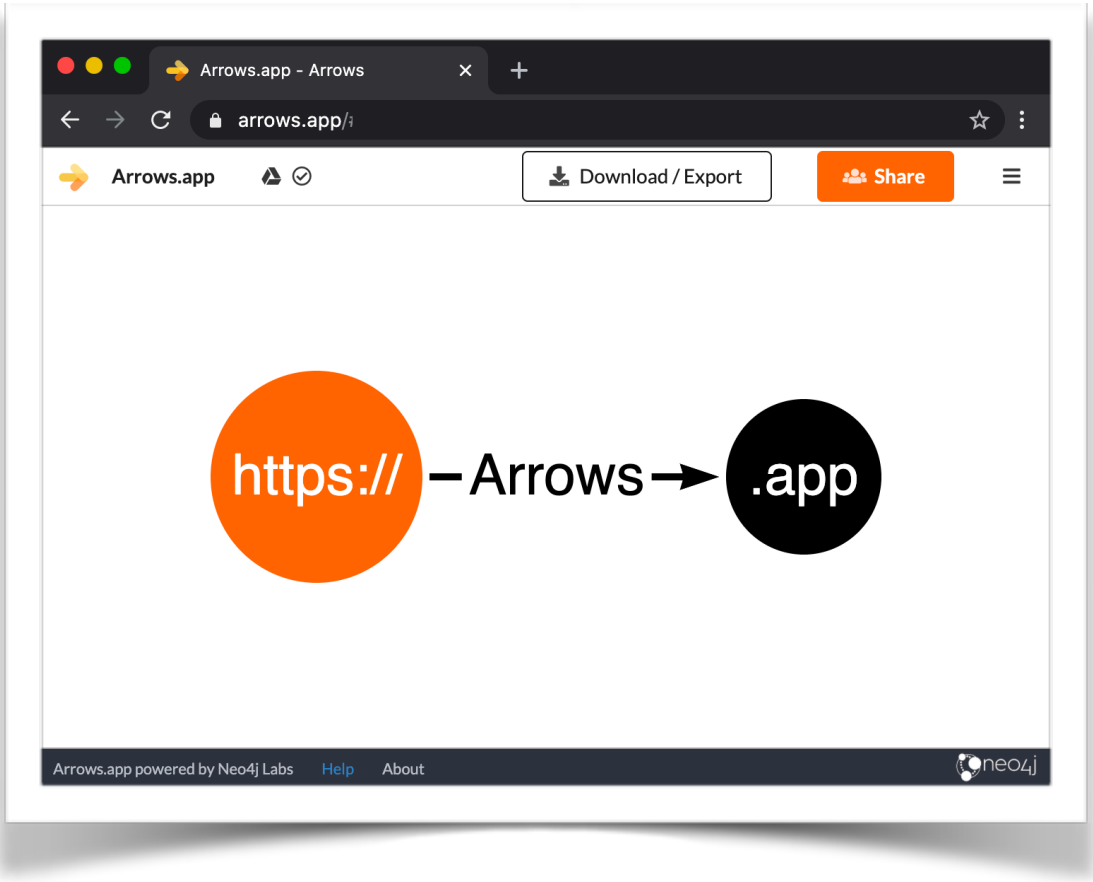
Lab 0 - Connecting to Aura

Neo4j Data Modeling

Visually Create Data Models with Arrows



- Create Graphs Visually
- Export to Cypher
- Import / Export models
- Simple to learn
- Youtube demos available

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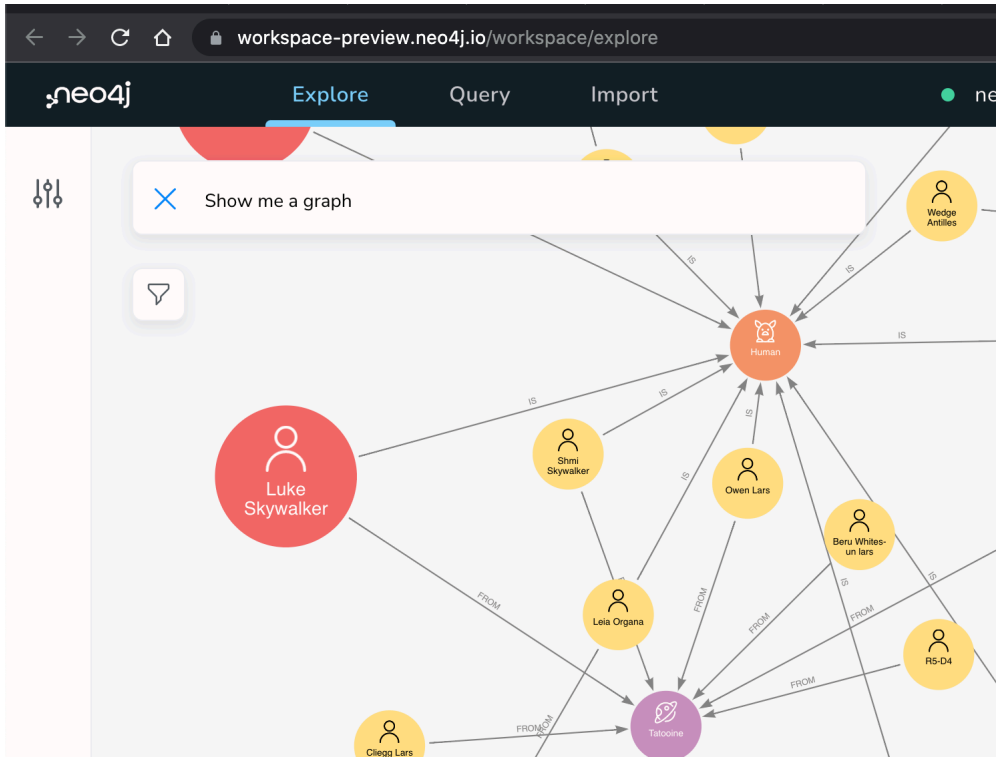
Lab 1 - Data Modeling with Arrows

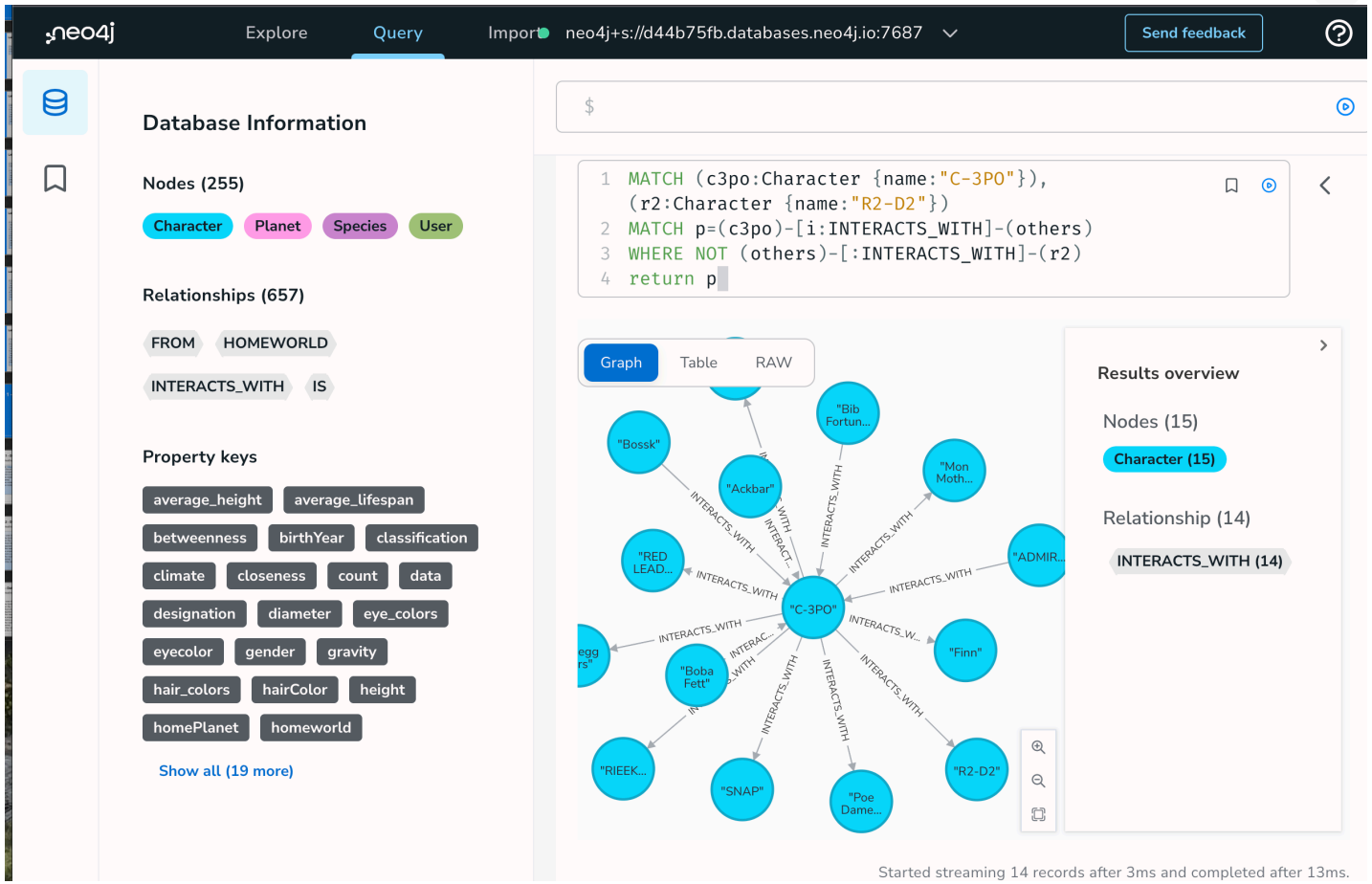
Neo4j Workspace

Explore, Query, Import with Neo4j Workspace



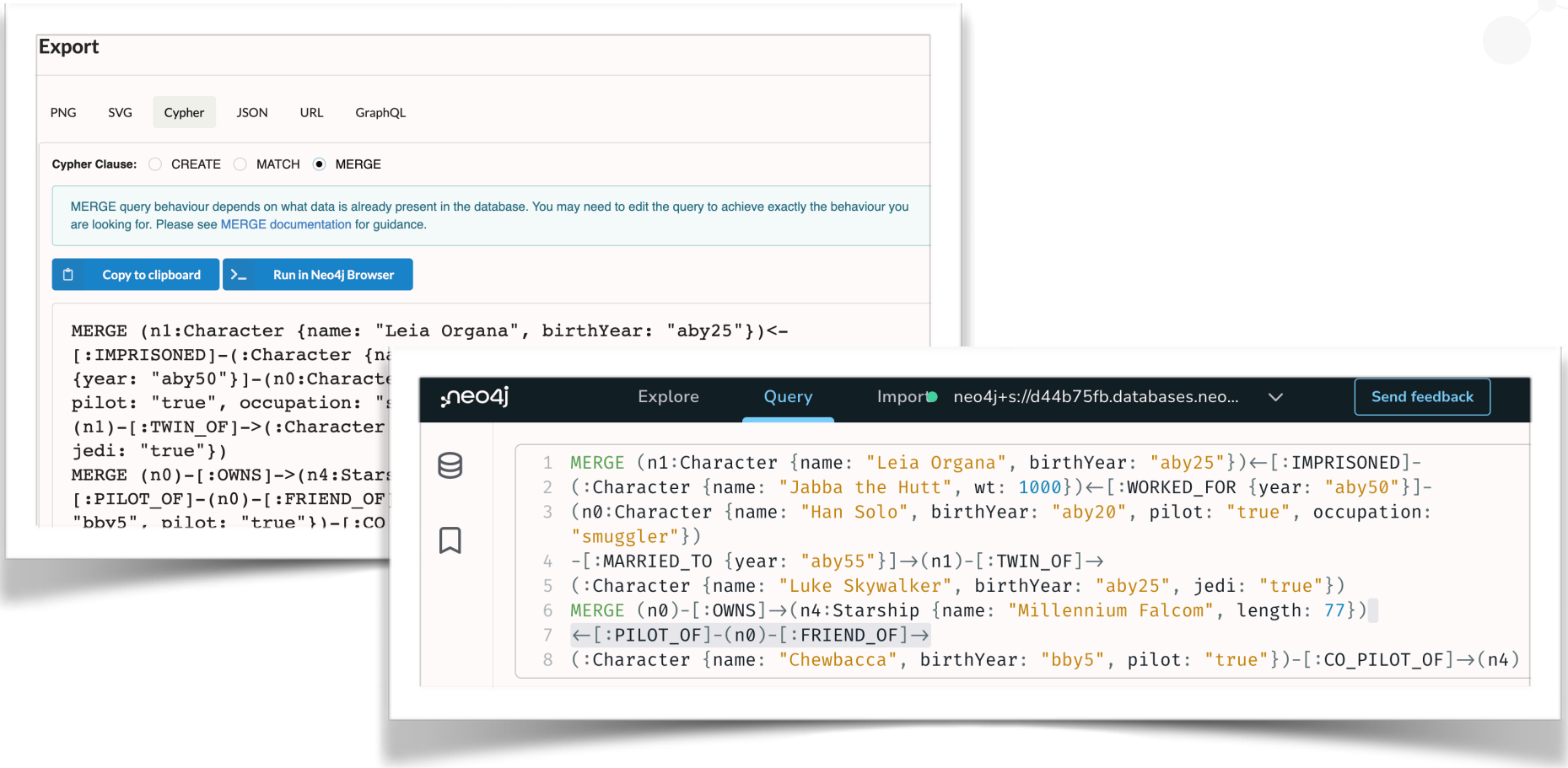
- Easy-to-use work surface (beta)
- Import CSV files
- Edit/Run Cypher Commands
- Visually explore the graph without using Cypher

Run Cypher Commands -Workspace - Query



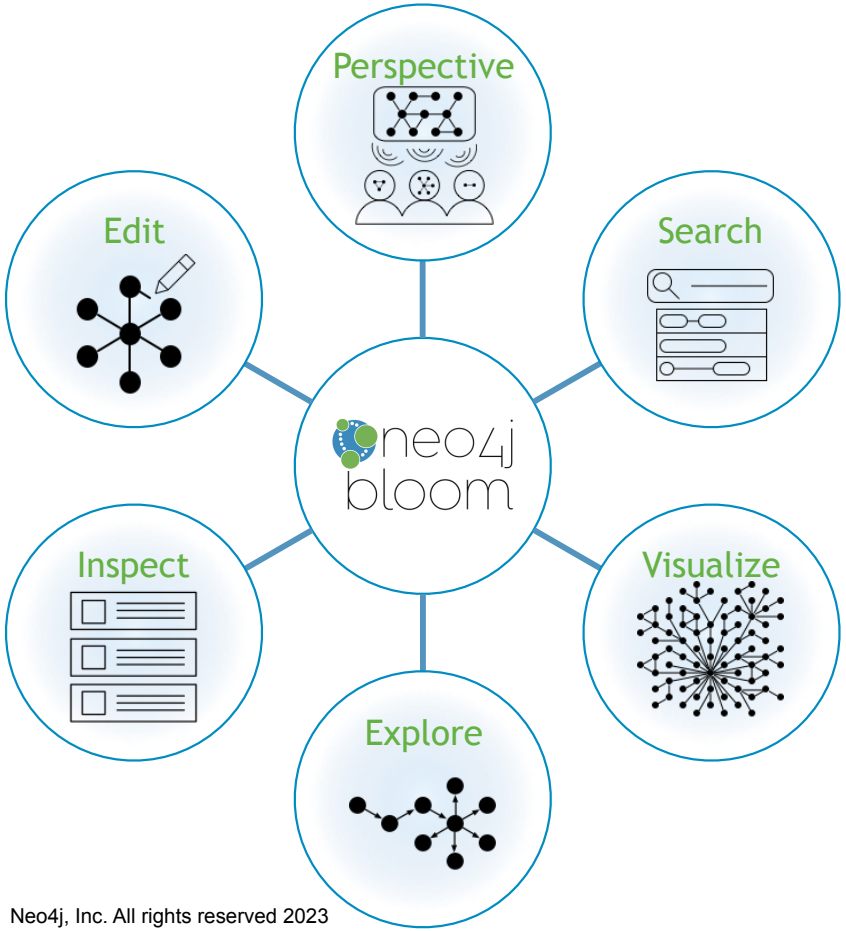
Quick Demo

Export Arrows Model - Import using Workstation



Neo4j Bloom

Explore & Collaborate with Neo4j Bloom



Explore Graphs Visually

Prototype Concepts Faster

Collaborate Across Teams

Neo4j Bloom's Intuitive User Interface

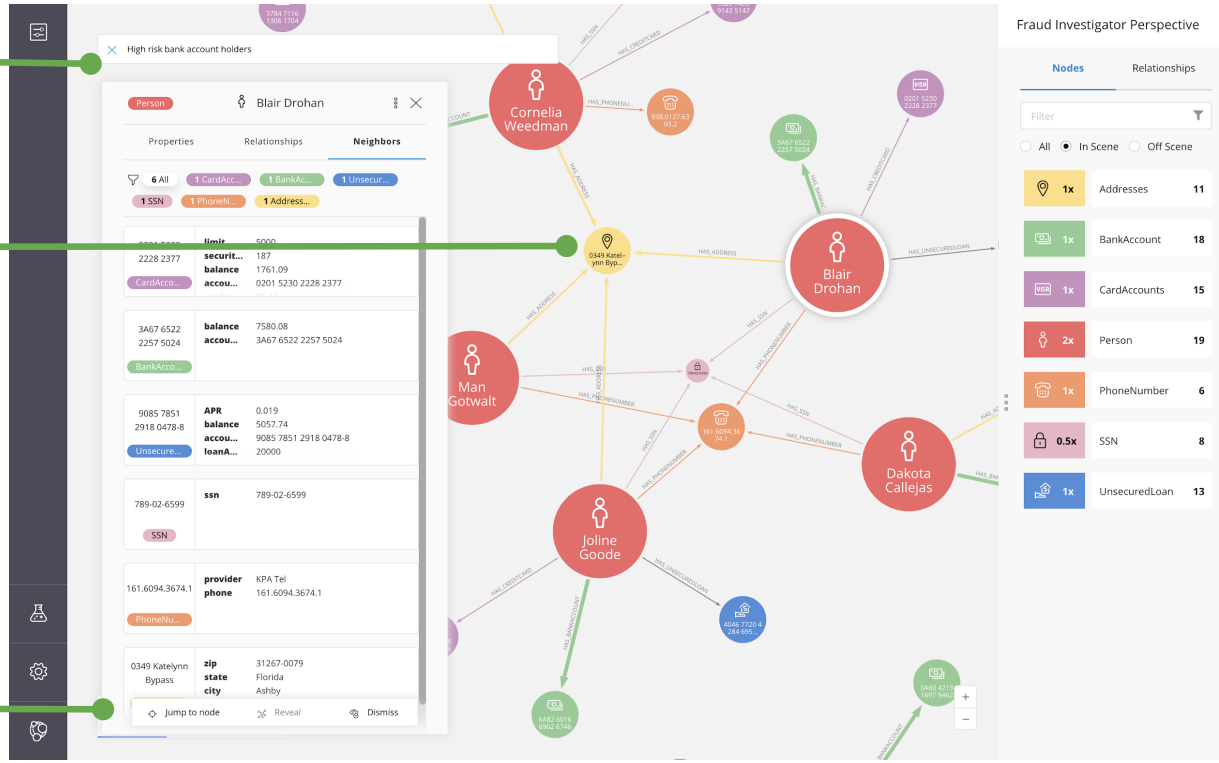
Search with type-ahead suggestions

Flexible Color, Size and Icon schemes

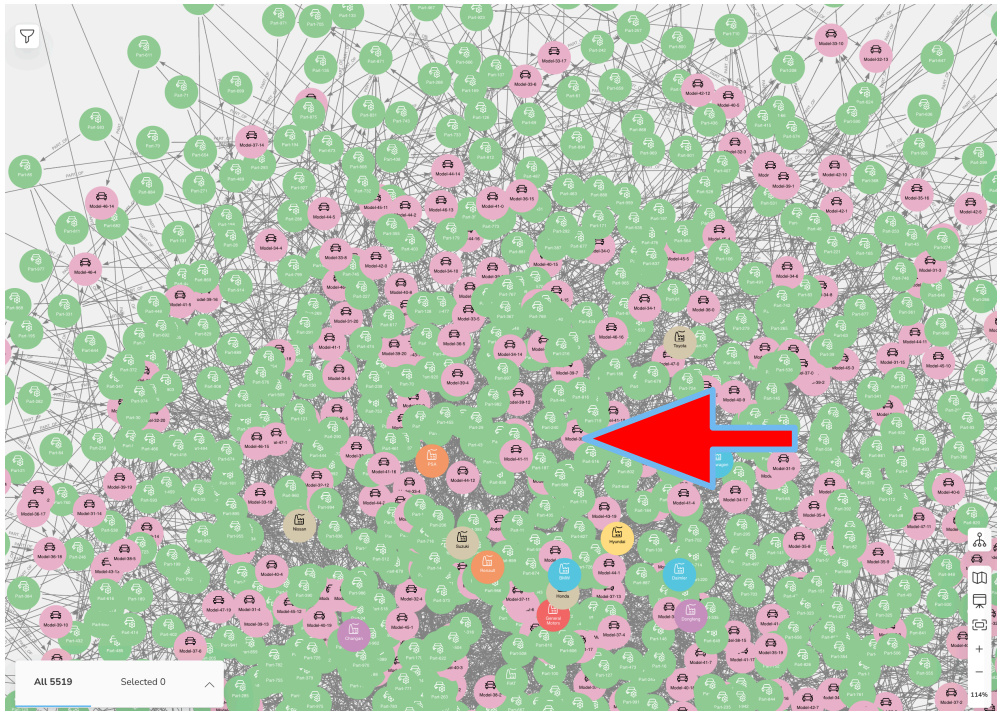
Visualize, Explore and Discover

Pan, Zoom and Select

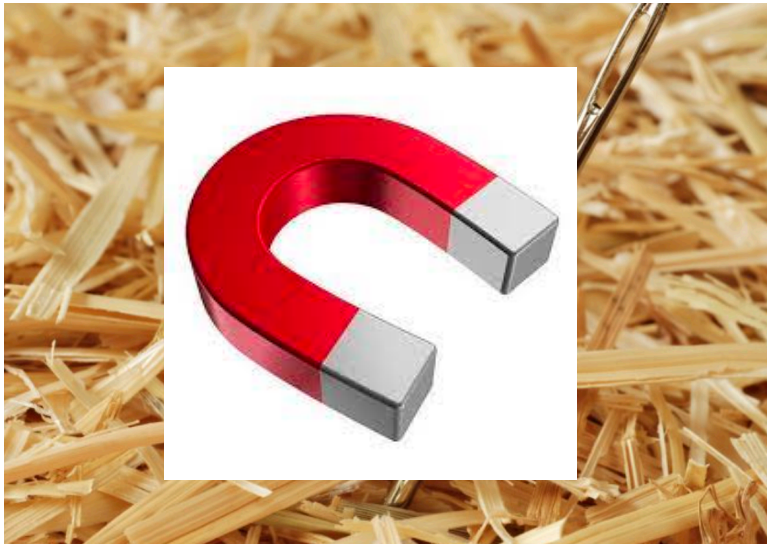
Property Browser and editor



Finding Key Objects



Similar to Finding a Needle in a Haystack



Easier to do with the right tools!

Graph Centrality Algorithms Assist in Analysis

- Closeness algorithms identify:
  - Highly-connected nodes
  - Built-in redundancy
- Betweenness algorithms identify:
  - Strategically-connected nodes
  - Single points of failure
  - Potentially vulnerable nodes

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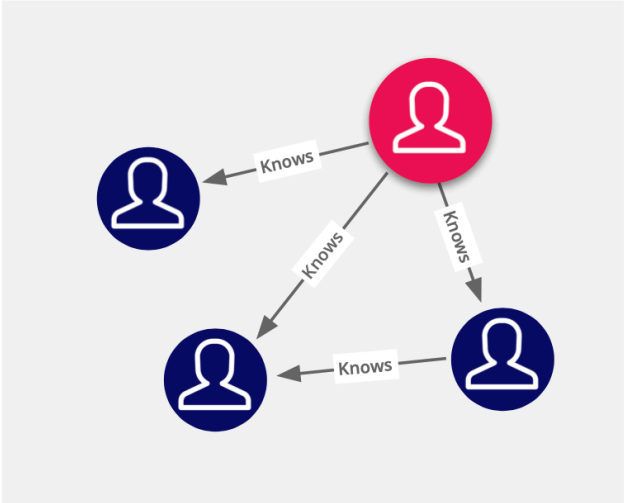
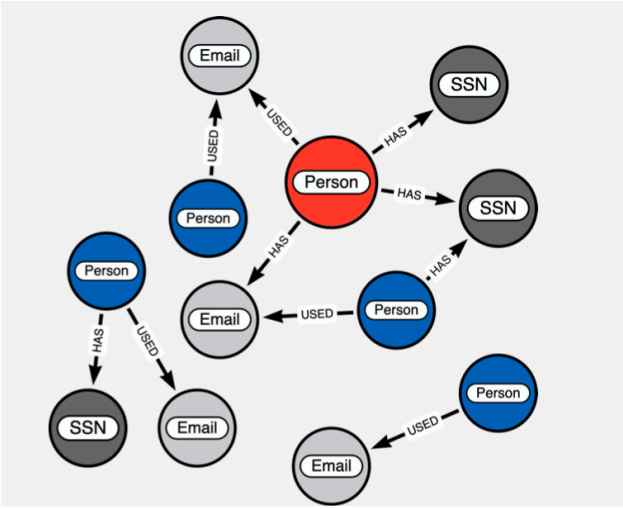
Neo4j Graph Data Science

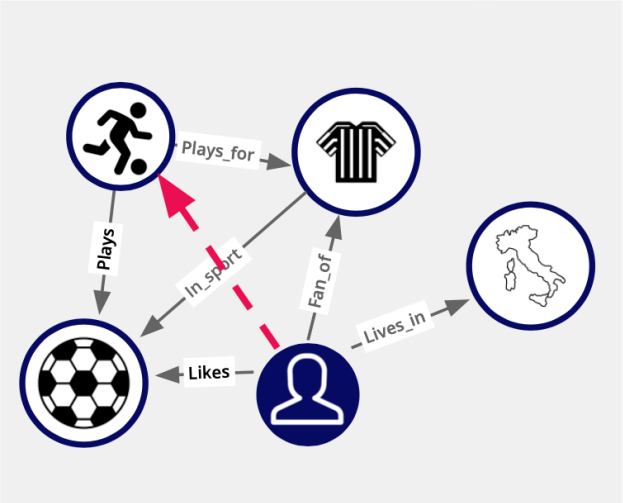
Use Graph Data Science to Answer:



What's important?



What's unusual?



What's next?

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Let’s Do Something Amazing Together