Introduction to Neo4j

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Github Repo

The Challenges of Traditional Databases (SQL)

- The SQL Approach: Data is stored in tables (rows & columns).
- The Challenge: Querying deep relationships (e.g., "friend-of-a-friend").
- Massive, complex "JOIN Monster" queries
- Disastrous performance drops
- Rigid Schema

The Solution: Neo4j

- Native Graph Database
- Core Philosophy: "Relationships are First-Class Citizens"

This means:

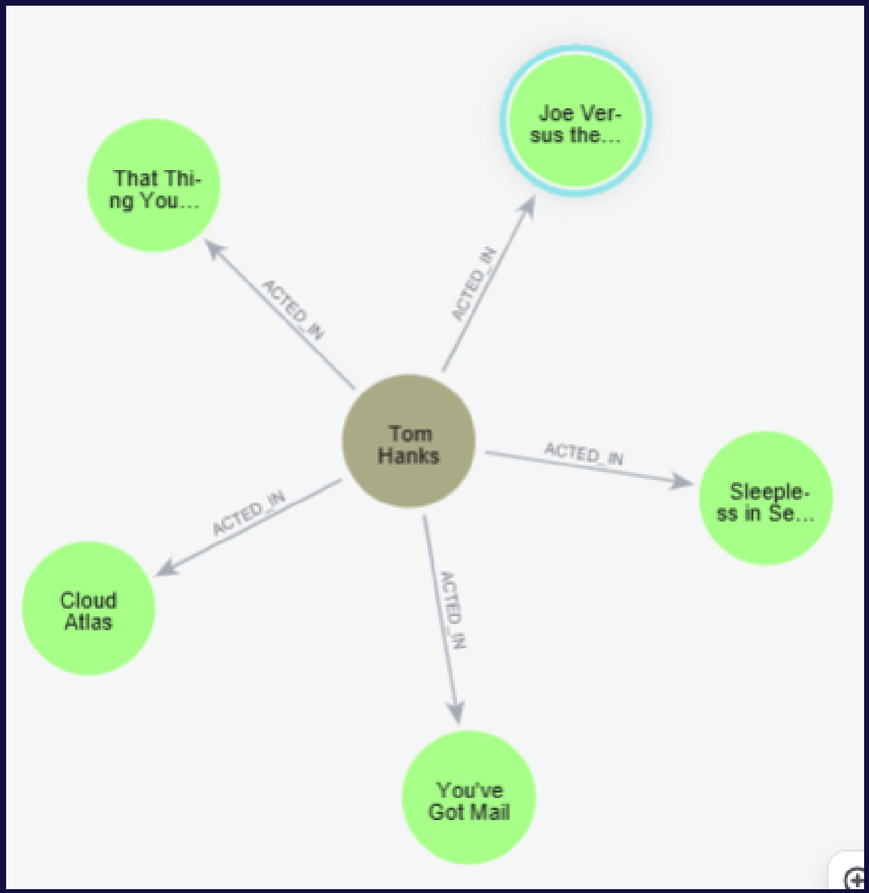
Data is stored as a graph (not in tables).

Connections are physical pointers, not computed at query time.

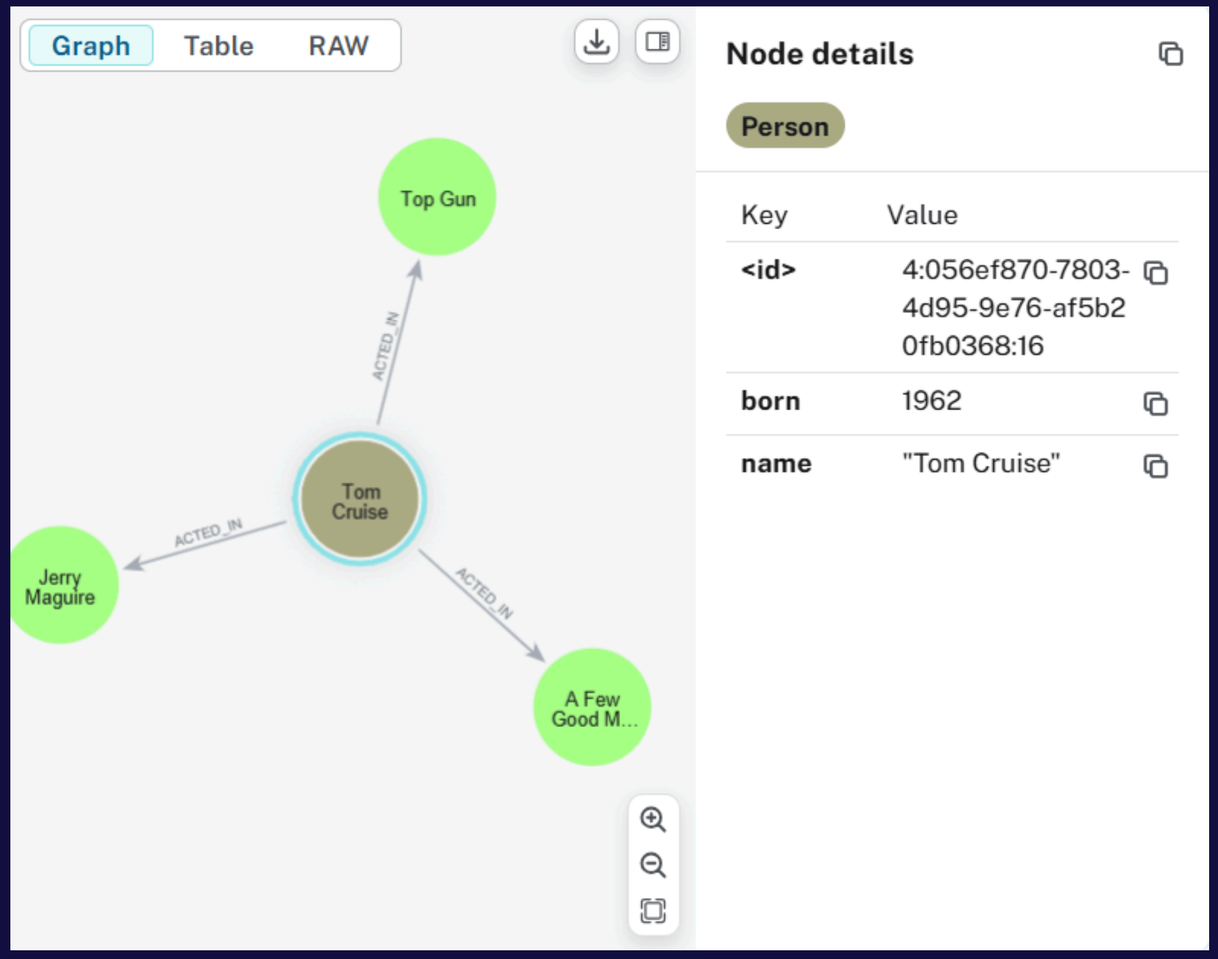
Optimized for high-speed, JOIN-free queries.

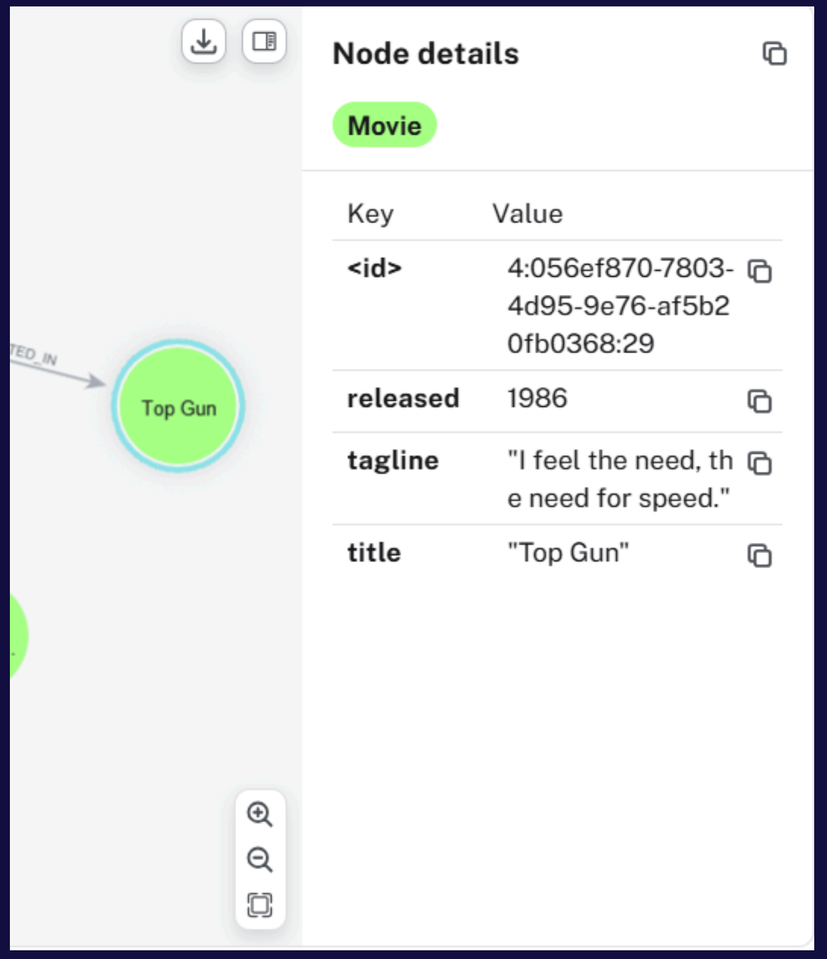
The Building Blocks: Property Graph Model

- Nodes: The entities or "dots".
- Relationships: Connect nodes. They have direction and type.
- Properties: Key-value data on both nodes and relationships.
  {name: 'Ali'}, {date: '2025-11-11'}



The Building Blocks: Property Graph Model





The Query Language: Cypher

The "SQL for Graphs"

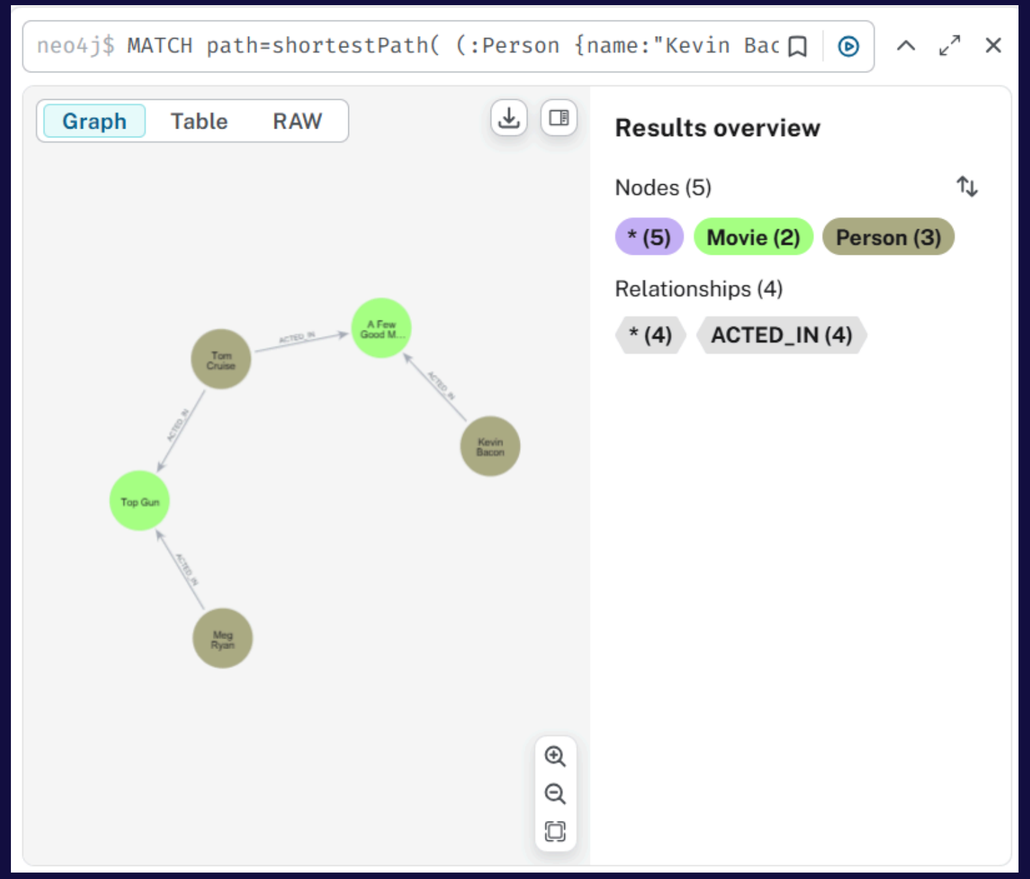
- (and) = Nodes (The "dots")
- -[ ]-> = Relationships (The "arrows")

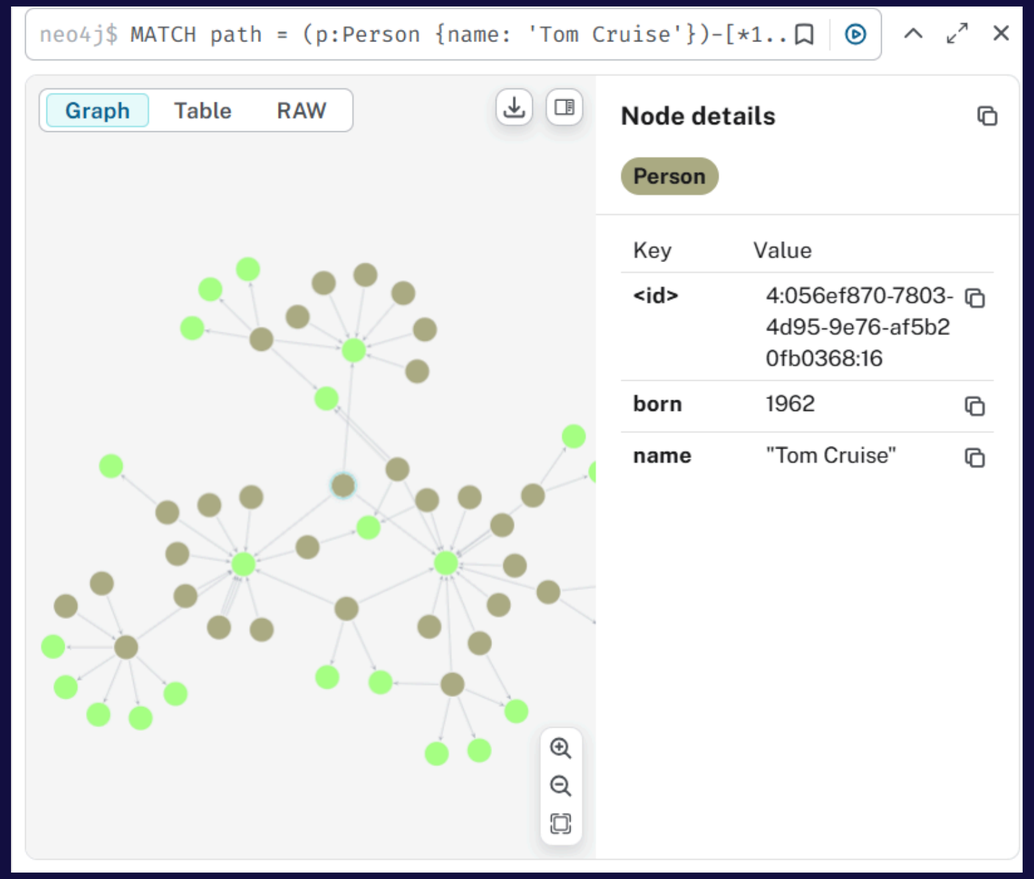
- Declarative
- Visual
- Intuitive

```
j$ MATCH (p:Person {name: "Tom Hanks"}) RETURN p
```

```
1 MATCH (p:Person {name: 'Tom Hanks'})-[r:ACTED_IN]->(m:Movie)
2 RETURN p, r, m
```

```
1 MATCH (m:Movie) WHERE m.released >= 1990 AND m.released < 2000
2 RETURN m.title, m.released
```


neo4j$ MATCH path=shortestPath((:Person {name:"Kevin Bac
Graph
Table
RAW
Tom Cruise
A Few Good M...
Kevin Bacon
Top Gun
Meg Ryan
ACTED_IN
Results overview
Nodes (5)
* (5)
Movie (2)
Person (3)
Relationships (4)
* (4)
ACTED_IN (4)


neo4j$ MATCH path = (p:Person {name: 'Tom Cruise'})-[*1..
Graph
Table
RAW
Node details
Person
Key
Value
<id>
4:056ef870-7803-4d95-9e76-af5b20fb0368:16
born
1962
name
"Tom Cruise"

Real-World Use Cases

1. Recommendation Engines

Query: "People who bought this, also bought..."

2. Fraud Detection

Query: "Does this transaction look like a known fraud ring?"

3. Social Networks

Query: "Who are my 'mutual friends'?"

4. Knowledge Graphs

Query: "What is the relationship between 'Drug A' and 'Protein B'?"

THANK YOU!