NoSQL: Overview and Examples

Key Concepts and Hands-on

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What is NoSQL

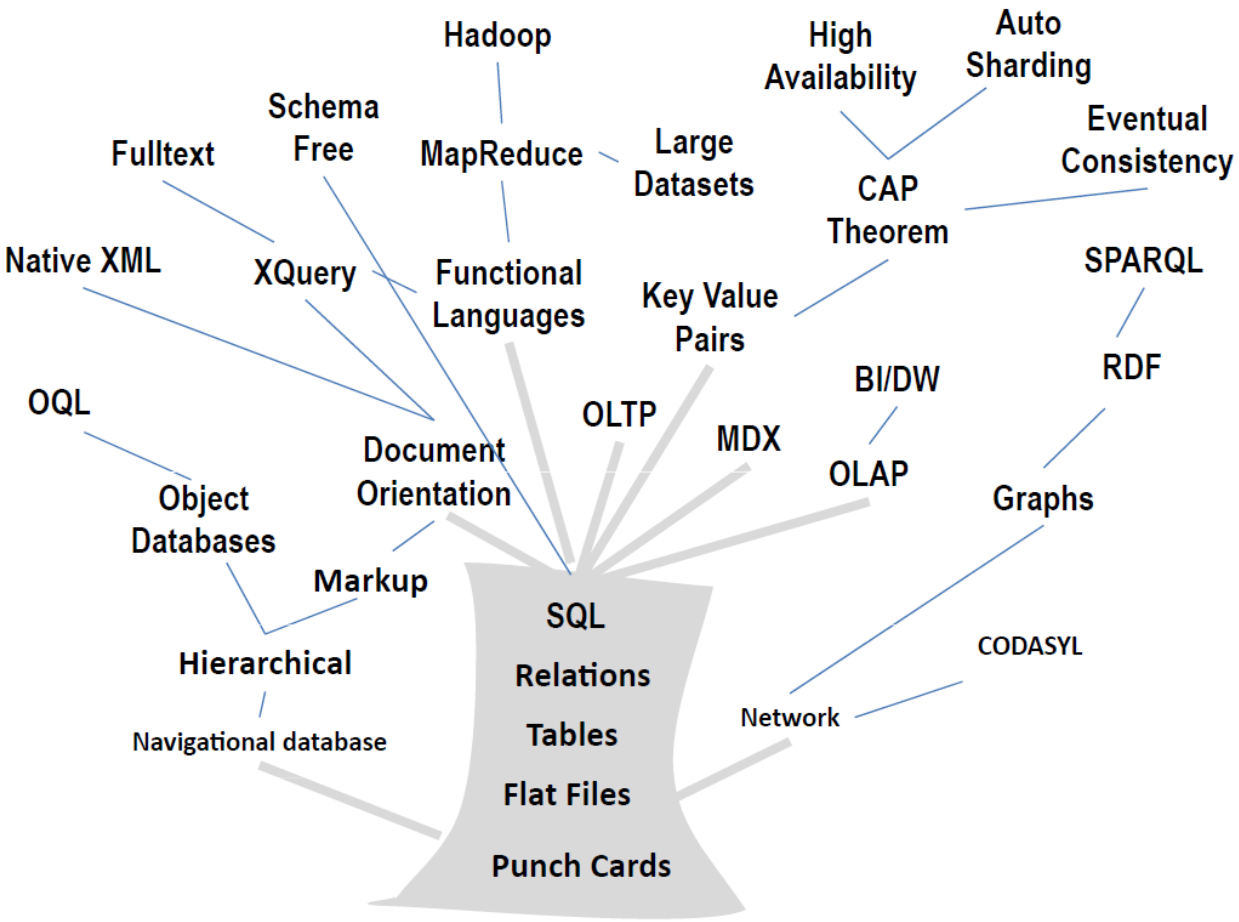
- Pronounce: *noseequel* or *no-squeal*
- It is a fast and portable database management system originated from the well-known relational database model.
- The data is stored in ASCII files that can be manipulated by UNIX utilities.
- The form the data file is a relation or a table of information.

What NoSQL is *not*

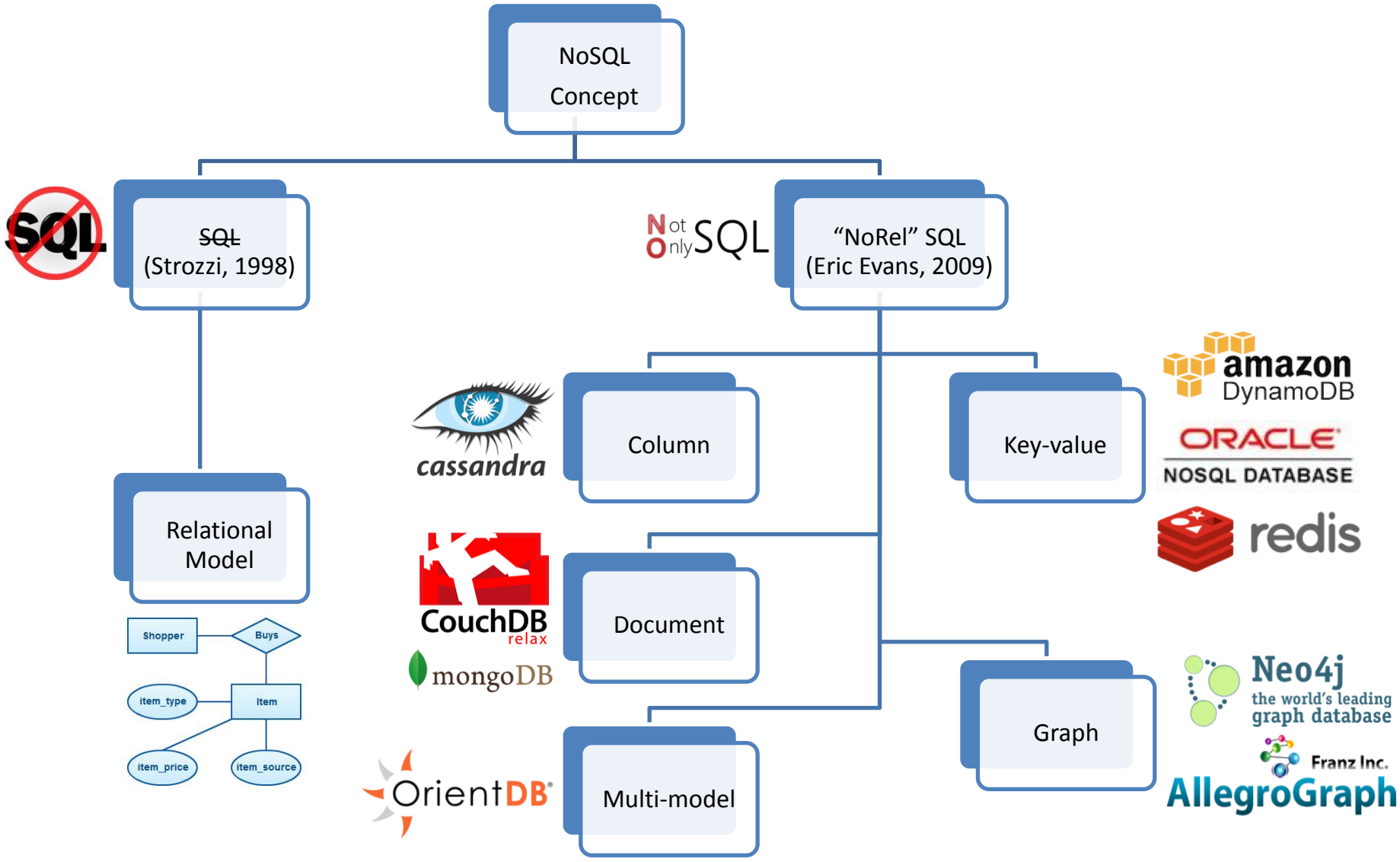
- NoSQL appeared in 1998 and has nothing to do with the NoSQL Movement
- The first is a well-defined software package, **is** a relational database to all effects and just it intentionally does not use SQL as a query language.
- The last is mostly a concept, which departs from the relational model altogether and it should therefore have been called more appropriately "NoREL“ (non-relational).

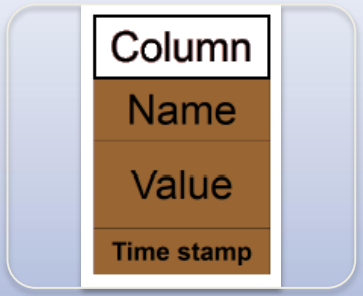
Source: http://www.strozzi.it/cgi-bin/CSA/tw7/I/en_US/nosql/Home%20Page

NoSQL Concept Tree



Source: CIO's Guide to NOSQL, Dan McCreary, June 2012 - http://www.dataversity.net/the-cios-guide-to-nosql-3/


NoSQL
Concept
SQL
(Strozzi, 1998)
"NoRel" SQL
(Eric Evans, 2009)
Relational
Model
Shopper
Buys
item_type
Item
item_price
item_source
Column
Key-value
Document
Graph
Multi-model
cassandra
CouchDB
relax
mongoDB
OrientDB
amazon
DynamoDB
ORACLE
NOSQL DATABASE
redis
Neo4j
the world's leading
graph database
Franz Inc.
AllegroGraph



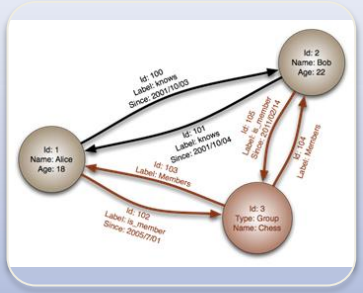
Column

- Unique name: Used to reference the column
- Value: The content of the column. It can have different types, like AsciiType, LongType, TimeUUIDType, UTF8Type, etc.
- Timestamp: The system timestamp used to determine the valid content.

```
<contact>
   <firstname>John</firstname>
   <lastname>Doe</lastname>
   <street1>123 Back St.</street1>
   <city>New York City</city>
   <state>NY</state>
   <zip>10007</zip>
   <country>US</country>
</contact>
```

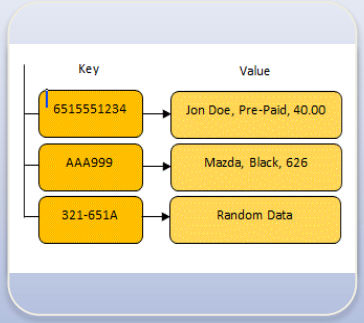
Document

- Typically the documents are stored in XML or JSON format.
- The document format determines the type of relationship between the documents the database.
- There can be hierarchies between documents.



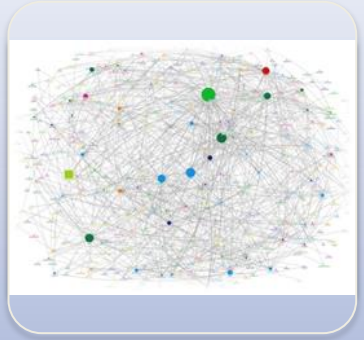
Graph

- All database information is stored in vertices (nodes) or edges (edges)
- The query in the bank is usually done by depth-first search (DFS)
- The edges may contain information other than just the nodes link



Key-value

- All values are associated with one or more keys
- The values may be stored in any language / shape



Multi-model

- More than one data type in the same database
- Are usually graph-oriented document databases
- Vertices & edges are special types of documents

Keep calm and love your database administrator.

(http://neo4j.com/)

Top Ten Reasons for Choosing Neo4j

1. World's Best and First Graph Database
2. Biggest and Most Active Graph Community on the Planet
3. Highly Performant Read and Write Scalability, Without Compromise
4. High Performance Thanks to Native Graph Storage & Processing
5. Easy to Learn
6. Easy to Use
7. Rock-Solid Reliability for Mission-Critical Production Applications
8. Easier than Ever to Load Your Data into Neo4j
9. Whiteboard-friendly Data Modeling to Simplify the Development Cycle
10. Superb Value for Enterprise and Startup Projects

A Closer Look at Neo4j Editions

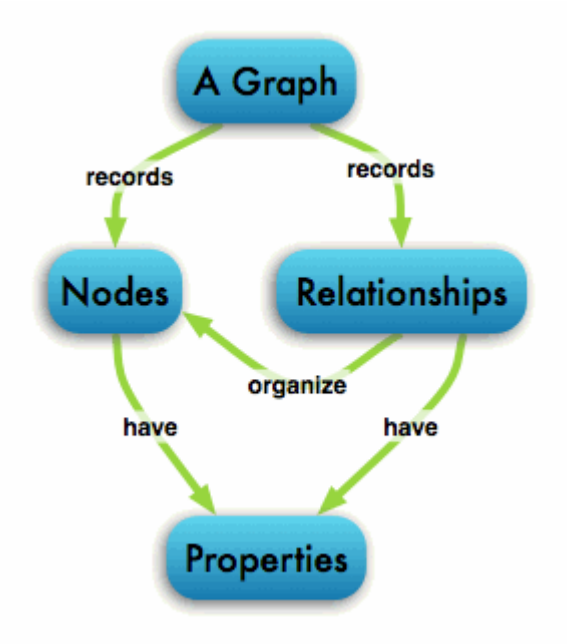
Edition	Enterprise	Community
Property Graph Model	X	X
Native Graph Processing & Storage	X	X
ACID[1]	X	X
Cypher – Graph Query Language	X	X
Language Drivers most popular languages	X	X
REST[2] API	X	X
High-Performance Native API	X	X
HTTPS (via Plug-in)	X	X

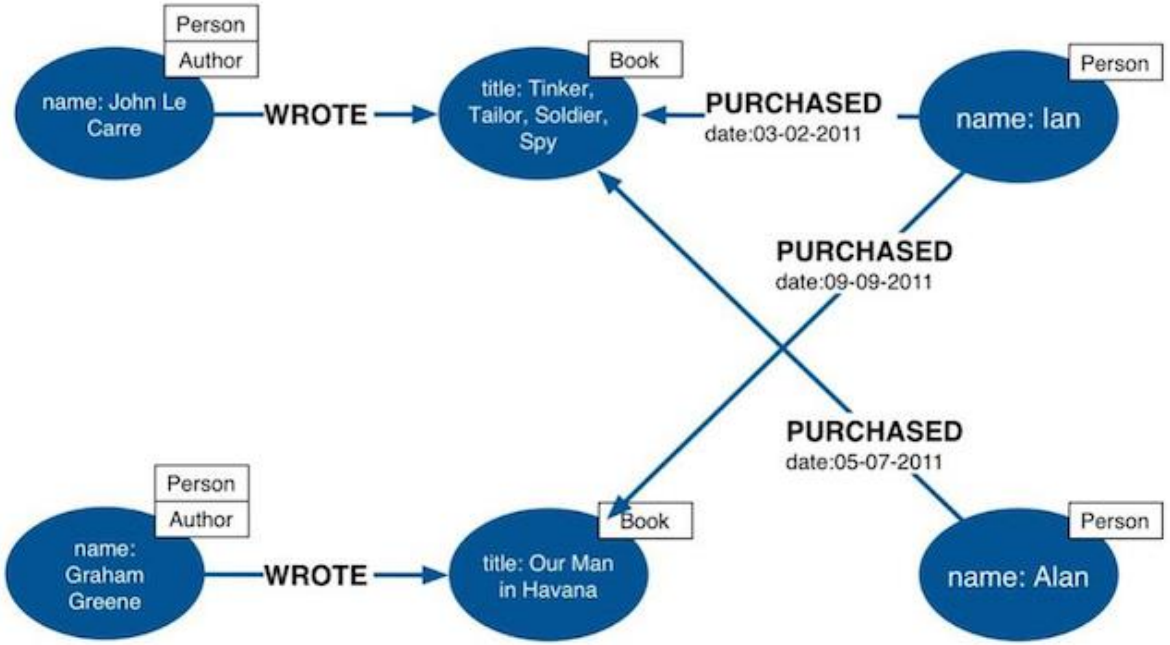
Performance & Scalability Features	Enterprise	Community
Enterprise Lock Manager	X	–
High-Performance Cache	X	–
Clustering	X	–
Hot Backups	X	–
Advanced Monitoring	X	–

[1] ACID (Atomicity, Consistency, Isolation, Durability: a set of properties that guarantee that database transactions are processed reliably

[2] REST (Representational State Transfer) is a architecture style consisting of guidelines and best practices for creating scalable web services.

Labeled Property Graph Data Model





"There is one core consistent rule in a graph database: "No broken links". Since a relationship always has a start and end node, you can't delete a node without also deleting its associated relationships. You can also always assume that an existing relationship will never point to a non-existing endpoint."

Source: http://neo4j.com/developer/graph-database/

Hands-on: Browser

- Using neo4j community (80.4 MB)
- Installation and startup finished in less than a minute.
- Access via http://localhost:7474/ (neo4j/neo4j → neo4j/root)

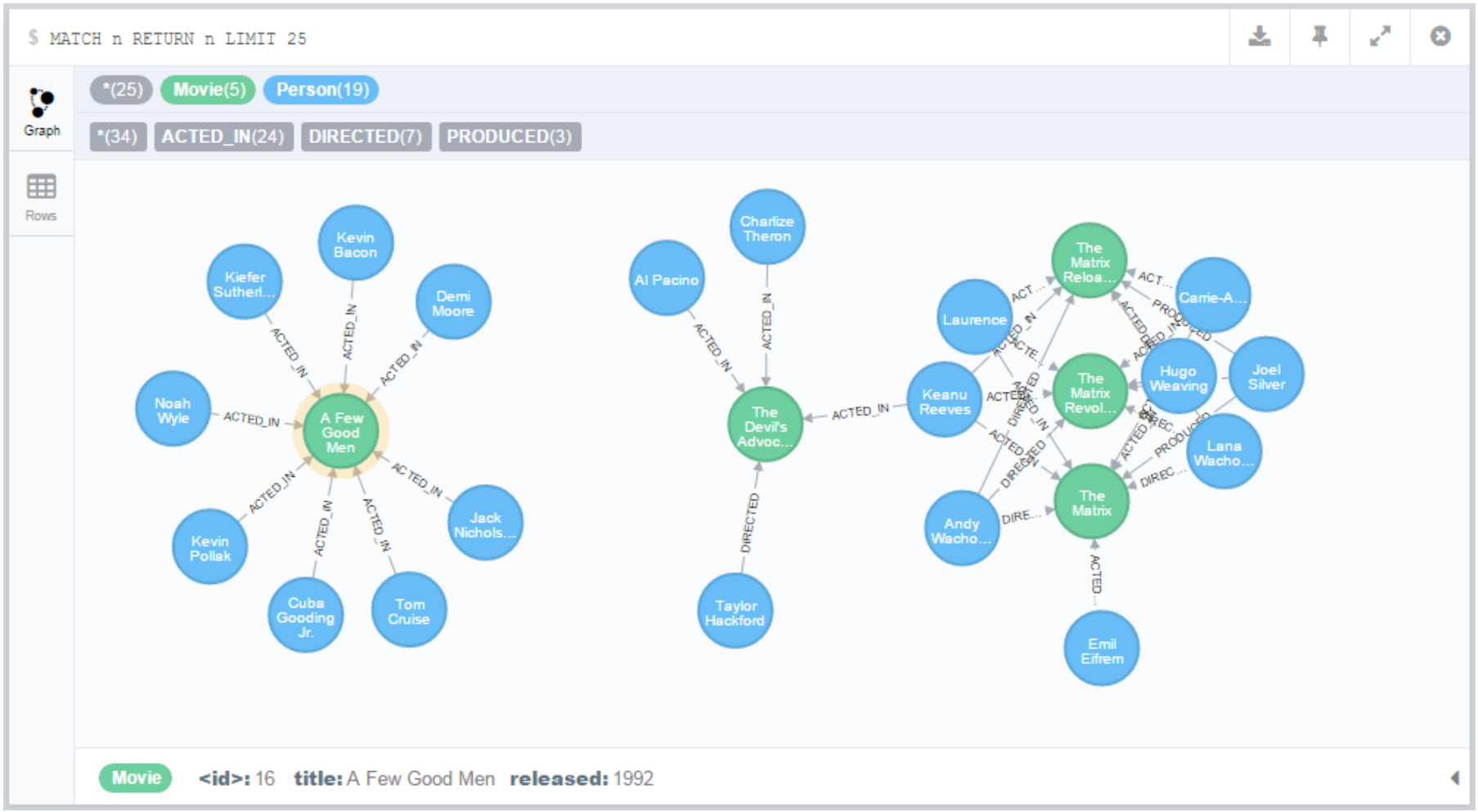
Movie Graph

- *The Movie Graph* is a mini graph application containing actors and directors that are related through the movies they've collaborated on.

Northwind Graph

- The*Northwind Graph* demonstrates how to migrate from a relational database to Neo4j. The transformation is iterative and deliberate, emphasizing the conceptual shift from relational tables to the nodes and relationships of a graph.

Hands-on: Browser



Hands-on: Java

Neo4j Developer Resources

- https://github.com/neo4j-contrib/developer-resources/

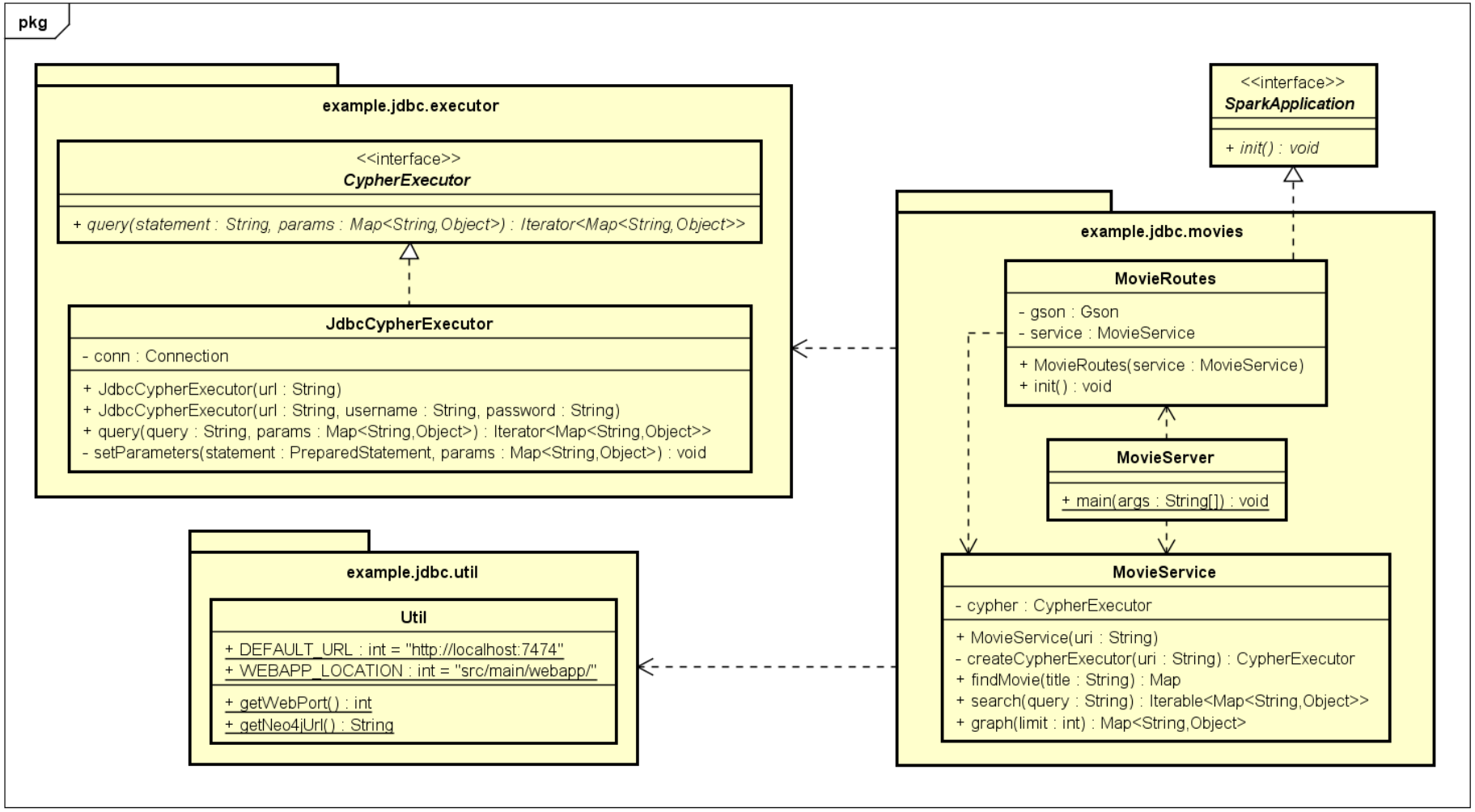
Neo4j Movies Example Application

- https://github.com/neo4j-contrib/developer-resources/tree/gh-pages/language-guides/java/jdbc/

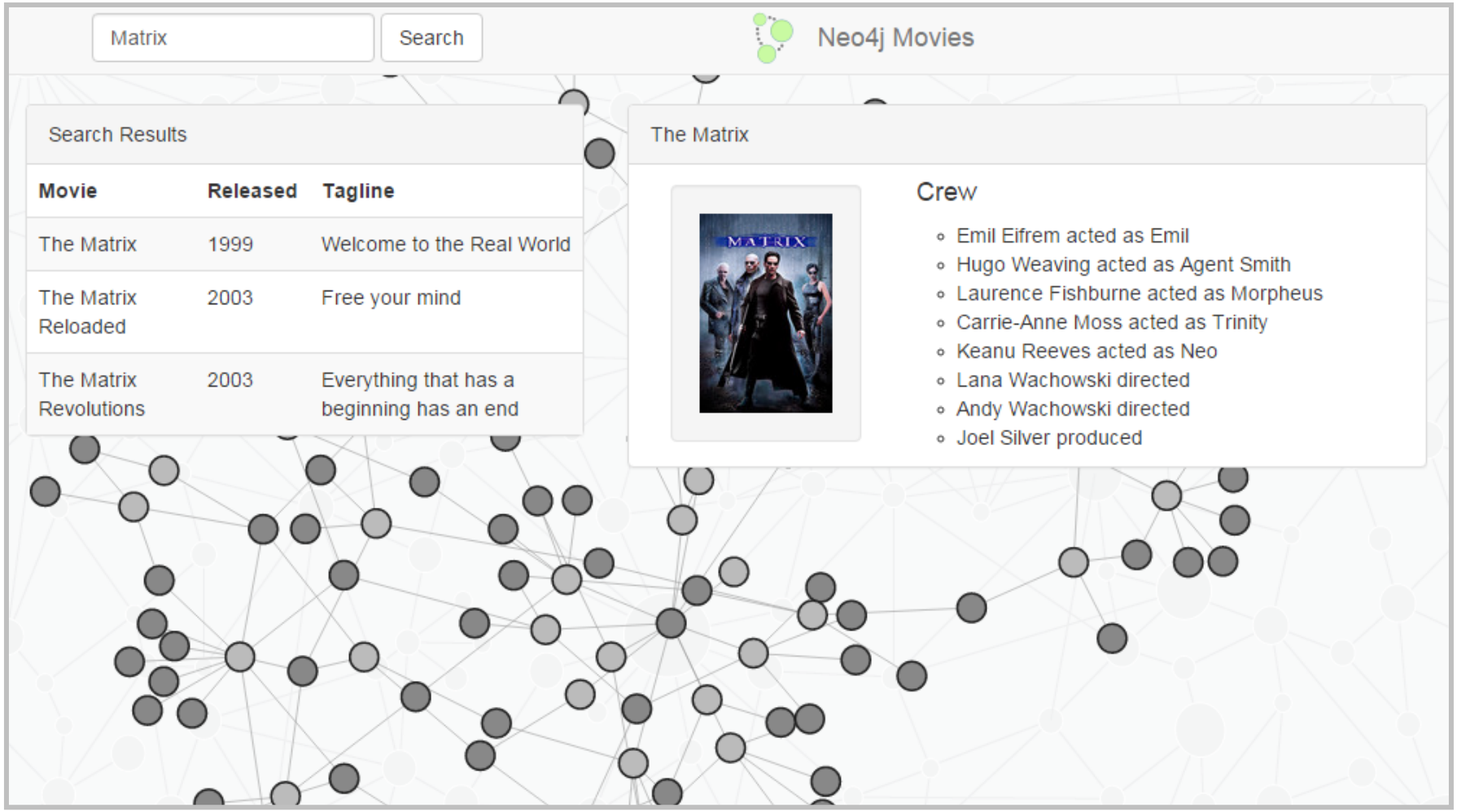
INSTALLATION STEPS

1. Install, start the local Neo4j Server and open the command promt
2. Open the Neo4j Browser (http://localhost:7474/) and run :play movies
3. git clone https://github.com/neo4j-contrib/developer-resources.git
4. cd D:\ke\developer-resources\language-guides\java\jdbc
5. mvn clean → mvn install → mvn compile exec:java
6. Access main page (http://localhost:8080/)

Hands-on: Java



Hands-on: Java



Interesting Links

- Get Started
  - Download & Install Neo4j Server, Use the Neo4j Browser
  - Learn to Create and Query Data, Take the Online Course
  - Import Your Data
  - Build an Application
  - Get Help on StackOverflow, Google Group or by contacting us
  - Deploy and Run your database in production
- From Relational to Neo4j
- From SQL to Cypher
  - Cypher Query Language
  - Neo4j Cypher Refcard 2.2.3
- Importing relational Data
- Database Integration
- Language Guides