



# Data Model

Database system structure

Instance → single **graph**

**Property graph** = directed labeled multigraph

- Collection of vertices (**nodes**) and edges (**relationships**)

## Node

- Internal identifier
- Set of **labels**, set of **properties**

## Relationship

- Internal identifier
- **Direction**, start and end node
- Exactly one **type**, set of **properties**

# First Steps

## Connect to our NoSQL server

- SSH / PuTTY and SFTP / WinSCP
- **nosql.felk.cvut.cz**

## Start Cypher shell

- **cypher-shell**

## Get familiar with basic commands

- help
- exit

## Sample data (common database)

- See /home/DS2/neo4j/data.cypher

# Source file

CREATE

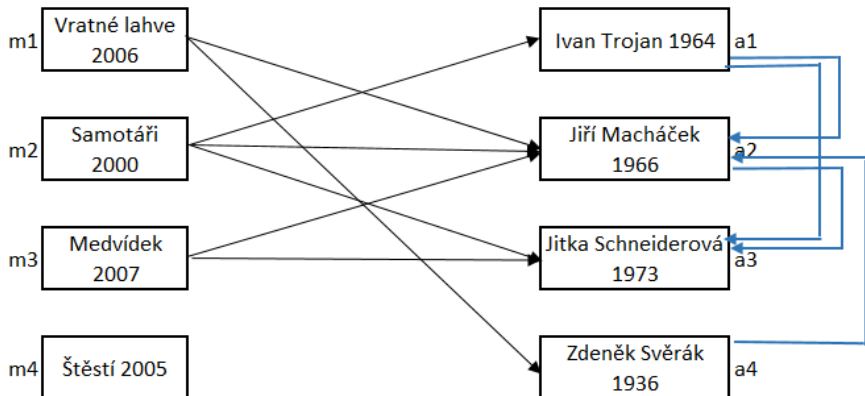
```
(m1:MOVIE { id: "vratnelahve", title: "Vratne lahve", year: 2006 }),  
(m2:MOVIE { id: "samotari", title: "Samotari", year: 2000 }),  
(m3:MOVIE { id: "medvidek", title: "Medvidek", year: 2007 }),  
(m4:MOVIE { id: "stesti", title: "Stesti", year: 2005 }),  
  
(a1:ACTOR { id: "trojan", name: "Ivan Trojan", year: 1964 }),  
(a2:ACTOR { id: "machacek", name: "Jiri Machacek", year: 1966 }),  
(a3:ACTOR { id: "schneiderova", name: "Jitka Schneiderova", year: 1973 }),  
(a4:ACTOR { id: "sverak", name: "Zdenek Sverak", year: 1936 }),  
(a5:ACTOR { id: "novak", name: "Jan Novak", year: 1970 }),  
(a6:ACTOR { id: "svoboda", name: "Petr Svoboda", year: 1965 }),  
(a7:ACTOR { id: "kral", name: "Lukas Kral", year: 1980 }),  
(a8:ACTOR { id: "novotny", name: "Martin Novotny", year: 1975 }),
```

# Source file

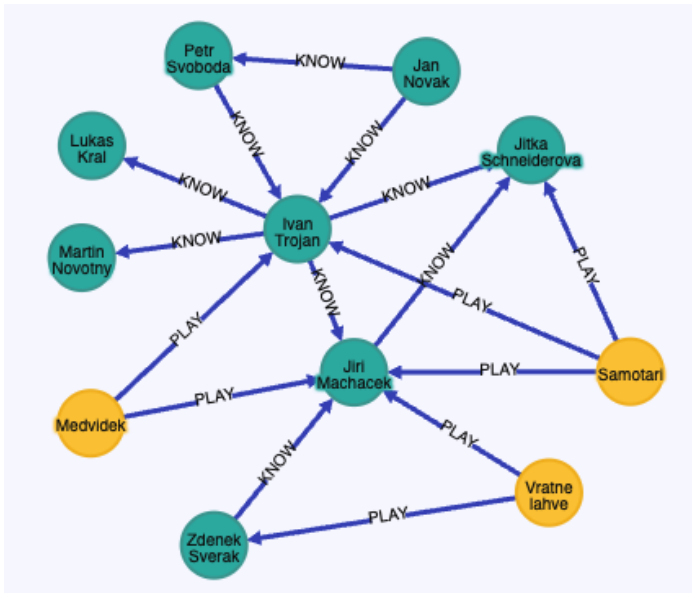
```
(m1)-[c1:PLAY { role: "Robert Landa" }]->(a2),  
(m1)-[c2:PLAY { role: "Josef Tkaloun" }]->(a4),  
(m2)-[c3:PLAY { role: "Ondrej" }]->(a1),  
(m2)-[c4:PLAY { role: "Jakub" }]->(a2),  
(m2)-[c5:PLAY { role: "Hanka" }]->(a3),  
(m3)-[c6:PLAY { role: "Ivan" }]->(a1),  
(m3)-[c7:PLAY { role: "Jirka", award: "Czech Lion" }]->(a2),
```

```
(a1)-[f1:KNOW]->(a2),  
(a1)-[f2:KNOW]->(a3),  
(a2)-[f3:KNOW]->(a3),  
(a4)-[f4:KNOW]->(a2),  
(a5)-[f5:KNOW]->(a6),  
(a6)-[f6:KNOW]->(a1),  
(a5)-[f7:KNOW]->(a1),  
(a1)-[f8:KNOW]->(a7),  
(a1)-[f9:KNOW]->(a8);
```

# Source file



# Source file



# Exercise 1

Express the following Cypher query

- **Find movies with identifier *medvidek***
- Return movie nodes together with title properties

# Exercise 2

Express the following Cypher query

- **Find actors born in 1965 or later**
- Return actor names and years they were born
- Sort the result using years (in descending order) and then names (in ascending order)

# Exercise 3

Express the following Cypher query

- **Find titles of movies in which *Jiri Machacek* played**

# Exercise 4

Express the following Cypher query

- **Find all actors whom Jiří Macháček knows**

# Exercise 5

Express the following Cypher query

- **Find movies where at least one actor played**

# Exercise 6

Express the following Cypher query

- **Find actors who starred in movies released after 2005**

```
+-----+
| a.name |
+-----+
| "Ivan Trojan" |
| "Jiri Machacek" |
| "Zdenek Sverak" |
+-----+
```

# Exercise 7

Express the following Cypher query

- **Find actors who played with *Ivan Trojan***

# Exercise 8

Express the following Cypher query

- **Find all friends of actor *Ivan Trojan***
- Include friends of friends etc.
- Return actor names

# Exercise 9

Express the following Cypher query

- **Find pairs of movies and their actors**
- Include movies without actors as well

# Exercise 10

Express the following Cypher query

- **Find actors who played in movies having above average number of actors**
- Return actor names

# Exercise 11

Express the following Cypher query

- **Find all actors who have played in the same movie as Jiří Macháček**
- **Output distinct actor names and concatenate movie titles if necessary.**