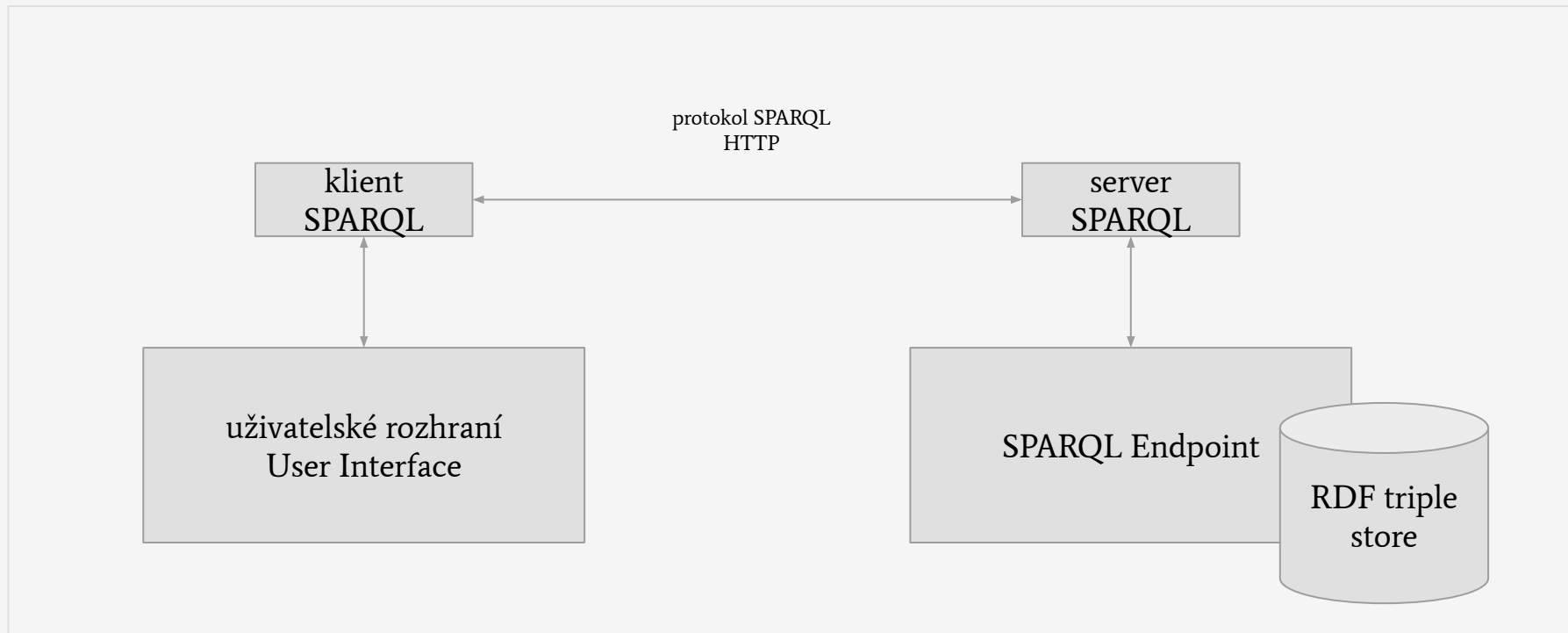


# Dotazovací jazyk SPARQL SELECT

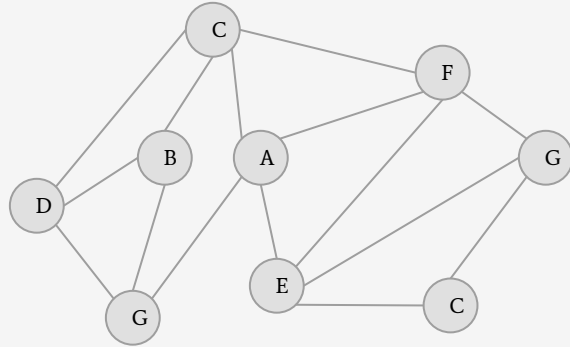


ISKM89 Organizace dat - sémantický web | podzim 2023  
Zuzana Nevěřilová | Centrum zpracování přirozeného jazyka

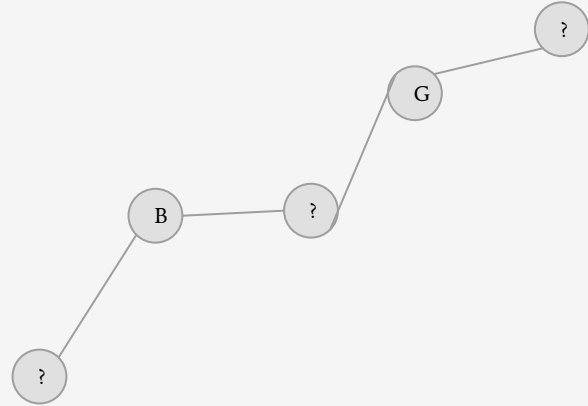
# SPARQL - architektura klient-server (stejně jako web)



# SPARQL - graph pattern matching

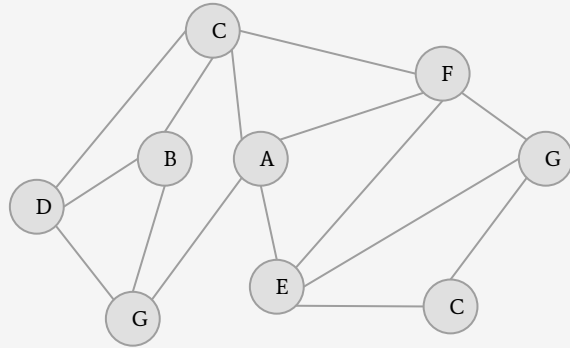


RDF graf

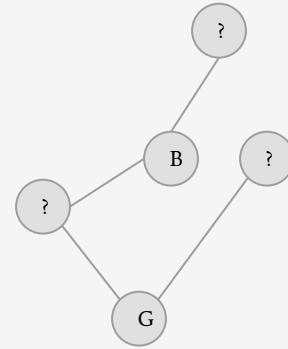


SPARQL query

# SPARQL - graph pattern matching

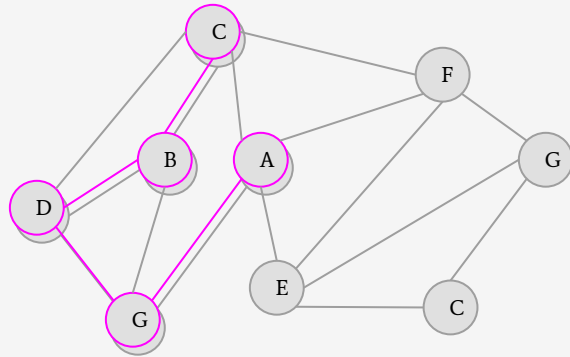


RDF graf

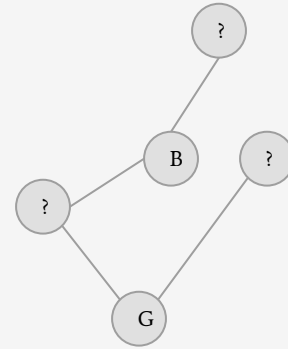


SPARQL query

# SPARQL - graph pattern matching

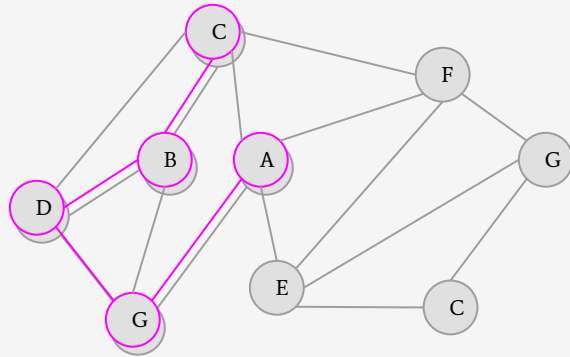


RDF graf

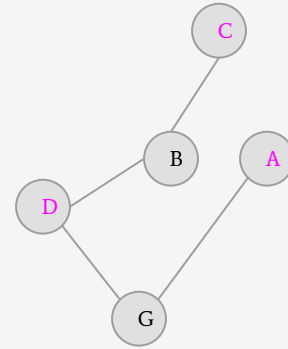


SPARQL query

# SPARQL - graph pattern matching



RDF graf



SPARQL query

# SPARQL SELECT - hledáme proměnné

Dotaz v SPARQL (SPARQL Query)

```
SELECT ?title, ?author, ?date ...
```

Výsledek SPARQL (SPARQL Result)

?title	?author	?date
Bůh je z Brna	Jiří Kamen	2022
Humble Pi	Matt Parker	2020
If Cats Disappeared From The World	Genki Kawamura	2018

# SPARQL SELECT - vázané proměnné

Dotaz v SPARQL (SPARQL Query)

```
SELECT <projekce> WHERE {  
  podgraf  
}
```

Výsledek SPARQL (SPARQL Result) - vázané proměnné

?title	?author	?date
Bůh je z Brna	Jiří Kamen	2022
Humble Pi	Matt Parker	2020
If Cats Disappeared From The World	Genki Kawamura	2018



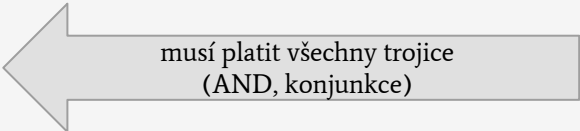
# SPARQL SELECT - podgraf (graph pattern)

## Graf v SPARQL (SPARQL Graph)

?book a dbo:Book .

?book dbo:author ?author .

?book dbp:releaseDate ?date .



musí platit všechny trojice  
(AND, konjunkce)

## Výsledek SPARQL (SPARQL Result)

?book	?author	?date
<a href="http://dbpedia.org/resource/Beijinger_in_New_York">http://dbpedia.org/resource/Beijinger_in_New_York</a>	<a href="http://dbpedia.org/resource/Glen_Cao">http://dbpedia.org/resource/Glen_Cao</a>	1994
<a href="http://dbpedia.org/resource/Bridget_Jones's_Diary">http://dbpedia.org/resource/Bridget_Jones's_Diary</a>	<a href="http://dbpedia.org/resource/Richard_Curtis">http://dbpedia.org/resource/Richard_Curtis</a>	2001-10-29
<a href="http://dbpedia.org/resource/Planetarian:_The_Reverie_of_a_Little_Planet">http://dbpedia.org/resource/Planetarian:_The_Reverie_of_a_Little_Planet</a>	<a href="http://dbpedia.org/resource/Yūichi_Suzumoto">http://dbpedia.org/resource/Yūichi_Suzumoto</a>	2021-08-25

# SPARQL SELECT - podgraf (graph pattern)

Dotaz v SPARQL (SPARQL Query)

```
?book a dbo:Book .  
?book dbo:author ?author .  
?book dbp:releaseDate ?date .  
?author rdfs:label ?author_name .  
?book rdfs:label ?title .
```

Výsledek SPARQL (SPARQL Result) - jiné proměnné než v předchozím příkladu

?title	?author	?date
"Beijinger in New York"@en	"Glen Cao"@en	1994
"Bridget Jones's Diary"@en	"Richard Curtis"@en	2001-10-29
"Deník Bridget Jonesové"@cs	"Richard Curtis"@cs	2021-08-25

# SPARQL SELECT

Všechny komponenty dotazu

PREFIX rdfs: <<http://www.w3.org/2000/01/rdf-schema#>>

PREFIX dbo: <<http://dbpedia.org/ontology/>>

PREFIX dbp: <<http://dbpedia.org/property/>>

SELECT ?title ?author\_name ?date

FROM <graph>

WHERE {

?book a dbo:Book .

?book dbo:author ?author .

?book dbp:releaseDate ?date .

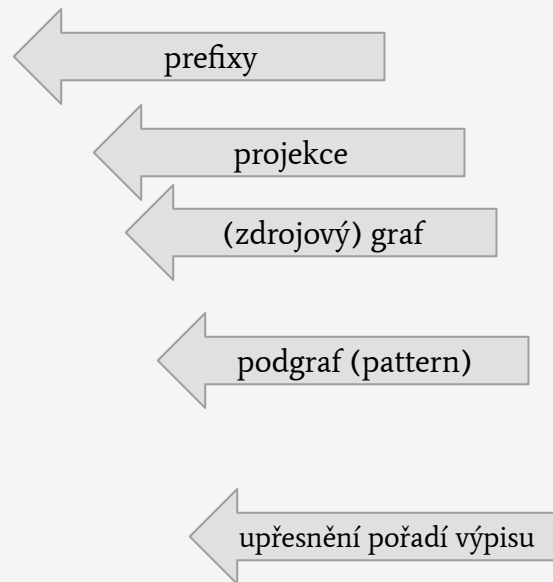
?author rdfs:label ?author\_name .

?book rdfs:label ?title .

}

ORDER BY ?title

LIMIT 100



# SPARQL SELECT

Všechny komponenty dotazu

PREFIX rdfs: <<http://www.w3.org/2000/01/rdf-schema#>>

PREFIX dbo: <<http://dbpedia.org/ontology/>>

PREFIX dbp: <<http://dbpedia.org/property/>>

SELECT ?title ?author\_name ?date

FROM <graph>

WHERE {

?book a **dbo:Book** .

?book **dbo:author** ?author .

?book **dbp:releaseDate** ?date .

?author **rdfs:label** ?author\_name .

?book **rdfs:label** ?title .

definice v ontologiích

}

ORDER BY ?title

LIMIT 100

<https://dbpedia.org/ontology/>

ovdefines

- [xsd:anyURI](#)
- [xsd:boolean](#)
- [dbo:Company](#)
- [dbo:Activity](#)
- [dbo:Name](#)
- [dbo:Person](#)
- [dbo:Actor](#)
- [dbo:Place](#)
- [dbo:Publisher](#)
- [dbo:Genre](#)
- [dbo:Language](#)
- [dbo:Department](#)
- [dbo:Software](#)
- [dbo:School](#)
- [dbo:Type](#)
- [dbo:location](#)
- [dbo:place](#)
- [dbo:birthPlace](#)
- [dbo:deathPlace](#)
- [dbo:deathDate](#)
- [dbo:birthDate](#)

<https://dbpedia.org/property/>

a **rdf:Property**

# SPARQL SELECT - WHERE a další funkce

```
SELECT ?title ?author_name ?date
WHERE {
    ?book a dbo:Book .
    ?book dbo:author ?author .
    ?book dbp:releaseDate ?date .
    ?author rdfs:label ?author_name .
    ?book rdfs:label ?title .
    ?book dbo:numberOfPages ?pages.

    FILTER(?pages > 500)
}
LIMIT 100
```

# SPARQL SELECT - WHERE a další funkce

unární operátory pro použití  
v kombinaci s FILTER

## Příklady

negativní podmínka:

`FILTER(?title!="Hlava XXII")`

DATATYPE:

`FILTER(DATATYPE(?date)=`

`"http://www.w3.org/2001/XMLSchema#date")`

operátor	typ	výsledek
!A	xsd:boolean	xsd:boolean
+A	číslo	číslo
-A	číslo	číslo
BOUND(A)	proměnná	xsd:boolean
isURI(A)	RDF term	xsd:boolean
isBLANK(A)	RDF term	xsd:boolean
isLITERAL(A)	RDF term	xsd:boolean
STR(A)	literál nebo URL	literál
LANG(A)	literál	literál
DATATYPE(A)	literál	URI

# SPARQL SELECT - WHERE a další funkce: FILTER

```
SELECT ?title ?author_name ?date
```

```
WHERE {
```

```
  ?book a dbo:Book .
```

```
  ?book dbo:author ?author .
```

```
  ?book dbp:releaseDate ?date .
```

```
  ?author rdfs:label ?author_name .
```

```
  ?book rdfs:label ?title .
```

```
  FILTER(LANG(?title)="cs")
```

```
  FILTER(?title!="Hlava XXII")
```

```
}
```

```
LIMIT 100
```

```
"Stín větru"@cs
```

```
"Jedenáct minut"@cs
```

```
"Umírat v nitru"@cs
```

```
...
```

# SPARQL SELECT - WHERE a další funkce: BIND

```
SELECT ?book ?date ?year
```

```
WHERE {
```

```
  ?book a dbo:Book .
```

```
  ?book dbp:releaseDate ?date .
```

```
  BIND(year(?date) as ?year)
```

```
  FILTER (DATATYPE(?date) = xsd:date)
```

```
}
```

```
LIMIT 100
```

book

[http://dbpedia.org/resource/Call\\_It\\_Courage](http://dbpedia.org/resource/Call_It_Courage)

[http://dbpedia.org/resource/Camera\\_Obscura\\_\(novel\)](http://dbpedia.org/resource/Camera_Obscura_(novel))

[http://dbpedia.org/resource/Campaign\\_Sourcebook\\_and\\_Catacomb\\_Guide](http://dbpedia.org/resource/Campaign_Sourcebook_and_Catacomb_Guide)

[http://dbpedia.org/resource/Carrie\\_\(novel\)](http://dbpedia.org/resource/Carrie_(novel))

[http://dbpedia.org/resource/Casino\\_Royale\\_\(novel\)](http://dbpedia.org/resource/Casino_Royale_(novel))

[http://dbpedia.org/resource/Castes\\_in\\_India:\\_Their\\_Mechanism,\\_Genesis\\_and\\_Development](http://dbpedia.org/resource/Castes_in_India:_Their_Mechanism,_Genesis_and_Development)

[http://dbpedia.org/resource/Catalyst\\_\(novel\)](http://dbpedia.org/resource/Catalyst_(novel))

date

1940

"August 2002"@en

1990

1974-04-05

1953-04-13

"May 1917"@en

"September  
2002"@en



# SPARQL SELECT - další funkce v projekci

```
SELECT *
```

```
SELECT DISTINCT ...
```

```
SELECT count(*) as ?count
```

```
SELECT (sum(?pages) as ?sum)
```

```
SELECT (sum(?pages) as ?total_number_of_pages)
WHERE {
    ?book a dbo:Book .
    ?book dbo:numberOfPages ?pages.
}
LIMIT 100
```