

B4M36DS2, BE4M36DS2: Database Systems 2

<https://cw.fel.cvut.cz/b221/courses/b4m36ds2/>

Practical Class 12

SPARQL

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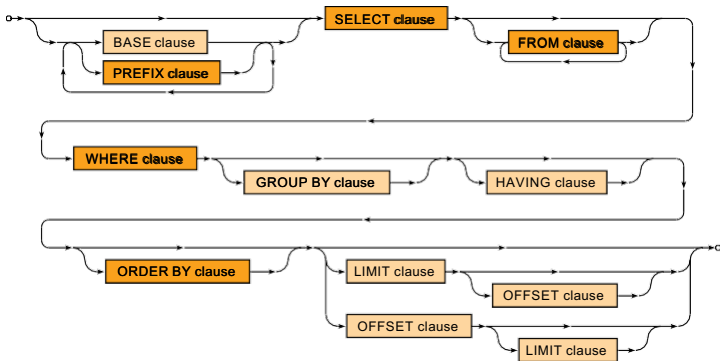
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Select Queries

Clauses of **SELECT** queries



Select Queries

Clauses of **SELECT** queries

- **BASE** – base address for all relative identifiers
- **PREFIX** – base addresses for prefixed names
- **SELECT** – **variables to be projected**
- **FROM** – **data graphs to be queried**
- **WHERE** – **graph patterns to be matched**
- **GROUP BY** – variables to be used for grouping
- **HAVING** – conditions these groups must satisfy
- **ORDER BY** – criteria used to sort solutions
- **LIMIT** – number of solutions to be included
- **OFFSET** – number of solutions to be skipped

NoSQL Server

Use your web browser to access our **SPARQL endpoint**

- <https://nosql.opendata.cz/sparql> Explore

the contents of our **RDF data graph**

- Identifier: <http://nosql.opendata.cz/school/>
 - Preserve every tiny detail, i.e., lowercase, http and not https, slash symbol at the end

NoSQL Server - SPARQL endpoint

SPARQL Query Editor About Tables ▾

Conductor Facet Browser Permalink

Extensions: cxml save to dav sponge User: SPARQL

Default Data Set Name (Graph IRI)

Query Text

```
SELECT *  
FROM <http://nosql.opendata.cz/school/>  
WHERE {?s ?p ?o}
```



Results Format

HTML ▾

Execute Query

Reset

NoSQL Server – data set

s	p	o
http://nosql.opendata.cz/school/course3	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Course
http://nosql.opendata.cz/school/course5	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Course
http://nosql.opendata.cz/school/course7	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Course
http://nosql.opendata.cz/school/course1	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Course
http://nosql.opendata.cz/school/student2	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Student
http://nosql.opendata.cz/school/student4	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Student
http://nosql.opendata.cz/school/student6	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Student
http://nosql.opendata.cz/school/student8	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Student
http://nosql.opendata.cz/school/teacher5	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Teacher
http://nosql.opendata.cz/school/teacher7	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://nosql.opendata.cz/school/terms#Teacher
http://nosql.opendata.cz/school/semester211	http://nosql.opendata.cz/school/terms#year	"2021/22"
http://nosql.opendata.cz/school/semester212	http://nosql.opendata.cz/school/terms#year	"2021/22"
http://nosql.opendata.cz/school/building5	http://nosql.opendata.cz/school/terms#address	nodeID://b10116
http://nosql.opendata.cz/school/teacher5	http://nosql.opendata.cz/school/terms#affiliation	http://nosql.opendata.cz/school/department8
http://nosql.opendata.cz/school/teacher7	http://nosql.opendata.cz/school/terms#affiliation	http://nosql.opendata.cz/school/department8
http://nosql.opendata.cz/school/roomS1	http://nosql.opendata.cz/school/terms#building	http://nosql.opendata.cz/school/building5
http://nosql.opendata.cz/school/roomS3	http://nosql.opendata.cz/school/terms#building	http://nosql.opendata.cz/school/building5
http://nosql.opendata.cz/school/roomS5	http://nosql.opendata.cz/school/terms#building	http://nosql.opendata.cz/school/building5
http://nosql.opendata.cz/school/roomS3	http://nosql.opendata.cz/school/terms#capacity	"116"

NoSQL Server – data set

```
@prefix s: <http://nosql.opendata.cz/school/> .  
@prefix i: <http://nosql.opendata.cz/school/terms#> .
```

```
s:student2  
  rdf:type i:Student ;  
  i:number "2" ;  
  i:name [ i:first "Petr" ; i:last "Skoda" ] ;  
  i:email "skoda@uni.cz" ;  
  i:web "http://www.uni.cz/~skoda/" .  
s:student4  
  rdf:type i:Student ;  
  i:number "4" ;  
  i:name [ i:first "Tomas" ; i:last "Knap" ] ;  
  i:email "knap@uni.cz" .  
s:student6  
  rdf:type i:Student ;  
  i:number "6" ;  
  i:name [ i:first "Jakub" ; i:last "Klimek" ] ;  
  i:web "http://www.uni.cz/~klimek/" .  
s:student8  
  rdf:type i:Student ;  
  i:number "8" ;  
  i:name [ i:first "Jakub" ; i:last "Starka" ] .  
  
s:student2  
  i:enroll [ i:course s:course7 ; i:semester s:semester211 ; i:result "2" ] .
```

NoSQL Server – data set

```
s:course7
  rdf:type i:Course ;
  i:title "XML Technologies" ;
  i:code "NPRG036" ;
  i:prerequisite s:course5 ; i:prerequisite s:course3 .
s:course5
  rdf:type i:Course ;
  i:title "Internet" ;
  i:code "NSWI096" ;
  i:prerequisite s:course3 .
s:course3
  rdf:type i:Course ;
  i:title "Programming I" ;
  i:code "NPRG030" .
s:course1
  rdf:type i:Course ;
  i:title "Computer Networks" ;
  i:code "NSWI090" .
```


NoSQL Server – data set

```
s:semester211
  i:year "2021/22" ;
  i:period "winter" .
s:semester212
  i:year "2021/22" ;
  i:period "summer" .
```

NoSQL Server – data set

```
s:teacher5
  rdf:type i:Teacher ;
  i:name [ i:first "Irena" ; i:last "Holubova" ] ;
  i:affiliation s:department8 .
```

```
s:teacher7
  rdf:type i:Teacher ;
  i:name [ i:first "Martin" ; i:last "Necasky" ] ;
  i:affiliation s:department8 .
```

```
s:teacher5
  i:teach [
    i:course s:course7 ;
    i:semester s:semester211 ;
    i:day "MON" ;
    i:time "10:40" ;
    i:place s:roomS5 ;
    i:length "90" ;
  ] .
```

Exercise 1

Express the following SPARQL query

- **Select all students**
- Return personal numbers, first and last names

?n	?f	?l
2	Petr	Skoda
4	Tomas	Knap
6	Jakub	Klimek
8	Jakub	Starka

Exercise 2

Express the following SPARQL query

- **Select all courses** with codes starting with *NPRG*
 - Use *regex(string, pattern)* function
- Return course codes and titles
- Order the courses using their titles

?c	?t
NPRG030	Programming I
NPRG036	XML Technologies

Exercise 3

Express the following SPARQL query

- **Find students and their e-mail addresses**
 - Note that e-mail addresses might be missing
- Return personal numbers and e-mails

?n	?e
2	skoda@uni.cz
4	knap@uni.cz
6	
8	

Exercise 4

Express the following SPARQL query

- **Select students, their e-mails, and web pages**
 - Note that both e-mails and web pages might be missing
- Return personal numbers, e-mails, and web pages

?n	?e	?w
2	skoda@uni.cz	http://www.uni.cz/~skoda/
4	knap@uni.cz	
6		http://www.uni.cz/~klimek/
8		

Exercise 5

Express the following SPARQL query

- **Select courses that are taught on Mondays or Fridays** during winter semester *2021/22*
- Return course references and codes

?p	?c
http://nosql.opendata.cz/school/course7	NPRG036
http://nosql.opendata.cz/school/course5	NSWI096

Exercise 6

Express the following SPARQL query

- **Select courses that are not taught on Mondays or Fridays** during winter semester *2021/22*
 - Including courses that are not taught at all in this semester
- Return course references and codes

?p	?c
http://nosql.opendata.cz/school/course3	NPRG030
http://nosql.opendata.cz/school/course1	NSWI090

Exercise 7

Express the following SPARQL query

- **Select courses that are not taught on Mondays or Fridays** during winter semester *2021/22*
 - Including courses that are not taught at all in this semester
- Return course references and codes
- **Do not use NOT EXISTS and nor MINUS constructs**

?p	?c
http://nosql.opendata.cz/school/course3	NPRG030
http://nosql.opendata.cz/school/course1	NSWI090

Exercise 8

Express the following SPARQL query

- **Return average study results for all students**
 - Assume only courses in winter semester *2021/22*
- Ignore enrollments with undefined results
- Describe students by their full names
- Include students with at most 10 courses only