

**Akademia Górniczo-Hutnicza  
im. Stanisława Staszica w Krakowie**



**Wydział Elektrotechniki, Automatyki, Informatyki i  
Elektroniki**

**Podstawy inżynierii wiedzy**

Semantic Web

**Temat: Using RDF/S**

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Wtorek 17:30

# 1. Semantic vocabularies: Dublin Core

- Modify the file to include it in the report.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc= "http://purl.org/dc/elements/1.1/"
  xmlns:library="http://student.agh.edu.pl/~nawojka/mylibrary#">

  <rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-shining">
    <dc:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Stephen King</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The Shining</dc:title>
    <dc:language>en</dc:language>
    <dc:date>2001</dc:date>
  </rdf:Description>

  <rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-liseysstory">
    <dc:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Stephen King</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">lisey's Story</dc:title>
    <dc:language>en</dc:language>
    <dc:date>2006</dc:date>
  </rdf:Description>

  <rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-catch22">
    <dc:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Joseph Heller</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Catch 22</dc:title>
    <dc:language>en</dc:language>
    <dc:date>1988</dc:date>
  </rdf:Description>

  <rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-crime">
    <dc:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Fyodor Dostoevsky</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Crime and Punishment</dc:title>
    <dc:language>ru</dc:language>
    <dc:date>1993</dc:date>
  </rdf:Description>

  <rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-cprogramming">
  <library:authors rdf:parseType="Collection">
  <rdf:Description>
    <rdf:first rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Brian W. Kerninghan</rdf:first>
    <rdf:rest>
    <rdf:Description>
    <rdf:first rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Dennis M. Ritchie</rdf:first>
    <rdf:rest rdf:resource="http://www.w3.org/1999/02/22-rdfsyntax-ns#nil" />
    </rdf:Description>
    </rdf:rest>
  </rdf:Description>
  </library:authors>
  </rdf:Description>
```

```

    </library:authors>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Język ANSI C</dc:title>
    <dc:language>pl</dc:language>
    <dc:date>1989</dc:date>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-madeinheaven">
    <dc:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Queen</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Made in Heaven</dc:title>
    <dc:date>1995</dc:date>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-innuendo">
    <dc:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Queen</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Innuendo</dc:title>
    <dc:date>1991</dc:date>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-yellowsubmarine">
    <dc:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The Beatles</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Yellow Submarine</dc:title>
    <dc:date>1969</dc:date>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/MyFavouriteBooks">
    <library:MyFavouriteBooks>
        <rdf:Bag>
            <rdf:li rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary/book-catch22"/>
            <rdf:li rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary/book-shining"/>
        </rdf:Bag>
    </library:MyFavouriteBooks>
</rdf:Description>

</rdf:RDF>

```

## 2. RDFSchema

- Modify the file to include it in the report.

```

<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
    xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
    xmlns:library="http://student.agh.edu.pl/~nawojka/mylibrary#">

    <rdfs:Class rdf:ID="Multimedia" />
        <rdfs:Class rdf:ID="CD">
            <rdfs:subClassOf rdf:resource="#Multimedia"/>
            <rdfs:label>Music CD in the library</rdfs:label>
            <rdfs:comment>Class of all the Music CDs in the library.</rdfs:comment>
        </rdfs:Class>

```

```
<rdfs:Class rdf:ID="Book">
  <rdfs:subClassOf rdf:resource="#Multimedia"/>
  <rdfs:label>Book in the library</rdfs:label>
  <rdfs:comment>Class of all the Books in the library.</rdfs:comment>
</rdfs:Class>
```

```
<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-shining">
  <library:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Stephen King</library:author>
  <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The Shining</library:title>
  <library:country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">USA</library:country>
  <library:year>2001</library:year>
  <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#Book"/>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-liseysstory">
  <library:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Stephen King</library:author>
  <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">lisey's Story</library:title>
  <library:country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">USA</library:country>
  <library:year>2006</library:year>
  <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#Book"/>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-catch22">
  <library:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Joseph Heller</library:author>
  <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Catch 22</library:title>
  <library:country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">England</library:country>
  <library:year>1988</library:year>
  <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#Book"/>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-crime">
  <library:author rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Fyodor
Dostoevsky</library:author>
  <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Crime and
Punishment</library:title>
  <library:country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">England</library:country>
  <library:year>1993</library:year>
  <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#Book"/>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/book-cprogramming">
<library:authors rdf:parseType="Collection">
<rdf:Description>
  <rdf:first rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Brian W. Kernighan</rdf:first>
  <rdf:rest>
  <rdf:Description>
  <rdf:first rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Dennis M. Ritchie</rdf:first>
  <rdf:rest rdf:resource="http://www.w3.org/1999/02/22-rdfsyntax-ns#nil" />
  </rdf:Description>
  </rdf:rest>
</rdf:Description>
```

```

    </library:authors>
    <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The C Programming
Language</library:title>
    <library:country rdf:datatype="http://www.w3.org/2001/XMLSchema#string">England</library:country>
    <library:year>1989</library:year>
    <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#Book"/>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-madeinheaven">
    <library:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Queen</library:artist>
    <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Made in Heaven</library:title>
    <library:year>1995</library:year>
    <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#CD"/>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-innuendo">
    <library:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Queen</library:artist>
    <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Innuendo</library:title>
    <library:year>1991</library:year>
    <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#CD"/>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojkag/mylibrary/cd-yellowsubmarine">
    <library:artist rdf:datatype="http://www.w3.org/2001/XMLSchema#string">The Beatles</library:artist>
    <library:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Yellow Submarine</library:title>
    <library:year>1969</library:year>
    <rdf:type rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary#CD"/>
</rdf:Description>

<rdf:Description rdf:about="http://student.agh.edu.pl/~nawojka/mylibrary/MyFavouriteBooks">
    <library:MyFavouriteBooks>
        <rdf:Bag>
            <rdf:li rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary/book-catch22"/>
            <rdf:li rdf:resource="http://student.agh.edu.pl/~nawojka/mylibrary/book-shining"/>
        </rdf:Bag>
    </library:MyFavouriteBooks>
</rdf:Description>

</rdf:RDF>

```

### 3. SPARQL - demo

- What semantic vocabularies are used in the queries? What are they for?

Słowniki semantyczne dostarczają predykatów to opisów konkretnych rodzajów informacji np.:

Dublic Core – słownik do opisu dokumentów i multimediów – video, książki itp.

FOAF – słownik do opisywania osób I zależności pomiędzy nimi

RSS 1.0 – słownik do opisu modyfikacji na stronie, nowych informacji, powiadomień.

SIOC – słownik do opisu informacji z serwisów społecznościowych

Rev – słownik do opisywania recenzji i ocen

- What do `SELECT` queries do?

Kwerendy `SELECT` zwracają wszystkie zmienne lub podzbiór zmiennych wraz z ich powiązaniem w formie tabeli.

- What do `CONSTRUCT` queries do?

Kwerendy `CONSTRUCT` zawierają pojedynczy graf RDF określony za pomocą szablonu grafu.

## 4. SPARQL queries – basics

- Put the constructed queries in the report.

friends who have name and e-mail defined:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
```

```
SELECT DISTINCT ?name ?mbox
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:mbox ?mbox
}
LIMIT 10
```

friends who have name and optional homepage:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
```

```
SELECT DISTINCT ?name ?mbox ?homepage
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:mbox ?mbox .
  OPTIONAL { ?x foaf:homepage ?homepage }
}
LIMIT 10
```

friends who have name and e-mail defined and optional homepage, sorted by name descending:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
```

```

SELECT DISTINCT ?name ?mbox ?homepage
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:mbox ?mbox .
  OPTIONAL {?x foaf:homepage ?homepage}
}
ORDER BY DESC(?name)
LIMIT 10

```

## 5. SPARQL queries - options

- Put the queries in the report.

### people whose name starts with 'K'

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>

```

```

SELECT DISTINCT ?name
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name

```

```

FILTER regex(?name, '^K')
}
ORDER BY DESC(?name)
LIMIT 10

```

### people who are older than 18 years old

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>

```

```

SELECT DISTINCT ?name ?age
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:age ?age

```

```

FILTER (?age > 18)
}
LIMIT 10

```

### people whose name starts with 'K' or are older than 18 years old, make search caseinsensitive

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>

```

```

SELECT DISTINCT ?name ?age

```

```

WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:age ?age

  FILTER (?age > 18)
  FILTER regex(?name, '^K', 'i')
}
LIMIT 10

```

### people having e-mails on student.agh.edu.pl server

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>

SELECT DISTINCT ?name ?mbox
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:mbox ?mbox

  FILTER regex(?mbox, '^'[A-Za-z0-9_-]+'@student.agh.edu.pl')
}
LIMIT 10

```

### name of people, who have homepage or e-mail on student.agh.edu.pl server

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>

SELECT DISTINCT ?name ?mbox ?homepage
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name ; foaf:mbox ?mbox; foaf:homepage

  FILTER regex(?mbox, '^'[A-Za-z0-9_-]+'@student.agh.edu.pl') || regex(?homepage,
"^[http://student\.agh\.edu\.pl")
}
LIMIT 10

```

## 6. Open Data Sets

- What are the main limitations of using (querying for information) the RDF datasets such as DBPedia or MusicBrainz?
  - Zasobu RDF są bardzo rozbudowane przez co oczekiwanie na wynik jest długie,



- Bardziej skomplikowane zapytania są przetwarzane jeszcze dłużej,
- Konieczność używania SPARQL – przeszukiwanie będzie możliwe jedynie dla użytkowników, którzy posiadają umiejętności tworzenia kwerend w SPARQL.