

AKADEMIA GÓRNICZO-HUTNICZA

WYDZIAŁ ELEKTROTECHNIKI, AUTOMATYKI, INFORMATYKI I ELEKTRONIKI
KIERUNEK INFORMATYKA STOSOWANA



PODSTAWY INŻYNIERII WIEDZY

Laboratorium 4

Resource Description Framework (RDF) in use

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1 Semantic vocabularies: Dublin Core

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:lib="http://example.org/mylibrary#">

  <rdf:Description rdf:about="http://example.org/mylibrary#book-siewcawiatru">
    <dc:author>Maia Lidia Kossakowska</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Siewca Wiatru</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2004-01-16</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-jakzyc">
    <dc:author>ks. Jozef Tishner</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Jak zyc</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1994-09-01</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-zyciprzetrwac">
    <dc:author>Robin Skynner</dc:author>
    <dc:author>John Cleese</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Zyc i przetrwac</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1993-04-23</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-elekdлакazd">
    <lib:Authors rdf:parseType="Collection">
      <dc:author>Earl Boysen</dc:author>
      <dc:author>Harry Kybett</dc:author>
    </lib:Authors>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Elektronika dla kazdego. Przewodnik</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2012-05-03</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#cd-metallica_mop">
    <dc:artist>Metallica</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Muster of puppets</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1986-03-03</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#cd-lp_metheora">
    <dc:artist>Linkin Park</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Metheora</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2003-08-17</dc:publicationDate>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#myfavouritebooks">
    <rdf:Bag>
      <rdf:li rdf:resource=http://example.org/mylibrary#book-jakzyc">
      <rdf:li rdf:resource=http://example.org/mylibrary#book-siewcawiatru">
    </rdf:Bag>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#myfavouritebooks">
    <lib:MultipleBooks rdf:parseType="Collection">
      <rdf:Description rdf:about="http://example.org/mylibrary#book-zyciprzetrwac"/>
      <rdf:Description rdf:about="http://example.org/mylibrary#book-elekdлакazd"/>
    </lib:MultipleBooks>
  </rdf:Description>

</rdf:RDF>
```

2 RDFSchema

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:lib="http://example.org/mylibrary#">

  <rdfs:Class rdf:ID="MultimediaItem" />
  <rdfs:Class rdf:ID="Literature">
    <rdfs:subClassOf rdf:resource="#MultimediaItem"/>
    <rdfs:label>Books</rdfs:label>
    <rdfs:comment>Class of all books in my library.</rdfs:comment>
  </rdfs:Class>
  <rdfs:Class rdf:ID="Music">
    <rdfs:subClassOf rdf:resource="#MultimediaItem"/>
    <rdfs:label>Music CDs</rdfs:label>
    <rdfs:comment>Class of all the CDs in my library.</rdfs:comment>
  </rdfs:Class>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-siewcawiatru">
    <dc:author>Maia Lidia Kossakowska</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Siewca Wiatru</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2004-01-16</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Literature"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-jakzyc">
    <dc:author>ks. Jozef Tishner</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Jak zyc</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1994-09-01</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Literature"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-zyciprzetrwac">
    <dc:author>Robin Skynner</dc:author>
    <dc:author>John Cleese</dc:author>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Zyc i przetrwac</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1993-04-23</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Literature"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#book-elekdlakazd">
    <lib:Authors rdf:parseType="Collection">
      <dc:author>Earl Boysen</dc:author>
      <dc:author>Harry Kybett</dc:author>
    </lib:Authors>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Elektronika dla kazdego. Przewodnik</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2012-05-03</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Literature"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#cd-metallica_mop">
    <dc:artist>Metallica</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Muster of puppets</dc:title>
    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">1986-03-03</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Music"/>
  </rdf:Description>

  <rdf:Description rdf:about="http://example.org/mylibrary#cd-lp_metheora">
    <dc:artist>Linkin Park</dc:artist>
    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">Metheora</dc:title>
```

```

    <dc:publicationDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2003-08-17</dc:publicationDate>
    <rdf:type rdf:resource="http://example.org/mylibrary#Music"/>
</rdf:Description>

<rdf:Description rdf:about="http://example.org/mylibrary#myfavouritebooks">
  <rdf:Bag>
    <rdf:li rdf:resource=http://example.org/mylibrary#book-jakzyc">
    <rdf:li rdf:resource=http://example.org/mylibrary#book-siewcawiatru">
  </rdf:Bag>
</rdf:Description>

<rdf:Description rdf:about="http://example.org/mylibrary#myfavouritebooks">
  <lib:MultipleBooks rdf:parseType="Collection">
    <rdf:Description rdf:about="http://example.org/mylibrary#book-zyciprzetrwac"/>
    <rdf:Description rdf:about="http://example.org/mylibrary#book-elekdlakazd"/>
  </lib:MultipleBooks>
</rdf:Description>

</rdf:RDF>

```

3 SPARQL

1. What semantic vocabularies are used in the queries? What are they for?
 - FOAF
 - Dublin Core
 - Project Vocabulary
2. What do SELECT queries do?

Zapytanie SELECT zwraca w formie tabeli informacje które spełniają kryterium wyszukiwania.
3. What do CONSTRUCT queries do?

Zapytanie CONSTRUCT służy do stworzenia grafu RDF, w tym celu tworzy pomocniczo trójki (triples) RDF

4 SPARQL queries

1. 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 .
  ?x foaf:mbox ?mbox
}

```

2. friends who have name and e-mail defined 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.
  ?x foaf:mbox ?mbox .
  OPTIONAL {?x foaf:homepage ?homepage}
}

```

3. 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.
    ?x foaf:mbox ?mbox .
    OPTIONAL {?x foaf:homepage ?homepage}
}
ORDER BY DESC(?name)
```

4. 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")
}
```

5. 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/>
```

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
```

```
SELECT DISTINCT ?name ?age
WHERE {
    ?x rdf:type foaf:Person .
    ?x foaf:name ?name .
    ?x foaf:age ?age
    FILTER (xsd:decimal(?age) > 18)
}
```

6. 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/>
```

```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
```

```
SELECT DISTINCT ?name ?age
WHERE {
    ?x rdf:type foaf:Person .
    ?x foaf:name ?name .
    ?x foaf:age ?age
    FILTER (xsd:decimal(?age) > 18 || regex(?name,'^K','i')).
}
```

7. 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 .
    ?x foaf:mbox ?mbox
    FILTER regex(?mbox, "student.agh.edu.pl", "i")
}
```

8. 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 ?page
WHERE {
  ?x rdf:type foaf:Person .
  ?x foaf:name ?name .
  {?x foaf:mbox ?mbox
   FILTER regex(?mbox, „*student.agh.edu.pl$”, "i")}
 UNION
  {?x foaf:homepage ?page
   FILTER regex(?page, „^http://student.agh.edu.pl.*”, "i")}
}
```

5 Open Data Sets

Głównymi czynnikami które ograniczają obecnie użyteczność wykorzystywania zapytań do baz danych opartych na RDF to:

- stosunkowo mała ilość sklasyfikowanej wiedzy(w porównaniu z np. wikipedią)
- możliwość wykonywania różnych opisów ontologii