

Podstawy Inżynierii Wiedzy - Semantic Web

Sprawozdanie 3

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1 Resource Description Framework (RDF) in use

1.1 Semantic vocabularies: Dublin Core & RDFSchemata

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <!DOCTYPE rdf:RDF PUBLIC "-//DUBLIN CORE//DCMES DTD 2002/07/31//EN"
3   "http://dublincore.org/documents/2002/07/31/dcmes-xml/dcmes-xml-dtd.dtd"
4   ">
5 <rdf:RDF
6   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
7   xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
8   xmlns:dc="http://purl.org/dc/elements/1.1/"
9   xmlns="http://piw.lab2.agh.edu.pl/mylibrary#">
10  <rdfs:Class rdf:ID="MultimediaItem"/>
11  <rdfs:Class rdf:ID="Book">
12    <rdfs:subClassOf rdf:resource="#MultimediaItem"/>
13    <rdfs:label>Books class</rdfs:label>
14    <rdfs:comment>Class of all the books in our library.</rdfs:comment>
15  </rdfs:Class>
16  <rdfs:Class rdf:ID="Game">
17    <rdfs:subClassOf rdf:resource="#MultimediaItem"/>
18    <rdfs:label>Computer games class</rdfs:label>
19    <rdfs:comment>Class of all the PC games in our library.</
20    rdfs:comment>
21  </rdfs:Class>
22  <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
23    perf">
24    <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
25      Jacek Dukaj</dc:creator>
26    <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
27      Perfekcyjna niedoskonalosc</dc:title>
28    <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
29      ">Wydawnictwo Literackie</dc:publisher>
30    <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
31      2004</dc:date>
```

```

27     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
28     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
29 </rdf:Description>
30 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      lod">
31     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Jacek Dukaj</dc:creator>
32     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Lod</dc:title>
33     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">Wydawnictwo Literackie</dc:publisher>
34     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      2007</dc:date>
35     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
36     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
37 </rdf:Description>
38 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      oceany">
39     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Jacek Dukaj</dc:creator>
40     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Czarne oceany</dc:title>
41     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">superNOWA</dc:publisher>
42     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      2001</dc:date>
43     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
44     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
45 </rdf:Description>
46 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      krol">
47     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Jacek Dukaj</dc:creator>
48     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Krol Bolu</dc:title>
49     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">Wydawnictwo Literackie</dc:publisher>
50     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      2010</dc:date>
51     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
52     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
53 </rdf:Description>
54 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      niegrzeszny">

```

```

55     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Eugeniusz Debski</dc:creator>
56     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Niegrzeszny mag</dc:title>
57     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Fabryka Slow</dc:publisher>
58     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
        2007</dc:date>
59     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
        gdc:date">pl</dc:language>
60     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
        >
61 </rdf:Description>
62 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
        ograd1">
63     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Jaroslaw Grzedowicz</dc:creator>
64     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Pan Lodowego Ogrodu - tom 1</dc:title>
65     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Fabryka Slow</dc:publisher>
66     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
        2005</dc:date>
67     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
        gdc:date">pl</dc:language>
68     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
        >
69 </rdf:Description>
70 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
        droga">
71     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Howar Phillips Lovecraft</dc:creator>
72     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Droga do szalenstwa</dc:title>
73     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Zysk i S-ka</dc:publisher>
74     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
        2004</dc:date>
75     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
        gdc:date">pl</dc:language>
76     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
        >
77 </rdf:Description>
78 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
        anislowa">
79     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Jacek Piekara</dc:creator>
80     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Ani slowa prawdy</dc:title>
81     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
        Runa</dc:publisher>
82     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
        2005</dc:date>

```

```

83     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
84     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
85 </rdf:Description>
86 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      carpe">
87     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Terry Pratchett</dc:creator>
88     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Carpe Jugulum</dc:title>
89     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">Proszynski i S-ka</dc:publisher>
90     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      2006</dc:date>
91     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
92     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
93 </rdf:Description>
94 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      coskonczy">
95     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Andrzej Sapkowski</dc:creator>
96     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Cos sie konczy, cos sie zaczyna</dc:title>
97     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">superNOWA</dc:publisher>
98     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      2000</dc:date>
99     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
100    <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
101 </rdf:Description>
102 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#book-
      omen">
103     <Authors rdf:parseType="Collection">
104         <rdf:Description rdf:Property="Terry Pratchett"/>
105         <rdf:Description rdf:Property="Neil Gaiman"/>
106     </Authors>
107     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
      Dobry omen</dc:title>
108     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string
      ">Proszynski i S-ka</dc:publisher>
109     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#gdc:date">
      1997</dc:date>
110     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
      gdc:date">pl</dc:language>
111     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Book"/
      >
112 </rdf:Description>
113

```

```

114 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#game-
115     d3">
116     <dc:creator rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
117         Blizzard Entertainment</dc:creator>
118     <dc:title rdf:datatype="http://www.w3.org/2001/XMLSchema#string">
119         Diablo III</dc:title>
120     <dc:publisher rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
121         ">Blizzard Entertainment</dc:publisher>
122     <dc:date rdf:datatype="http://www.w3.org/2001/XMLSchema#date">
123         2012-05-15</dc:date>
124     <dc:language rdf:datatype="http://www.w3.org/2001/XMLSchema#
125         gdc:date">pl</dc:language>
126     <rdf:type rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#Game"/
127     >
128 </rdf:Description>
129
130 <rdf:Description rdf:about="http://piw.lab2.agh.edu.pl/mylibrary#
131     favbooks">
132     <MyFavouriteBooks>
133         <rdf:Bag>
134             <rdf:li rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#
135                 book-carpe"/>
136             <rdf:li rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#
137                 book-oceany"/>
138             <rdf:li rdf:resource="http://piw.lab2.agh.edu.pl/mylibrary#
139                 book-perf"/>
140         </rdf:Bag>
141     </MyFavouriteBooks>
142 </rdf:Description>
143 </rdf:RDF>

```

1.2 SPARQL - demo

- What semantic vocabularies are used in the queries? What are they for?
 - rdf - ogólnego zastosowania, reprezentowanie informacji,
 - foaf - łączenie ludzi i informacji,
 - dc, dct - opisywanie zasobów,
 - sioc - opisywanie informacji z miejsc takich jak fora internetowe, blogi, listy mailingowe etc.,
 - owl - ontologie,
 - rss - kanały RSS, teksty podsumowujące wraz z pewnymi metadanymi,
 - rev - recenzje i oceny,
 - prj - opisywanie projektów niezależnie od ich dziedziny,
 - tag - do opisu tagów, takich jak te używane przez np. del.icio.us czy Flickr, i zależności między nimi.

- What do SELECT queries do?
SELECT zwraca zmienne oraz ich bezpośrednie powiązania w formie tabeli.
- What do CONSTRUCT queries do?
CONSTRUCT zwraca graf RDF określony przez wzorzec.

1.3 SPARQL queries - basics

- friends who have name and e-mail defined

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3
4 SELECT ?name ?mail
5 FROM <http://student.agh.edu.pl/~ola/foaf.html>
6 WHERE
7 {
8   ?x rdf:type foaf:Person ;
9     foaf:knows ?friend .
10  ?friend foaf:name ?name ;
11         foaf:mbox ?mail .
12 }

```

- friends who have name and e-mail defined and optional homepage

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3
4 SELECT ?name ?mail ?www
5 FROM <http://student.agh.edu.pl/~ola/foaf.html>
6 WHERE
7 {
8   ?x rdf:type foaf:Person ;
9     foaf:knows ?friend .
10  ?friend foaf:name ?name ;
11         foaf:mbox ?mail .
12  OPTIONAL { ?friend foaf:homepage ?www }
13 }

```

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

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3
4 SELECT ?name ?mail ?www
5 FROM <http://student.agh.edu.pl/~ola/foaf.html>
6 WHERE
7 {
8   ?x rdf:type foaf:Person ;
9     foaf:knows ?friend .
10  ?friend foaf:name ?name ;

```

```

11         foaf:mbox      ?mail .
12     OPTIONAL { ?friend foaf:homepage ?www }
13 }
14 ORDER BY DESC(?name)

```

1.4 SPARQL queries - options

- people whose name starts with 'K'

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3
4 SELECT ?name
5 FROM <http://student.agh.edu.pl/~ola/foaf.html>
6 WHERE
7 {
8     ?person rdf:type foaf:Person ;
9         foaf:name ?name .
10    FILTER regex(?name, '^K')
11 }

```

- people who are older than 18 years old

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4
5 SELECT ?name ?age
6 FROM <http://student.agh.edu.pl/~ola/foaf.html>
7 WHERE
8 {
9     ?person rdf:type foaf:Person ;
10        foaf:name ?name ;
11        foaf:age ?age .
12    FILTER ( xsd:decimal(?age) > 18 )
13 }

```

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

```

1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4
5 SELECT ?name ?age
6 FROM <http://student.agh.edu.pl/~ola/foaf.html>
7 WHERE
8 {
9     ?person rdf:type foaf:Person ;
10        foaf:name ?name ;
11        foaf:age ?age .

```

```

12 | FILTER ( regex(?name, '^k', 'i') && xsd:decimal(?age) > 18 )
13 | }

```

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

```

1 | PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 | PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3 | PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4 |
5 | SELECT ?name ?mail
6 | FROM <http://student.agh.edu.pl/~ola/foaf.html>
7 | WHERE
8 | {
9 |   ?person rdf:type foaf:Person ;
10 |           foaf:name ?name ;
11 |           foaf:mbox ?mail .
12 |   FILTER regex(xsd:string(?mail), '@student.agh.edu.pl$')
13 | }

```

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

```

1 | PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 | PREFIX foaf: <http://xmlns.com/foaf/0.1/>
3 | PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
4 |
5 | SELECT ?name ?mail ?www
6 | FROM <http://student.agh.edu.pl/~ola/foaf.html>
7 | WHERE
8 | {
9 |   ?person rdf:type foaf:Person ;
10 |           foaf:name ?name ;
11 |           foaf:mbox ?mail ;
12 |           foaf:homepage ?www .
13 |   FILTER ( regex(xsd:string(?mail), '@student.agh.edu.pl$') || regex(
14 |             xsd:string(?www), '^http://student.agh.edu.pl/' ) )

```

1.5 Open Data Sets

- What are the main limitations of using (querying for information) the RDF datasets such as DBPedia or MusicBrainz?
 - wymagana znajomość języka zapytań SPARQL, co dla przeciętnego użytkownika Internetu może być barierą nie do przeskoczenia,
 - wymagana znajomość słowników semantycznych, które opisują interesujące nas dane, aby móc napisać poprawne zapytanie SPARQL, czyli kolejne utrudnienie w stosunku do chociażby Wikipedii czy Google,
 - czas potrzebny do uzyskania odpowiedzi przy bardziej skomplikowanych zapytaniach bądź w przypadku operowania na większych zbiorach danych.