

RDF

Read

- Semantic Web Programming: chapter 3.
- Foundations of Semantic Web Technologies: chapter 2.

1 Exercises from Foundations of Semantic Web Technologies

The exercises

- Exercise 2.1
- Exercise 2.2

are relevant.

2 FOAF - Friend of a friend

The FOAF project is one of the most well-known projects using RDF and a project where RDF is the core technology. Quoting foaf-project.org¹ :

FOAF is about your place in the Web, and the Web's place in our world. FOAF is a simple technology that makes it easier to share and use information about people and their activities (eg. photos, calendars, weblogs), to transfer information between Web sites, and to automatically extend, merge and re-use it online.

See also the following webpages for more information.

- [FOAF project: home](#)²
- [Wikipedia: FOAF \(software\)](#)³
- [XML Watch: Finding friends with XML and RDF](#)⁴ on IBM developer works

2.1 Exercise

Go to the [FOAF-a-Matic](#)⁵ and create your own FOAF file. If you are hesitant publishing information about yourself online, then make something up.

¹<http://www.foaf-project.org/about>

²<http://www.foaf-project.org/>

³[http://en.wikipedia.org/wiki/FOAF_\(software\)](http://en.wikipedia.org/wiki/FOAF_(software))

⁴<http://ontogenealogy.com/documents/2012/08/dumbill-e-xml-watch-finding-friends-with-xml-and-rdf.pdf>

⁵<http://www.ldodds.com/foaf/foaf-a-matic>

Befriend yourself with at least Martin Giese and Martin G. Skjæveland, who have the following FOAF files, respectively:

- <http://folk.uio.no/martingi/foaf.rdf>
- <http://folk.uio.no/martige/foaf.rdf>

2.1.1 Solution

This solution shows Martin G. Skjæveland's FOAF file. We will go through the complete file now, code snippet by code snippet.

The RDF serialisation is RDF/XML. An RDF/XML file always starts with the element `<rdf:RDF>`. Inside the element the namespaces we will use are defined. The namespaces `rdf`, `rdfs`, `foaf` and `admin` are added by the FOAF-a-Matic. The first three are the standard namespaces for RDF, RDFS and FOAF. The `rel` and `geo` namespaces are manually added and will be used in later exercises.

```
1 <rdf:RDF
2   xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
3   xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
4   xmlns:foaf="http://xmlns.com/foaf/0.1/"
5   xmlns:admin="http://webns.net/mvcb/"
6   xmlns:rel="http://purl.org/vocab/relationship/"
7   xmlns:geo="http://www.w3.org/2003/01/geo/wgs84_pos#"
8   xmlns="http://folk.uio.no/martige/foaf.rdf#"
9   xml:base="http://folk.uio.no/martige/foaf.rdf"
10  >
```

Next comes meta data about the file: who has made it, who is it about, what generated the file and where to send error reports.

```
11 <foaf:PersonalProfileDocument rdf:about="">
12   <foaf:maker rdf:resource="#me"/>
13   <foaf:primaryTopic rdf:resource="#me"/>
14   <admin:generatorAgent rdf:resource="http://www.ldodds.com/foaf/foaf-a-matic"/>
15   <admin:errorReportsTo rdf:resource="mailto:leigh@ldodds.com"/>
16 </foaf:PersonalProfileDocument>
```

Now information about Martin G. Skjæveland is listed. The statements and triples in this section are

Subject	Predicate	Object
me	<code>rdf:type</code>	<code>foaf:Person</code>
me	<code>foaf:name</code>	"Martin G. Skjæveland"
me	<code>foaf:title</code>	"Mr."
me	<code>foaf:givenname</code>	"Martin G."
me	<code>foaf:family_name</code>	"Skjæveland"
me	<code>foaf:mbox_sah1sum</code>	"5223e81829..."
me	<code>foaf:homepage</code>	http://folk.uio.no/martige
me	<code>foaf:workplaceHomepage</code>	http://www.uio.no/
me	<code>foaf:schoolHomepage</code>	http://www.uio.no/

Note the difference from when an object in a triple is a resource and when it is a literal. In the second to the fifth statement, `foaf:name` – `foaf:mbox_sah1sum`, the object is a literal, while in the first and the last three triples the object is a resource.

```

17 <foaf:Person rdf:about="#me">
18   <foaf:name>Martin G. Skjæveland</foaf:name>
19   <foaf:title>Mr.</foaf:title>
20   <foaf:givenname>Martin G.</foaf:givenname>
21   <foaf:family_name>Skjæveland</foaf:family_name>
22   <foaf:mbox_sha1sum>5223e81829088aa837295fab98f3c286b8f106a2</foaf:mbox_sha1sum>
23   <foaf:homepage rdf:resource="http://folk.uio.no/martige/" />
24   <foaf:workplaceHomepage rdf:resource="http://www.uio.no/" />
25   <foaf:schoolHomepage rdf:resource="http://www.uio.no/" />

```

Martin G. Skjæveland knows Martin Giese. Martin Giese is identified *in this file* as martingi. Additionally, information about his name, email address and pointer to his FOAF file is given.

```

26   <foaf:knows>
27     <foaf:Person rdf:about="http://folk.uio.no/martingi/foaf.rdf#me">
28       <foaf:name>Martin Giese</foaf:name>
29       <foaf:mbox_sha1sum>9cc447f0f4877bc04e7d6703bf040d7337094e65</foaf:mbox_sha1sum>
30       <rdfs:seeAlso rdf:resource="http://folk.uio.no/martingi/foaf.rdf" />
31     </foaf:Person>
32   </foaf:knows>
33 </foaf:Person>

```

What remains is to end the root tag of the document, `<rdf:RDF ...>`, but since we still have more to add to the FOAF file in the coming exercises, we will wait with this. The file ends on line 70.

2.2 Exercise

Publish your FOAF file to your homepage. If you don't have a homepage, you can create one using your UiO account. Follow the instructions on <http://folk.uio.no/>.

2.3 Exercise

In the FOAF file you have generated you are identified as me, e.g., the identifier for Martin G. Skjæveland is

`http://folk.uio.no/martige/foaf.rdf#me`

Explain why # me is used? What is the difference from

`http://folk.uio.no/martige/foaf.rdf`

and

`http://folk.uio.no/martige/foaf.rdf#me ?`

See [Best Practice Recipes for Publishing RDF Vocabularies⁶](#) and [Cool URIs for the Semantic Web⁷](#) for help.

Note that the URL to my FOAF file should not include the serialisation format, since what format the file is written should not be part of the identifier for the file. Instead I should have used *content negotiation* on the server decide what format and even file to return the user. However, I seems that the necessary software for content negotiation is not setup on the server.

⁶<http://www.w3.org/TR/2008/NOTE-swbp-vocab-pub-20080828/>

⁷<http://www.w3.org/TR/2007/WD-cooluris-20071217/>

2.3.1 Solution

The URI

`http://folk.uio.no/martige/foaf.rdf`

is the identifier for the foaf.rdf file, while

`http://folk.uio.no/martige/foaf.rdf#me`

is the identifier for the person Martin G. Skjæveland.

2.4 Exercise

Set up a redirection service on your UiO homepage so that

`http://folk.uio.no/martige/id/martige`

, or a similar URL, 303-redirects to your FOAF file—assuming your username is martige.

For help see the articles referred to in the above exercise and [Apache's documentation](#)⁸.

2.4.1 Solution

My solution redirects to the root of my homepage.

Create a file named `.htaccess` with the contents

```
Redirect 303 /martige/id/martige http://folk.uio.no/martige/foaf.rdf
```

and place it in a directory `id` in your homepage directory. Go to <http://folk.uio.no/martige/id/martige> to see if it works.

2.5 Exercise

Open your FOAF file with an RDF browser, e.g., [FOAF-visualiser](#)⁹, and find the interests of Gregory Todd Williams, who Kjetil Kjernsmo knows, who again Martin Giese knows (, who again Martin G. Skjæveland knows).

2.5.1 Solution

Greg's interests is of 28.01.2013: Semantic Web, MovableType, RDFWeb, Perl Development, Parrot and Beer.

2.6 Exercise

Open your FOAF file in your favourite plain text editor. Add `ifi` as Organisation with the following values:

- `rdf:ID = ifi`

⁸http://httpd.apache.org/docs/2.2/mod/mod_alias.html#redirect

⁹<http://foaf-visualizer.gnu.org.ua/#form>

- name in both Norwegian and English
- homepage
- logo, use e.g., <http://www.ifi.uio.no/gfx-bin/logo.jpg>
- the coordinates where IfI is located, see <http://www.w3.org/2003/01/geo/>
- add at least yourself, Martin Giese and Martin G. Skjæveland as members of the organisation.

Use the [FOAF ontology](#)¹⁰ to find the correct resource names for adding this information. You can write RDF using the RDF serialisation you prefer, but you will need to publish it in RDF/XML as that currently is the only standardised RDF serialisation language. There are applications available online which convert between RDF serialisations, one is found behind the next link. Make sure that your FOAF file is written in valid RDF syntax. Use an RDF validator, e.g., [EasyRDF Validator and Converter](#)¹¹ or W3C's [RDF validator](#)¹² (accepts only RDF/XML), for this purpose. You can also use the library [Raptor RDF Syntax Library](#)¹³ which ships with the package `raptor-utils` on a few Linux distributions.

2.6.1 Solution

The element name for organisation is `foaf:Organization`. Names and homepage are listed just like for a `foaf:Person`. To find how to specify logo, open the [FOAF ontology](#)¹⁴ in a web browser and search for "logo". <http://www.w3.org/2003/01/geo/> gives good examples on how to add coordinates to a FOAF file. Use [iTouchMap.com](#)¹⁵ to find the coordinates.

```

34 <foaf:Organization rdf:ID="ifi">
35   <foaf:name xml:lang="en">Department of Informatics</foaf:name>
36   <foaf:name xml:lang="no">Institutt for informatikk</foaf:name>
37   <foaf:homepage rdf:resource="http://www.ifi.uio.no/">
38   <foaf:member rdf:resource="#me"/>
39   <foaf:member rdf:resource="http://folk.uio.no/martingi/foaf.rdf#me"/>
40   <foaf:logo rdf:resource="http://www.ifi.uio.no/gfx-bin/logo.jpg"/>
41   <foaf:based_near>
42     <geo:Point>
43       <geo:lat>59.943386</geo:lat>
44       <geo:long>10.717077</geo:long>
45     </geo:Point>
46   </foaf:based_near>
47 </foaf:Organization>

```

2.7 Exercise

Add more information about yourself or your surroundings, e.g., a picture of yourself, where you live—maybe using coordinates, places you have been to, your interests, your chat identities, and so on.

¹⁰<http://xmlns.com/foaf/spec/index.rdf>

¹¹<http://www.easyrdf.org/converter>

¹²<http://www.w3.org/RDF/Validator/>

¹³<http://librdf.org/raptor/>

¹⁴<http://xmlns.com/foaf/spec/index.rdf>

¹⁵<http://itouchmap.com/latlong.html>

See the [FOAF ontology](#)¹⁶, e.g., these [relationships](#)¹⁷, for the vocabulary you can use in your FOAF file.

2.7.1 Solution

First I have added a link to a picture of myself. Next I have added more information about my relationship to Martin Giese, who I work with (`rel:worksWith`), and added two more relationships. One to Tim Berners-Lee, who I know of (`rel:knowsOf`)¹⁸, and one to Robert Engels, who I have met (`rel:haveMet`).

The subject for all the "top-predicates" listed below, i.e., `foaf:depiction`, `rel:worksWith`, `foaf:knows`, `rel:knowsOf` and `rel:hasMet`, is me. To state this I have created a new subject element `<foaf:Person rdf:about="# me">` which is a sibling element to the `<foaf:Person rdf:ID="me">` on line 17. I could also have placed the information inside the `<foaf:Person rdf:ID="me">` element, but have chosen this way for the clarity of this exposition.

```
48 <foaf:Person rdf:about="#me">
49   <foaf:depiction rdf:resource="http://folk.uio.no/martige/180px-MartinGS.jpg"/>
50   <rel:worksWith>
51     <foaf:Person rdf:about="http://folk.uio.no/martingi/foaf.rdf#me"/>
52   </rel:worksWith>
53   <foaf:knows>
54     <foaf:Person rdf:about="http://www.w3.org/People/Berners-Lee/card#i">
55       <foaf:name>Tim Berners-Lee</foaf:name>
56     </foaf:Person>
57   </foaf:knows>
58   <rel:knowsOf>
59     <foaf:Person rdf:about="http://www.w3.org/People/Berners-Lee/card#i"/>
60   </rel:knowsOf>
61   <foaf:knows>
62     <foaf:Person rdf:about="http://www.esis.no/data/robert.engels/foaf.rdf#me">
63       <foaf:name>Robert Engels</foaf:name>
64     </foaf:Person>
65   </foaf:knows>
66   <rel:hasMet>
67     <foaf:Person rdf:about="http://www.esis.no/data/robert.engels/foaf.rdf#me"/>
68   </rel:hasMet>
69 </foaf:Person>
```

Now, finally, we add the closing tag for the root tag `<rdf:RDF ...>`.

```
70 </rdf:RDF>
```

2.7.2 Listing in Turtle

Here follows a generated listing of the FOAF file in Turtle serialization.

```
@prefix :      <http://folk.uio.no/martige/foaf.rdf#> .
@prefix rdfs:  <http://www.w3.org/2000/01/rdf-schema#> .
@prefix geo:   <http://www.w3.org/2003/01/geo/wgs84_pos#> .
```

¹⁶<http://xmlns.com/foaf/spec/index.rdf>

¹⁷<http://vocab.org/relationship/>

¹⁸Note that the `foaf:knows` relationship is very weak, e.g., `foaf:knows` is more general than `rel:knowsOf`.

```

@prefix foaf:    <http://xmlns.com/foaf/0.1/> .
@prefix admin:  <http://webns.net/mvcb/> .
@prefix rdf:    <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rel:    <http://purl.org/vocab/relationship/> .

:me    a          foaf:Person ;
      rel:hasMet  <http://www.esis.no/data/robert.engels/foaf.rdf#me> ;
      rel:knowsOf <http://www.w3.org/People/Berners-Lee/card#i> ;
      rel:worksWith <http://folk.uio.no/martingi/foaf.rdf#me> ;
      foaf:depiction <http://folk.uio.no/martige/180px-MartinGS.jpg> ;
      foaf:family_name "Skjæveland" ;
      foaf:givenname "Martin G." ;
      foaf:homepage <http://folk.uio.no/martige/> ;
      foaf:knows <http://www.w3.org/People/Berners-Lee/card#i> ,
                 <http://folk.uio.no/martingi/foaf.rdf#me> ,
                 <http://www.esis.no/data/robert.engels/foaf.rdf#me> ;
      foaf:mbox_sha1sum "5223e81829088aa837295fab98f3c286b8f106a2" ;
      foaf:name "Martin G. Skjæveland" ;
      foaf:schoolHomepage <http://www.uio.no/> ;
      foaf:title "Mr." ;
      foaf:workplaceHomepage
        <http://www.uio.no/> .

<http://www.w3.org/People/Berners-Lee/card#i>
  a          foaf:Person ;
  foaf:name  "Tim Berners-Lee" .

<http://folk.uio.no/martige/foaf.rdf>
  a          foaf:PersonalProfileDocument ;
  admin:errorReportsTo
    <mailto:leigh@ldodds.com> ;
  admin:generatorAgent
    <http://www.ldodds.com/foaf/foaf-a-matic> ;
  foaf:maker :me ;
  foaf:primaryTopic :me .

<http://folk.uio.no/martingi/foaf.rdf#me>
  a          foaf:Person ;
  rdfs:seeAlso <http://folk.uio.no/martingi/foaf.rdf> ;
  foaf:mbox_sha1sum "9cc447f0f4877bc04e7d6703bf040d7337094e65" ;
  foaf:name "Martin Giese" .

<http://www.esis.no/data/robert.engels/foaf.rdf#me>
  a          foaf:Person ;
  foaf:name  "Robert Engels" .

:ifi    a          foaf:Organization ;
      foaf:based_near
        [ a          geo:Point ;
          geo:lat "59.943386" ;
          geo:long "10.717077"
        ] ;
      foaf:homepage <http://www.ifi.uio.no/> ;
      foaf:logo <http://www.ifi.uio.no/gfx-bin/logo.jpg> ;
      foaf:member :me , <http://folk.uio.no/martingi/foaf.rdf#me> ;
      foaf:name "Department of Informatics"@en , "Institutt for informatikk"@no .

```

2.8 Exercise

Open your FOAF file in Protégé and see how things look when Protégé interprets the RDF file as OWL. Try to find all the information you have written in your FOAF file. Pay attention to where you find which information, e.g., which information is located under the classes, properties and individuals tabs, respectively.