Getting started

Each week's exercises will start by indicating the most relevant chapters from the curriculum to read.

Read

- Semantic Web Programming: chapters 1, 2.
- Foundations of Semantic Web Technologies: chapter 1.

1 Software

The task for the first week's exercises is to install all necessary software packages to get started, and to confirm that everything is set up correctly by running a first semantic web program.

1.1 Exercise

First install the latest versions of the following software.

- Java[1] SDK
- Eclipse[2] or an editor of your choice
- Protégé[3] or equivalent ontology editor
- Jena API[4]
- Pellet[5]

Note that if you are using a lab linux computer you can probably skip this exercise; all necessary software should be installed and the Jena API is "included" in the next exercise.

1.2 Exercise

Read through chapter 2 in the book, set up all software, import project from the book's homepage[6] and execute the Hello Semantic Web World project as explained in the book.

[1] http://www.java.com/
[2] http://www.Eclipse.org/
[3] http://protege.stanford.edu/
[4] http://jena.sourceforge.net/
[5] https://github.com/stardog-union/pellet
[6] http://media.wiley.com/product_ancillary/1X/04704180/DOWNLOAD/Code%20Package%20with%20Jars%20--%20Chapter%2001-04.zip

Note you don't need to understand everything in this chapter, but this chapter will give a good idea of what you will learn in this course, and having a functioning system is key for the rest of the course and the exercises.

1.2.1 Solution

To make the package run in Eclipse on my linux user account on Ifi, I followed the following steps.

- Download the zip file[7] with the package, and unzip it to some temporary location.
- Open Eclipse.
- Start a new java project, name it `HelloSemanticWeb` and select "Create project from existing source", locate the downloaded and unzipped folder `HelloSemanticWeb` and click Finish.
- After import, I get two errors. One of them is "wrong buildpath". Its reason is that the classpath of the imported project does not point to the correct JRE. To change this, complete the steps:
  1. right-click the project,
  2. Properties,
  3. Java Build Path,
  4. Libraries,
  5. locate JRE System Library in the list,
  6. Edit,
  7. select Workspace default JRE,
  8. Done!
- Now both errors are gone, but I get two new warnings. These are safely ignored.
- To run the project, right-click the `src` folder in the project and select Run As -> Java Application.
- The output of the program appears in the console pane in Eclipse.

Note that the Jena jar files included in the zip file from the book are not the newest versions. In the remainder of the course you should use the latest versions.

1.2.2 Results

The results of the HelloSemanticWeb program:

```
Load my FOAF Friends

Say Hello to Myself
Hello to Semantic Web
```

[7] http://media.wiley.com/product_ancillary/1X/04704180/DOWNLOAD/Code%20Package%20with%20Jars%20--%20Chapter%2001-04.zip

```
Say Hello to my FOAF Friends
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement

add my new friends

Say hello to all my friends - hey the new ones are missing!
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement

Add the Ontologies

See if the ontologies help to say hello to all my friends - Nope!
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement

Ok, lets add alignment statements for the two ontologies.

Try again - Hello to all my friends - nope still not all!
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement

Run a Reasoner


Finally- Hello to all my friends!
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement
Hello to Mr. Owl
Hello to Web O. Data

Say hello to myself - oh no there are two names for me!
Hello to Semantic Web
Hello to Sem Web

Add a rule to make just one name

Just checking there is now one name for me!
Hello to Semantic Web
Hello to Sem Web

Just checking that I didn't mess anthing up - Say hello to all my friends again.
Hello to I. M. Ontology
Hello to Ican Reason
Hello to Makea Statement
Hello to Mr. Owl
Hello to Web O. Data

Establishing a restriction to just get email friends
Hello to Makea Statement
Hello to Ican Reason
```

```
Hello to I. M. Ontology

Say hello to my gmail friends only
Hello to Makea Statement
Hello to I. M. Ontology

Say hello to my gmail friends only wo entailments

Success!
```

2 Some peaks ahead

This section presents some of the core languages and technologies we will work with in the coming weeks.

2.1 RDF and SPARQL: DBpedia and SPARQL endpoints

DBpedia[8] is one of the most well-known semantic web projects. It collects structured information from Wikipedia, e.g., like the information in the fact box on the page Norway[9] . This information is represented in the *RDF* data format and is available for querying through a *SPARQL endpoint*. The query language for RDF databases is *SPARQL*.

1. Exercise

   Go to `http://dbpedia.org/page/Norway` to see the information DBpedia has collected about Norway.

2. Exercise

   Data in RDF format may be *serialized* in different languages. The file `http://dbpedia.org/data/Norway.n3` contains the RDF data displayed on the above page in the RDF serialization *Turtle*. A list of different serialisation formats is available on the bottom of the page on Norway.

3. Exercise

   The endpoint address of DBpedia is `http://dbpedia.org/sparql`. Go to this address and paste the following simple SPARQL query in the "Query Text" input field:

   ```
   SELECT ?Geo
   WHERE {
     dbr:Norway dbp:north ?Geo
   }
   ```

   The query asks for what is north of Norway.

2.2 OWL: Protégé and the pizza ontology

The set of exercises under this heading is written for the lectures on OWL, but are included here to introduce you to the ontology tool Protégé. This means that there are notions that

[8] `http://dbpedia.org`
[9] `http://en.wikipedia.org/wiki/Norway`

you are not likely to understand, but try anyway. We will revisit this exercises when you have learnt about OWL.

The pizza ontology is a well-known ontology in the semantic web community. It is developed for educational purposes by the University of Manchester, which is a leading university in the development of semantic technologies.

The pizza ontology and a tutorial that uses it is found at

- `http://130.88.198.11/co-ode-files/ontologies/pizza.owl`
- `http://owl.cs.manchester.ac.uk/research/co-ode/`

The tutorial is primarily for learning how to use Protégé 4. Use it to get help on how to use Protégé in the coming exercises.

1. Exercise

   Open the pizza ontology in Protégé. Run Protégé on an Ifi linux computer with the command `protege`. The pizza ontology is found in the bookmarks in the "Open OWL ontology from URI" menu.

   Take some time to browse the class hierarchy, the property hierarchies and the individuals and note how the ontology describes the domain of pizzas.

2. Exercise

   Find `hasIngredient`. What is the domain and range of this property? What are the subproperties of `hasIngredient`? What is the inverse property of `hasIngredient`? What property characteristics does `hasIngredient` have?

3. Exercise

   Find Margherita and see how it is defined as a pizza with only cheese and tomato topping. Look at the definition of VegetarianPizza. Is a Margherita pizza a vegetarian pizza? Why / why not?

3 What is Semantic Web?

Here is a list of links to movies or other media about or using semantic web technology.

- Realising the Full Potential of the Web[10] , Tim Berners-Lee, 1997(!)
- Semantic Web Road map[11] , *A road map for the future, an architectural plan untested by anything except thought experiments.* Tim Berners-Lee, 1998.
- TED talk by Tim Berners-Lee[12]
- Tim Berners-Lee on the Semantic Web[13]
- `http://data.gov.uk/`
  - `http://data.gov.uk/faq`
  - `http://data.gov.uk/resources`

[10] `http://www.w3.org/1998/02/Potential.html`
[11] `http://www.w3.org/DesignIssues/Semantic.html`
[12] `http://www.ted.com/talks/tim_berners_lee_on_the_next_web.html`
[13] `http://www.youtube.com/watch?v=HeUrEh-nqtU`

- http://www.w3.org/2001/sw/
- http://www.semanticweb.org/
- http://www.semanticweb.com/