

# INFO-H509: XML & Web Technologies

## Semantic Web Exercises

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On the website you will find a set of RDF documents (in RDF/XML and Turtle format) that describe a simplified course catalog. They are necessary to do the following exercises.

### 1 RDF

#### Exercise 1.1

1. Inspect the contents of the file `staff.rdf` (this file is in the RDF/XML format). Draw the corresponding RDF graph on a sheet of paper.

**Note:** You can verify the correctness of your solution by using the online tool available at <http://www.w3.org/RDF/Validator/>: copy the file's content and paste it in the text box. Make sure that under *Display Result Options*, the option *Triples and/or graph* is set to “Triples and Graph”. (See Figure 1.)

2. Complete your graph drawing by adding the information about the course *XML Technologies* that you find in the file `catalogue.rdf`.
3. Further complete the graph on paper by taking into account the information from the file `infoh509.ttl`.
4. Based on the graph that you have drawn so far, write down the triples that you would need to record the information of the second lecture of the course *XML Technologies* in the graph.

#### Exercise 1.2

Open the file `catalog.rdf` with a text editor, and add to it a new course with the title “Object Oriented Programming, whose code is INFO-H-200. This course is lectured by prof. Zimányi and the assistant is called Boris Verhaegen

Next, modify the file `catalog.rdf` to record the fact that the course INFO-H-303 Databases is a prerequisite for the course *Distributed Information Systems*. (You can use the predicate `ulb:prerequisite` for this.)

Similarly, add the fact that the course INFO-H-100 is a prerequisite for *Object Oriented Programming*. (You can again use the predicate `ulb:prerequisite` for this.)

#### Exercise 1.3

Write a document using the Turtle syntax that describes who you are (in the same spirit as the information in the `staff.ttl` file). Indicate in this file that you follow the course *XML Technologies*. Any new terms that you may need to invent in order to do this should be added under `http://www.example.org/[your name]/`.

Home Documentation Feedback

Check and Visualize your RDF documents

olde servlet

Enter a URI or paste an RDF/XML document into the text field above. A 3-tuple (triple) representation of the corresponding data model as well as an optional graph

Check by Direct Input

```
<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://purl.org/dc/elements/1.1/">
  <rdf:Description rdf:about="http://www.w3.org/">
    <dc:title>World Wide Web Consortium</dc:title>
  </rdf:Description>
</rdf:RDF>
```

Copy and paste RDF/XML format here.

Set to "Triples & Graph" to get a drawing of the graph.

Parse RDF Restore the original example Clear the textarea

Display Result Options:

Triples and/or Graph: Triples and Graph

Graph format: PNG - embedded

Paste an RDF/XML document into the following text field to have it checked. More options are available in the [Extended interface](#).

Figure 1: The RDF Validator Tool

## 2 RDF Schema

### Exercise 2.1

The file `inference.ttl` contains an RDF Schema ontology that specifies that the typical people working at a university (`ulb:Professor`, `ulb:PHDStudent`) are members of the academic personnel (`ulb:Faculty`).

1. The data files available on the course webpage also contains a Java JAR that allows us to print out all RDF triples that can be inferred from a given set of input RDF documents. To show all triples that can be inferred when interpreting the RDF Schema information available, you can call this as follows:

```
java -jar infertools.jar [--rdfs | --owlfull] <list of files containing rdf>
```

- By default, `-owlfull` is assumed. In this mode, OWL inferences, including axiomatic triples, will be made. Note that the tool uses the Jena ([jena.apache.org](http://jena.apache.org)) library for OWL reasoning; the algorithm provided by this toolkit is not complete however, but should be complete for the OWL DL things that are to be used in these exercises.
- The `-rdfs` option causes inferencing to be done only on the RDF schema vocabulary. Axiomatic triples are not output.

Hence, from within a Windows Command Prompt or Linux Terminal in the directory where you extracted the data files, you would do the following command to make RDF schema inferences on `staff.rdf` using the rules in `inference.ttl`.

```
java -jar infertools.jar --rdfs inference.ttl staff.rdf
```

2. Run this command and inspect the output. Notice that all professors and PhD students are now also classified as belonging to the class `ulb:Faculty`.
3. Modify the file `inference.ttl` by adding a rule that states that all personnel members (`ulb:Faculty`) are people (`foaf:Person`).
4. Run the above command again and inspect the output. Verify that your rule works as expected.

## Exercise 2.2

At current, the `catalog.rdf` file does not specify any type for the courses *Databases* and *Introduction to Computer Programming*. Use the RDF Schema terms `rdfs:range` and `rdfs:domain` to add rules to the `inference.ttl` file that state that the prerequisite of a course is itself a course. Run the tool from exercise 2.2. again to verify that your addition is correct.

**Supplementary exercise:** In a similar vain, still using `rdfs:range` and `rdfs:domain`, add rules that describe the properties `lecturer` and `assistant` in more detail.

## Exercise 2.3

Create a new property `workHomepage`, and specify that it is a sub property of `foaf:homepage`. Modify `staff.rdf` to use this property.