

Exercise sheet - RDF/RDFS

1. Create a FOAF document listing members of the class whom you know and some friends not visiting the class. In each document specify the “knows” relation for your friends. You can use FOAF-a-Matic¹ to generate stubs. Define all Person URIs as `http://aau.at/#ZIDLogin` for each member of your class, where ZIDLogin is substituted with your login, and arbitrary URLs for other friends. Use these URIs in your FOAF documents instead of searching. Present your RDF document in RDF/XML and Turtle (aka N3) serialization formats. Please, fill out at least five fields suggested in FOAF-a-Matic input form with personal information. Define at least one FOAF term about yourself that is not suggested in the form (see FOAF vocabulary description² for a list of terms).
2. Display your documents as a graph (you can use Protege³ editor or RDF Validator⁴). Exchange documents with your friends in the class and merge them into one. Present the result as a graph.
3. Model the following sentences in RDF (Turtle). If possible use URI from schemas available at schema.org or [GoodRelations](http://www.goodrelations.org) whenever possible or use other vocabularies if the previous two do not comprise relevant concepts and relations:
 - a. Peter is a person
 - b. Every student is a person
 - c. Jonas and Rosemary are children of Peter, who are 3 and 5
 - d. Mark IV is developed by Canon for professional photographers
 - e. My friend told me that a person who owns a cat is a woman
4. What is JSON-LD serialization format for RDF? Convert the document obtained in the previous exercise to JSON-LD and use [RDF-translator](http://rdf-translator.org) to check your results.
5. Select an HTML page (e.g. some small article from Wikipedia) and introduce RDF annotations in RDFa or JSON-LD formats to it. You can use Google [Structured Data Testing Tool](http://structureddata.net) (see [Documentation](http://structureddata.net/documentation) for more details).
6. Use Jena⁵ command line tools (riot.bat) to convert the `student.rdf` into Turtle syntax. Explain the meaning of the meaning of the triples. See <http://jena.apache.org/documentation/io/> for help.
7. Use Jena RDFS inference engine to obtain RDFS entailments (infer.bat) of `student.rdf` and save only inferred axioms in the Turtle format. Explain why these triples are derived using common sense reasoning.
8. Similarly as in (7) apply inference to `axe1.rdf` using FOAF as RDFS vocabulary.

¹ <http://www.ldodds.com/foaf/foaf-a-matic.html>

² <http://xmlns.com/foaf/0.1/>

³ <https://protege.stanford.edu/software.php>

⁴ <http://www.w3.org/RDF/Validator/> do not forget to make an appropriate selection in “Triples and/or Graph”

⁵ Download Jena from <http://jena.apache.org> (works with Java 6 or higher) and register the `JENA_ROOT=Jena/Path` environmental variable

Example (Windows PC connected to the Internet):

run cmd.exe, go into a directory where axel.rdf is saved and run:

```
infer.bat --rdfs=http://xmlns.com/foaf/0.1/index.rdf axel.rdf
```

Save all inferred triples in the Turtle format. Select five saved triples and explain them using FOAF vocabulary definitions <http://xmlns.com/foaf/spec/>

9. Create an RDFS ontology describing the following part of a domain that describes pets.
 - All dogs are animals.
 - Parent is a relationship defined for animals.
 - All animals related as parents are also relatives.
 - Jake states that dogs are carnivores.
 - Wikipedia has also a definition of a dog.

Use derivation rules presented in the lecture to obtain simple entailments of the following RDF document. Use RDFS axiomatic and valid triples, i.e. statements that are always true for every RDFS document (see Section 9 of RDFS 1.1 Recommendation⁶), to obtain as much entailments as possible.

10. `ex:Mike a foaf:Person .`

`ex:Mike ex:friend ex:Jerry .`

`ex:friend rdfs:subPropertyOf foaf:knows .`

11. `ex:Megan ex:hasParent ex:Mike .`

`ex:hasParent rdfs:domain ex:Person .`

`ex:Person rdfs:subClassOf ex:Agent .`

⁶ <http://www.w3.org/TR/2014/REC-rdf11-mt-20140225/Overview.html#rdfs-interpretations>