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Master MIASHS
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Jena Fuseki & Jena RDF Connection API

This document covers some parts of Apache Jena project. It shows how to:
- Run a SPARQL endpoint + Triple Store
- Perform queries over a remote SPARQL endpoint
- Manipulate graphs as Jena Models

1- Setup Jena Fuseki

Jena Fuseki provides a SPARQL endpoint and triple store.

- Download the tuned version on the course site (WebSemJena.tar.gz)
- Decompress it
- Go to directory WebSemJena/apache-jena-fuseki-3.13.0-openllet

To launch it, open a terminal, go to Fuseki directory and type "./fuseki-server" or fuseki-server.bat on Windows (you can stop the server with Ctrl+c)

You should be able to access it through: http://localhost:3030

You will see 3 datasets :

- /sempic: it is the union (merge) of sempic-data and sempic-onto + a reasoner engine
- /sempic-data: will contain only the data of the application
- /sempic-onto: will contain the ontology of sempic

From the web interface, you can query them, add data, etc.
sempic-data and sempic-ontology datasets should be empty.
Sempic dataset contains all statements from the OWL language and inferred ones.

These three datasets have been declared in the file `run/configuration/sempic.ttl` of Jena Fuseki directory.

The ontology sempic (sempic-onto) is loaded directly from a file (`SempicRDF/src/main/resources/sempiconto.owl`). This file will not be modified by sparql update queries on it. If you want to modify it, use a text editor or some tool like Protege.

2- SempicRDF project

SempicRDF is a Java Maven project (setup with Maven to manage dependencies with external libraries like Jena).
It contains:
- the sempic ontology (a very basic one), in the "Resources" folder (src/main/resources)
- the `SempicOnto` class in the "Generated Source" folder (target/generated-sources/java). This class is automatically generated at build time (mvn package) from the ontology using the tool schemagen of Jena. The SchemaGen tool is setup in the Maven configuration file (pom.xml).
- The class Namespace where we store the namespaces used for instances created by the applications.

- The class `RDFStore`, which allows to interact with a triple store (here the Fuseki server that has been setup before). In this class, we make use of the RDFConnection API of Jena (https://jena.apache.org/documentation/rdfconnection/). `RDFConnection` allows to work with any SPARQL endpoint using HTTP SPARQL protocols (SPARQL protocol and SPARQL Graph Store Protocol).
In this class, several methods are proposed to store and delete Jena models or resources (i.e. java representation of RDF graphs). It also contains some examples to show how to performs SPARQL construct queries, SPARQL update Query and also how to use SPARQL Graph Store Protocol.

Appendix: Steps to create SempicRDF from scratch

With Netbeans.

Create a new Maven EJB Module project (File → new Project → Maven → "whatever you want")
Choose:

- Project Name: SempicRDF
- Group Id: fr.uga.miashs.sempic
- Package: fr.uga.miashs.sempic.rdf

Add Jena dependency

Right click on dependencies (in the project tree) → Add dependancy. Put in the "Query" field: apache-jena
Open `org.apache.jena` package, and choose the last version (here 3.5.0)
All jars of Jena will be downloaded automatically

Configure the SchemaGen tool

Copy your ontology into the directory "Other Sources" src/main/resources of your project.
Open the pom.xml file of your project.
Copy and adapt the two plugins described here :
https://jena.apache.org/documentation/tools/schemagen.html#using-schemagen-with-maven
(the is also https://jena.apache.org/documentation/tools/schemagen-maven.html but I did not succeed to make it work).

If you build your project, you should obtain a new folder "Generated Sources (java)" in the project tree, with the generated class

Bibilography

Jena ARQ (i.e. sparql engine of Jena): https://jena.apache.org/documentation/query/index.html
Schemagen:
https://jena.apache.org/documentation/tools/schemagen.html
RDFConnection:
https://jena.apache.org/documentation/rdfconnection/
https://jena.apache.org/documentation/javadoc/rdfconnection/org/apache/jena/rdfconnection/RDFConnection.html

SPARQL: https://www.w3.org/TR/sparql11-query/
SPARQL Update: https://www.w3.org/TR/sparql11-update
SPARQL Graph Store Protocol: https://www.w3.org/TR/sparql11-http-rdf-update/