**Virtuoso**

OpenLink Virtuoso is a SQL-ORDBMS and Web Application Server hybrid (aka Universal Sever) that provides SQL, XML, and RDF data management in a single multithreaded server process. Triple Store access is available via SPARQL, SIMILE Semantic Bank API, ODBC, GRDDL, JDBC, ADO.NET, XMLA, WebDAV, and Virtuoso/PL (SQL Stored Procedure Language). The product is available in Open Source and Commercial editions (https://www.w3.org/2001/sw/wiki/Virtuoso - accessed February 2016).

**Configuration (Windows):**

**1) Virtuoso Download:**

* Link to download (windows 64 bits):

<http://sourceforge.net/projects/virtuoso/>

**2) Configuring Virtuoso**

* Follow all steps of the link: <http://virtuoso.openlinksw.com/dataspace/dav/wiki/Main/VOSUsageWindows>

(This link illustrates how to configure the environment variables and how to create and initialize Virtuoso as a Windows service)

**3) Starting Virtuoso:**

* Always execute the initialization script as administrator
* If an error occurs in the initialization, delete the virtuoso.lck file (located in the directory database)

**4) Acessing the triplestore:**

* Conductor (Virtuoso admin interface):  <http://localhost:8890/conductor> (Login: dba, Password: dba (change as soon as possible))
* Local endpoint address: [http://localhost:8890/](http://localhost:8890/conductor)sparql
* There are 2 ways of running SPARQL queries:
  + Conductor -> Interactive SQL (icon in the upper-left corner)
  + Conductor -> Linked Data Tab -> SPARQL Tab

**5) Grant permissions (if any permission error occurs after executing a query):**

* Open isql
* Run que query GRANT execute ON SPARQL\_INSERT\_DICT\_CONTENT TO "SPARQL";
* To grant permissions to the user to execute federated queries:
  + GRANT execute ON SPARQL\_SINV\_2 TO "SPARQL";
  + GRANT execute ON SPARQL\_SINV\_IMP TO "SPARQL";

**Handling Graphs (Virtuoso)**:

**1) Handling graphs:**

* Visualizing the existing graphs: Conductor -> Linked Data -> Graphs
* Creating a new graph: Run the query CREATE GRAPH <GRAPHNAME>;
  + \* If any permission error occurs, see item (4) of Virtuoso Configuration.
  + If the error persists, run the script:

grant SPARQL\_UPDATE to "SPARQL"; in iSql

**2) Inserting triples in graphs:**

* To insert triples from an .rdf or .ttl file: Conductor -> Linked Data -> Quad Store Upload

**3) Verifying the inserted triples:**

* Conductor -> Linked Data -> SPARQL
* Indicate the graph name in Default Graph IRI
* Run the following query: select ?s ?p ?o WHERE {?s ?p ?o}
  + This query finds all triples in a graph that match the specified pattern:?s ?p ?o

**4) Clear a graph:**

* Open isql
* Run the query sparql clear graph <GRAPHNAME>

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