Oracle® Spatial and Graph
RDF Semantic Graph Developer’s Guide
12c Release 1 -
Support for Ontology Editing with Protégé Desktop

August 2015

Provides usage and reference information about Oracle Database support for semantic technologies, including storage, inference, and query capabilities for data and ontologies based on Resource Description Framework (RDF), RDF Schema (RDFS), and Web Ontology Language (OWL).
# INTRODUCTION

Prerequisites to install support for Protégé

# INSTALLING SUPPORT FOR PROTÉGÉ ON WINDOWS

## Objective

## Installing Protégé Desktop

## Installing Protégé on Other Operating Systems

Enabling the support for Protégé

* Downloading the Jar Files
* Adding the JAR files to Protégé
* Executing Protégé on Windows 7
* Executing Protégé on Windows 8
* Executing Protégé on Linux Systems
* Verifying support for Protégé Installation

# THE FACT++ PLUG-IN

How to Disable Fact++ Plug-in

# OPENJDK WARNING

Install Java runtime from Oracle

# USING THE SUPPORT FOR PROTÉGÉ

The Oracle Menu

Connecting to a Database

# USING PROTÉGÉ

Editing Classes

Editing Object Properties

Editing Individuals

# USING A REASONER WITH PROTÉGÉ

Starting a Reasoner

Saving Inferred Ontology

# USING THE MODEL MANAGER

Creating Models

Empty Models

Delete Models

Rename Models

Create Virtual Models

Delete Virtual Models

Loading RDF Data

# USING THE ENTAILMENT MANAGER

Creating Entailments

Deleting Entailments

# HANDLING OWL:imports of Ontologies Stored in Oracle Database

Importing an Ontology
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generating the XML Catalog</td>
<td>34</td>
</tr>
<tr>
<td>XML Catalog Structure</td>
<td>34</td>
</tr>
<tr>
<td>Loading the XML Catalog</td>
<td>34</td>
</tr>
<tr>
<td>Adding an Oracle Database Ontology Data Source Redirect</td>
<td>36</td>
</tr>
<tr>
<td>Importing a Database Ontology</td>
<td>36</td>
</tr>
<tr>
<td>Removing an Imported Ontology</td>
<td>39</td>
</tr>
</tbody>
</table>

**EXECUTING SPARQL QUERY'S IN ORACLE DATABASE** 40

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELECTING DATABASE MODELS</td>
<td>42</td>
</tr>
<tr>
<td>SELECTING DATABASE ATTACHMENTS</td>
<td>43</td>
</tr>
<tr>
<td>Navigating Through Results</td>
<td>44</td>
</tr>
<tr>
<td>GENERATING QUERIES</td>
<td>44</td>
</tr>
<tr>
<td>CANCEL A LONG RUNNING QUERY</td>
<td>45</td>
</tr>
</tbody>
</table>
Copyright © 2005, 2014, Oracle and/or its affiliates. All rights reserved.

This document is an addendum to the Oracle Spatial and Graph RDF Semantic Graph Developer’s Guide 12c Release 1. Oracle Spatial and Graph RDF Semantic Graph Developer’s Guide provides usage and reference information about Oracle Database Enterprise Edition support for semantic technologies, including storage, inference, and query capabilities for data and ontologies based on Resource Description Framework (RDF), RDF Schema (RDFS), and Web Ontology Language (OWL). The RDF Semantic Graph feature is licensed with the Oracle Spatial and Graph option to Oracle Database Enterprise Edition, and it requires the Oracle Partitioning option to Oracle Database Enterprise Edition.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are “commercial computer software” pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.
Introduction

Protégé Desktop 4.3 (also referred to here as Protégé) is an open source graphical tool, created by Stanford University, for viewing and editing ontologies.

Oracle Spatial and Graph RDF Semantic Graph support for Protégé Desktop 4.3 (also referred to here as support for Protégé) provides the ability to view and edit ontologies in Oracle Database with Protégé Desktop. It implements a plugin that conforms to the Protégé-OWL 4.x plugin architecture, as described in the Protégé 4 Developer Documentation. It replaces the University of Manchester OWLAPI that is distributed with Protégé Desktop 4.3 to enable the support for Protégé.

Installing support for Protégé adds an Oracle menu to the Protégé menu bar. The menu items execute RDF Semantic Graph operations on one or more ontologies of interest stored in Oracle Database RDF graph store.

For information about Protégé Desktop, including links to documentation and download instructions see http://protege.stanford.edu/products.php - desktop-protege.

Prerequisites to install support for Protégé

- Oracle Database 12c Release 1 (12.1.0.1 or higher). Oracle Database 11g Release 2 (11.2.0.3 or higher) is also supported.
- Oracle JDK6 or JDK7
- Protégé Desktop 4.3

Installing support for Protégé on Windows

www.oracle.com
Oracle Spatial and Graph

Objective

This document describes how to install Protégé Desktop 4.3 (also referred to here as Protégé), enable Graph RDF Semantic Graph support for Protégé (also referred to here as support for Protégé) and use Protégé to operate on ontologies stored in Oracle Database.

Installing Protégé Desktop

Assuming the Protégé Desktop 4.3 installer is available on your local disk, when running the installer under Windows, you will be asked for permission to start the Protégé InstallAnywhere wizard. Click Yes.
The installation wizard will guide you step by step in order to select the installation folder, create shortcuts and choose the Java VM to run Protégé.

When installing, there are two important locations to remember that Protégé installer will ask:

1. Location on the hard drive to install Protégé
2. Location of the Java Runtime Environment you wish to use

When choosing the Java VM you must select version 1.6 or later, and not select the embedded JVM. Choosing other versions of the Java VM may cause the plug-in to fail at startup.

*There are known issues under Windows in which the embedded Java VM may fail to run Protégé.*
Once the installation finishes, you will see a success message and the location of the installation as follows:

**Installing Protégé on Other Operating Systems**

Follow the instructions for installing Protégé in your desired operating system, which are located in the *Documentation* link on the download page for *Protégé Desktop 4.3*. *JDK 6 or later is recommended.*
Enabling the support for Protégé

Downloading the Jar Files
The support for Protégé is implemented as a set of jar files. The distribution is available for download from Oracle's Support website My Oracle Support (support.oracle.com).

Adding the JAR files to Protégé
Once downloaded, the jar files must be added to the plugins folder inside the Protégé installation. The files in the installation directory look like following

![Protégé for Windows Installation Directory](image)

The following jar must be replaced - org.semanticweb.owl.owlapi.jar

The following jar must be added - OraclePlugin.jar

Inside the folder plugins you will find all the plug-ins that Protégé uses, and to enable support for Protégé you need to copy the jar file here and start the app. The folder for the plug-ins looks like the following:
Executing Protégé on Windows 7
On Windows 7, Protégé has an executable file, which is added to the Start menu under All Programs.

Executing Protégé on Windows 8
On Windows 8, Protégé has an executable file, which is added to the Apps view under the Protégé_4.3 category.
Executing Protégé on Linux Systems

For Linux systems the start script, `run.sh`, is in the Protégé installation directory. To run this script, type `sh run.sh` using a terminal window as shown below.

Verifying support for Protégé Installation

Once started, you will see information about your platform and a list showing which plug-ins are enabled. If the support for Protégé was successfully installed in Protégé, the list of plug-ins will include *Oracle Plugin* as shown below.
Once the Protégé application is displayed, the support for Protégé will add Oracle to the menu bar. At this point support for Protégé is ready for use.
How to Disable Fact++ Plug-in

When running Protégé you may encounter the following message about missing libraries or platforms not supported:

In this case, you must delete or remove the *uk.ac.manchester.cs.owl.factplusplus.jar* file inside the *plugins* folder and restart Protégé.
Install Java Runtime from Oracle

When running Protégé you may encounter the following message about OpenJDK Runtime not supported:

In this case, you must install a Java Runtime from: https://java.com/download and set the JAVA_HOME variable to point to the newly installed Java Runtime before you restart Protégé.
The support for Protégé adds a menu tab with a set of options to Protégé.

### The Oracle Menu

The main application of Protégé will include a menu with the options *Open Database Ontology, Save, Save As, Save Reasoner Output, Manage Database Models, Manage Database Entailments* and *Switch Database*.

When an ontology is loaded, the *Save* option will make an incremental edit that is saved in Oracle Database, whereas the *Save As* option will replace the ontology or create a new one.

After choosing *Save* or *Save As*, a message window will pop up to report weather the ontology was saved or if there was an error, as shown below.

*The message may be delayed depending on the size of your ontology, configuration of Oracle Database and network speed.*

The *Save As* option displays a menu to choose between overwriting an existing ontology and creating a new one in the database.
When using the *Open Database Ontology* option, a dialog will display all the ontologies that the current user can load from Oracle Database. After selecting and loading an ontology, the main application will display the name of the ontology in the window title bar.

The first time you try to save the ontology you create, the database connection dialog is displayed so that you can establish an Oracle Database connection. Once a database connection is successfully established, the *Save* and *Save As* options allow you to replace an existing ontology or create a new ontology, as shown below.
Connecting to a Database

From the Oracle menu choose *Switch Database*, which enables you to input the database connection information.

The following illustrations show tabs for connections to Oracle Database:

![Connect to Oracle](image)

After inputting the required information to connect to Oracle Database, ontologies can be loaded using the *Open Database Ontology* option. A dialog with all available ontologies for the current users will be displayed so that you can choose which ontology to read from and load into Protégé.

After choosing the ontology, the load time will vary depending on your network connection speed and the size of the model.

*There is no data loading progress indicator in Protégé, the application may appear non-responsive while the ontology is being loaded.*
Using Protégé
www.oracle.com
Oracle Spatial and Graph

Protégé is a visual editor for the Web Ontology Language. The main application is tab-based with options to edit Classes, Object Properties, Data Properties, Individuals and Annotations.

The support for Protégé provides compatibility with the database by providing conversion between Triples and OWL APIs in order for Protégé to be able to exchange information with it.

Editing Classes
Once the main application is loaded, the classes can be edited in the Classes tab. All classes are a subclass of Thing (owl:Thing) and are selected for editing in the Class hierarchy as shown below.

![Class hierarchy diagram]

Here you have the options to add a subclass or sibling class or to remove one. Once a Class is added, you can select it to add annotations and descriptions of it.

The following is an example of how to add a union.

![Description panel diagram]

*From the Description Panel, Press the Plus Sign next to Equivalent To for class “A”*
In the Class Expression Editor, Type “B or C”

The Equivalence Will Be Displayed When Selecting The Class “A”

Editing Object Properties

Object properties are edited in the Object Properties tab; as with the classes tab, you will have a hierarchy with topObjectProperty as the root of all object properties.

The following is an example of adding an object property.
From the Hierarchy Panel, Select the "topObjectProperty" and Then Press "Add sub property"

Once the Object Property is Added, We Can Edit the Description/Characteristics/Annotations

Editing Individuals

The Individuals tab differs from the rest of the tabs by adding a hierarchy for classes and a members list for the individuals. Individuals can belong to a specific class or be part of the Thing class. Once a class is selected, you can add/remove individuals from the members by using the Add/Delete buttons as shown below.
Once an individual is added, you can choose it from the members and edit its description, assertions and annotations.
The following is an example of individuals with Object Property Assertions.

First Add Two Individuals to the Thing Class

On the Property Assertions of One of the Individuals, Press “Object property assertions”
An Editor Lets You Choose an “Object Property” and “Individual” to Create the Assertion

Once Selected, the Object Property Assertion Will be Displayed in the Assertion Panel
**Using a Reasoner with Protégé**

www.oracle.com
Oracle Spatial and Graph

**Starting a Reasoner**

Protégé comes bundled with *HermiT* and *Fact*. In order to start, you must select a reasoner from the *Reasoner* menu.

After selecting the reasoner, you can start the inferencing on the ontology by selecting the **Start reasoner** option from the *Reasoner* menu as shown below.

After the process is completed, the inferred classes and individuals will appear as a highlighted element in each of the description panels of their corresponding types. These elements cannot be edited, and you can easily access them by selecting the inferred class hierarchy and members list.

*Note that the support for Protégé will not save the inferred elements in the database.*
Saving Inferred Ontology

To save the inferred ontology, you must select *Save Reasoner Output* from the Oracle menu. *You must start a reasoner first in order to save the inference.*

You will be asked to input a name to save the inference as a new ontology in the database.
The process of inferencing is resource-intensive, and can sometime take a long time to complete, depending on complexity. Before processing the inference, you will be asked to provide a timeout in seconds for the inference process to stop trying to complete the inference when this time is reached (setting the timeout to zero means there is no time limit).

Once the inference process reaches its timeout or completes, a message dialog will be displayed, giving feedback about the operation, such as follows:

If the inference does not complete in the allocated time, the process may be retired with increased timeout.
RDF Semantic Graph supports models and virtual models in Oracle Database. Models store ontologies, asserted data and entailments. (See the RDF Semantic Graph Developer’s Guide for details.) The support for Protégé can manage and bulk load RDF Semantic Graph models. To do this click Oracle > Manage Database Models.

The Model Browser has a row for each model in the associated database connection, with the following information about each model: Model ID, Model Name, Owner (schema), Name of the RDF application table, and whether it is a Virtual Model. You can specify a string to Filter the displayed results, and you can click Show All to show all the models.

The Model Browser has the following menus and menu items:

- **Options menu:**
  - **Update:** Updates the display based on the current metadata and data.
  - **Pagination:** Specifies the maximum results to be displayed per page.

- **Edit menu:**
  - **Copy:** Copies the text from the selected row or rows to the system clipboard.
  - **Copy All:** Copies the text from all rows to the system clipboard.

- **Actions menu:**
  - **Drop Model:** Drops (deletes) the selected model. To select the model, click in its row. When prompted, confirm that you want to delete the selected ontology.
For Oracle Database, this action is implemented using the PL/SQL `SEM_APIS.DROP_SEM_MODEL` procedure.

- **Empty Model**: Truncates the selected model by deleting the data from its RDF application table but not the table itself. To select the model, click in its row. When prompted, confirm that you want to truncate the selected ontology. For Oracle Database, this action is implemented using the SQL statement `TRUNCATE TABLE`, which is described in *Oracle Database SQL Language Reference*.

- **Rename Model**: Renames the selected model (not a virtual model). To select the model, click in its row. When prompted, specify the new name for the selected ontology. For Oracle Database, this action is implemented using the PL/SQL `SEM_APIS.RENAME_MODEL` procedure.

- **Create Model**: Creates a model that is not a virtual model. If you click **Advanced**, you can specify the tablespace and whether to use basic compression, in addition to the model name. After the model is created, it appears in the Model Browser display. For Oracle Database, this action is implemented using the PL/SQL `SEM_APIS.CREATE_SEM_MODEL` procedure.

- **Create Virtual Model**: Creates a virtual model. Specify the models and rulebases to be used in creating the virtual model. After clicking **Create VM**, specify the new name for the new virtual model. After the virtual model is created, it appears in the Model Browser display. For Oracle Database, this action is implemented using the PL/SQL `SEM_APIS.CREATE_VIRTUAL_MODEL` procedure.

- **Remove Virtual Model**: Drops (deletes) the selected virtual model. To select the virtual model, click in its row. When prompted, confirm that you want to delete the selected virtual model. For Oracle Database, this action is implemented using the PL/SQL `SEM_APIS.DROP_VIRTUAL_MODEL` procedure.

- **Load RDF Data**: Loads RDF data into the selected model. To select the model, click in its row. Select the tab for desired main option: Load Files; Load All Files from Directory; Split, Save & Load; or Save & Load. (The available fields depend on the option selected.)
Creating Models
To create a model, you must select *Create Model* from the Actions menu.

![Model creation](image)

You will be asked to input a name to save the model into the database. *You will also be given the choice to specify the advanced options.*

![Advanced model creation](image)

Empty Models
To empty a model, you must select *Empty Model* from the Actions menu.

![Empty model](image)

You will be asked to confirm before truncating the selected model.

Delete Models
To delete a model, you must select *Drop Model* from the Actions menu.

![Delete model](image)
You will be asked to confirm before deleting the selected model.

**Rename Models**

To rename a model, you must select *Rename Model* from the Actions menu.

![Rename Model Dialog](image)

You will be asked a new name to rename the model.

**Create Virtual Models**

To create a virtual model, you must select *Create Virtual Model* from the Actions menu.

![Create Virtual Model](image)

You will be shown a list of all available models and rulebase, which the current user has access to. To create the virtual model you must choose the desired models and rulebase by selecting their respective checkbox. Selected elements will be displayed in a list below.

*Regular expressions are supported for the filter.*
Once you click Create, you will be asked to input a name to save the entailment into the database.

**Delete Virtual Models**
To delete a virtual model, you must select *Remove Virtual Model* from the Actions menu.

You will be asked to confirm before deleting the selected virtual model.

**Loading RDF Data**
To load RDF data into a model, you must select *Load RDF Data* from the Actions menu.
The loader allows the user to *Load Files, Load All Files from Directory, Split Save & Load* and *Split & Load*. User can choose the option that best fit the loading needs and will be displayed a series of options to improve the loading which allows flags, language selection and threads.

*Zip and GZip compressed files are supported.*

The loader supports the following formats:
N-Triple, N-Quad, RDF/XML, OWL/XML, OWL, OWL Manchester, OBBO, KRRS2, TTL and Turtle.

*The auto select option will try all supported formats in order to load.*
The Entailment Browser has a row for each entailment in the associated database connection, with the following information about each entailment: Entailment Name and Owner (schema). You can specify a string to Filter the displayed results, and you can click Show All to show all the entailments.

The Entailment Browser has the following menus and menu items:

- **Options menu:**
  - **Update:** Updates the display based on the current metadata and data.
  - **Pagination:** Specifies the maximum results to be displayed per page.

- **Edit menu:**
  - **Copy:** Copies the text from the selected row or rows to the system clipboard.
  - **Copy All:** Copies the text from all rows to the system clipboard.

- **Actions menu:**
  - **Create Entailment:** Creates an entailment. Specify the models and rulebases to be used in creating the entailment. After clicking Create, specify the name for the new entailment, and optionally click Advanced for advanced options. After the entailment is created, it appears in the Entailment Browser display.
    
    For Oracle Database, this action is implemented using the PL/SQL SEM_APIS.CREATE_ENTAILMENT procedure.

  - **Remove Entailment Model:** Deletes the selected entailment. To select the entailment, click in its row. When prompted, confirm that you want to delete the selected entailment.
    
    For Oracle Database, this action is implemented using the PL/SQL SEM_APIS.DROP_ENTAILMENT procedure.
Creating Entailments

To create an entailment, you must select *Create Entailment* from the Actions menu.

![Create Entailment](image)

You will be shown a list of all available models and rulebase, which the current user has access to. To create the entailment you must choose the desire models and rulebase by selecting their respective checkbox. Selected elements will be display in a list below.

*Regular expressions are supported for the filter.*

![Entailment creation](image)

Once you click Create, you will be asked to input a name to save the entailment into the database.

*You will also be given the choice to specify the advanced options.*
Deleting Entailments

To delete an entailment, you must select *Create Entailment* from the Actions menu.

You will be asked to confirm before deleting the selected entailment.
Handling owl:imports of Ontologies Stored in Oracle Database

www.oracle.com
Oracle Spatial and Graph

OWL allows import of the contents of entire ontologies in other ontologies with owl:imports assertion(s). Protégé supports owl:imports of ontologies stored in a file system or ones that can be accessed through a valid URL.

The support for Protégé allows you to import ontologies stored in Oracle Database.

To reference (ow:imports) an ontology from Oracle Database you must generate the XML catalog, load the catalog, specify the ontology name and data source by creating a redirect, and importing the database ontology.

Importing an Ontology

In order to import ontologies from Oracle Database you must load the XML Catalog generated by Protégé and manually specify the ontology ID and its Datasource.

Generating the XML Catalog

Start Protégé from scratch and save the current ontology into a directory on your local file system without making changes to the temporal ontology, then open the saved ontology into the current editor.

After reloading the saved ontology, a catalog file will be generated in the directory where the ontology was saved.

XML Catalog Structure

The XML catalog file contains the redirects of ontologies that have an ontology IRI that is not the same as its physical location or the data source identifier. Below is an example catalog file.

```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<catalog prefer="public" xmlns="urn:oasis:names:tc:entity:xmlns:xml:catalog">
  <uri id="User Edited Redirect" name="urn:N1" uri="jndi-name:oracle-database:N1DS:N1"/>
</catalog>
```

You can manually add an entry in the catalog by using the following format

```xml
<uri id="User Edited Redirect" name="[Ontology IRI]" uri="[physical location or data source]"/>
```

Loading the XML Catalog

Once you have loaded an ontology you can import one or multiple ontologies from the database by selecting Edit ontology libraries option from the File menu.
Select the *catalog-v001.xml* file, which contains the redirects from ontology IDs to physical locations or Data Sources.

After the catalog is loaded you will see the ontology libraries containing the catalog locations and all the redirects.
**Adding an Oracle Database Ontology Data Source Redirect**

You can add a redirect by opening the ontology library from the *Edit Active Ontology Library* option from the *File* menu, and clicking the *Add Redirect* button.

![Add Redirect Button]

The redirect needs to use the Ontology IRI as the Import Declaration and Data Source syntax as follows:

*Note that when adding a new entry to the catalog, there is a known issue in which you must switch focus between the text areas in order for the OK button to be enabled.*

```
jndi-name:oracle-database:[Data Source Name]:[Oracle Database Model Name]
```

![Data Source Syntax to redirect an ontology to a model stored in Oracle Database](image)

```
jndi-name:oracle-nosql:[Data Source Name]:[Oracle Database Model Name]
```

![Data Source Syntax to redirect an ontology to a model stored in Oracle NoSQL Database](image)

**Importing a Database Ontology**

Use the *Import Wizard*, located in the *Ontology imports* tab and choose *Import an ontology that is contained in one of the ontology libraries*, as shown below.
Select the ontology to import and Protégé will verify the import.

After the import has been verified, click Finish to complete the import.

Once the ontology is imported, the *Ontology imports* tab will display the name of the imported ontology, and all indirect imports if applicable.
You will need to input the connection information for the data source specified in the ontology redirect for ontologies imported from Oracle Database.

"Ontology imports" tab located under the "Active Ontology" tab

The imported ontologies elements will be displayed using light fonts and the elements belonging to the ontology will be displayed using bold fonts, as shown below.
Removing an Imported Ontology

To remove an imported Ontology, click the X icon, located to the right of the ontology on the Ontology Imports tab.

![Ontology Imports Table]

---

39 Oracle Spatial and Graph RDF Semantic Graph Developer’s Guide - Support for Ontology Editing with Protégé Desktop
SPARQL contains capabilities for querying required and optional graph patterns along with their conjunctions and disjunctions. The SPARQL Query option allows you to query Oracle Database models. To execute SPARQL Query’s click *Oracle > Execute SPARQL Query*.

The SPARQL Query has the following menus and menu items:

- **Options menu:**
  - **Select Model:** Selects the model to query.
  - **Attachments:** Selects the attachments for a model in Oracle Database (Models and Rulebase’s).

- **Edit menu:**
  - **Copy:** Copies the text from the selected elements to the system clipboard.
  - **Copy All:** Copies the text from all result rows to the system clipboard.
- **Paste**: Paste content from the system clipboard into the query input area.
- **Undo**: Undo the last change.
- **Redo**: Redo the last change.

**Query menu:**
- **Execute**: Executes the current query.
- **Execute from file**: Executes a query from a file.
- **Example Query**: Sets an example query in the input area.
- **Previous Query**: Changes the query into the previous successfully executed one.
- **Next Query**: Changes the query into the next successfully executed one.
Selecting Database Models
To select a model, you must select *Select Model* from the Options menu.

A dialog will display all the ontologies that the current user can load from the database. After selecting and loading an ontology, the application will display the name of the ontology in the window title bar.

Once the model has been selected the user can start executing SPARQL queries. If the user did not choose a model and executes a query the application will display the models selection dialog in order to execute the query.
Selecting Database Attachments

To select attachments, you must select *Attachments* from the Options menu.

You will be shown a list of all available models and rulebase, which the current user has access to. To set the attachments you must choose the desired models and rulebase by selecting their respective checkbox. Selected elements will be displayed in a list below. Once selected, click the select button in order to save changes.

*Regular expressions are supported for the filters.*
Navigating Through Results

After a query is executed the results will be displayed in a table in which URI’s will be displayed using prefixes if available or hiding the prefix of the resource if a valid prefix is not found. To display the full URI the user can hover the mouse over the cell containing the desire element and the full blown URI will be displayed in a tooltip.

Results are shown in batches of 250 elements, distributed in 10 pages. To move between the batches of data the user needs to use the *Next Batch* and *Previous Batch* buttons and to move between the data in a batch the user can use the arrow buttons or the dropdown option.

The complete batch can be displayed by selecting the *Show All* button.

Generating Queries

After results of a query are displayed, the user can right click a cell and a menu will be displayed showing options to copy the full blown URI of the selected resource and an option to create a query that will return all information about the selected resource.

*If a user chooses to generate this query, it will be generated in the input area but not executed.*
**Cancel a Long Running Query**

Because some applications need to be able to terminate long-running SPARQL queries, a cancel option is included in the loading animation.

The query will also be terminated from the database side using a unique query ID (qid) value. Using the following Oracle prefix can set this ID:

```
PREFIX ORACLE_SEM_FS_NS: <http://example.com/semtech#qid=8761>
```

The qid attribute value is of long integer type. You can choose a value for the qid for a particular query based on your own application needs.

If the user does not specify a qid in the query, the application will automatically generate one for the current query.
Apache License

Version 2.0, January 2004

http://www.apache.org/licenses/

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized
to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

You must give any other recipients of the Work or Derivative Works a copy of this License; and
You must cause any modified files to carry prominent notices stating that You changed the files; and
You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and
If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for
any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: HOW TO APPLY THE APACHE LICENSE TO YOUR WORK
To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[ ]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at

http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.