

# Crash Course on Protégé

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v1.2

## 1 Introduction

Protégé is an ontology editor. Its earlier versions (Protégé 3 and lower) were used for creating ontologies in frame-based formalisms. The third and fourth major versions of Protégé allows creating OWL (Protege 3) and OWL 2 (Protege 4), respectively. The software is open-source and downloadable from <http://protege.stanford.edu>.

### 1.1 Web Ontology Language (OWL) in a Few Sentences

Description logics (DLs) provide logical and reasoning calculus to OWL ontologies. Yet, in order to be practical, OWL is much richer.

- OWL contains, in addition to *object properties* (corresponding to description logics roles), also *data properties* that connect individuals to basic data (like strings, or integers) and allow reasoning about them, and *annotation properties* that connect any **entity** (class, object property, data property, annotation property, data type, individual) to a any other entity or basic data and *without the possibility* to reason about them.
- OWL identifies all entities with URIs in order to be addressable in the semantic web space.

There is much more about OWL. Please look at <http://www.w3.org/TR/owl2-primer>.

### 1.2 Correspondence between DLs and OWL

There is different terminology, as well as different syntax, between DLs and OWL.

#### 1.2.1 Terminology

As for the terminology, here is the correspondence between OWL terms and DL terms:

description logics	OWL
<b>concept</b>	<b>class</b>
<b>role</b>	<b>object property</b>
<b>constant/individual</b>	<b>individual</b>
<b>theory</b>	<b>ontology</b>
<b>axiom</b>	<b>axiom</b>

### 1.2.2 Syntax

As for the syntax, OWL uses many serializations and syntaxes. E.g. the OWL file you download in Section 3, is RDF/XML serialization of the OWL ontology. Protégé parses various serializations and shows up the OWL ontology in so called Manchester Syntax (see <http://www.w3.org/TR/owl2-manchester-syntax>). The Manchester syntax tries to keep the axioms readable for non-experts in description logics. Here are the most important parts of the translation:

description logics syntax	Manchester syntax (OWL in Protégé)
$C_1 \sqsubseteq C_2$	$C_1$ <b>SubClassOf</b> $C_2$
$C_1 \equiv C_2$	$C_1$ <b>EquivalentTo</b> $C_2$
$C_1 \sqsubseteq \neg C_2$	$C_1$ <b>DisjointWith</b> $C_2$
$R_1 \sqsubseteq R_2$	$R_1$ <b>SubPropertyOf</b> $R_2$
$\neg C$	<b>not</b> $C$
$C_1 \sqcup C_2$	$C_1$ <b>or</b> $C_2$
$C_1 \sqcap C_2$	$C_1$ <b>and</b> $C_2$
$\exists R \cdot C$	$R$ <b>some</b> $C$
$\forall R \cdot C$	$R$ <b>only</b> $C$
$\exists R \cdot \{i\}$	$R$ <b>value</b> $\{i\}$
$(\geq 2 R C)$	$R$ <b>min</b> 2 $C$
$(\leq 2 R C)$	$R$ <b>max</b> 2 $C$
$R^-$	<b>inverse</b> $R$

## 2 Installation

- Download and install Protégé 4.3 from <http://protege.stanford.edu/download/registered.html>. You need to use Java SE 6 or 7.
- Install the Pellet Reasoner Plug-in (more info at <http://clarkparsia.com/pellet/>). Go to Preferences → Plugins and change the Plugin registry to <https://raw.githubusercontent.com/Complexible/pellet/master/protege/plugin/plugins.repository>. You will need to restart Protege before the repository change is taken into account (a Protege bug).

### 3 Short tutorial

- Download the Pizza Ontology from the following URL: <http://protege.stanford.edu/ontologies/pizza/pizza.owl>.

- Run Protégé and open the Pizza ontology.

- You will see an application window with several tabs – become familiar namely with the Entities, Classes, Object Properties and Data Properties window:

**Active Ontology** – here, you can find the information about ontology metrics (number of classes, object properties, data properties, axioms) and the corresponding description logic expressiveness, the ontology uses (in the case of *pizza.owl* you should see *SHOIN*).

**Entities/Classes** – here, you will probably spend most time when working with Protégé. Left, you can see a class hierarchy (subsumption axioms rendered as a tree) before classification (Asserted class hierarchy) and after classification (Inferred class hierarchy). In the central part, there are details about the class selected in the left tree – specific annotations, axioms in which this class participates.

**Object/Data Properties/Individuals** – analogous to Classes view.

**OWLViz** – shows simple and intuitive visualization of TBox.

**DL Query** – allows posing simple ontological queries, e.g. “Find all subclasses/instances/... of the given class”.

- Try classifying the ontology – go to the menu “Reasoner”, choose Pellet, or FaCT++, or HermiT and select the “Start reasoner” menu item. Look what are the differences before (Asserted class hierarchy) and after (Inferred class hierarchy) the classification.

### 4 Other Relevant Resources

- Ontology Modeling Tutorial with Protégé:  
[http://protege.stanford.edu/publications/ontology\\_development/ontology101.pdf](http://protege.stanford.edu/publications/ontology_development/ontology101.pdf)
- Getting Started with Protégé 4:  
<http://protegewiki.stanford.edu/index.php/Protege4GettingStarted>
- A Practical Guide to Building OWL Ontologies Using Protégé 4 and CO-ODE Tools, Ed. 1.3,  
[http://owl.cs.manchester.ac.uk/tutorials/protegeowltutorial/resources/ProtegeOWLTutorialP4\\_v1\\_3.pdf](http://owl.cs.manchester.ac.uk/tutorials/protegeowltutorial/resources/ProtegeOWLTutorialP4_v1_3.pdf)
- A list of ontology authoring and management tools,  
<http://www.mkbergman.com/862/the-sweet-compendium-of-ontology-building-tools>.