

# The Protégé OWL Plugin

Holger Knublauch, Stanford Medical Informatics  
[holger@smi.stanford.edu](mailto:holger@smi.stanford.edu) – <http://protege.stanford.edu/plugins/owl>

## 1 Motivation

The OWL Plugin extends Protégé with support for the Web Ontology Language (OWL). OWL is an official W3C standard in the context of their Semantic Web initiative. The vision of the Semantic Web is to build a network of ontologies and Web resources that use these ontologies to provide more intelligent Web services than possible with the current internet. Basically, OWL is used to represent domain concepts and relationships in a form that is comprehensible to machines and humans. OWL ontologies supply intelligent agents with background knowledge so that they can perform better informed reasoning. The rapidly growing interest in OWL is documented in the success of recent Semantic Web conferences, and also in the growing user community of the Protégé OWL Plugin. While this abstract only provides a very brief overview, you are encouraged to check the OWL Plugin's web site for additional publications about it.

## 2 Some Features of the OWL Plugin

The OWL Plugin is a complex Protégé extension consisting of storage formats, custom-tailored graphical widgets, new reasoning capabilities, and its own API. We have taken care to integrate all these features as good as possible with the Protégé core system, so that many existing Protégé components can also be used under OWL.

### 2.1 Loading and Saving OWL Files and Databases

The OWL Plugin can read and write OWL files in various formats, including XML/RDF, N3 and N-Triple. Partial support for the OWL Abstract Syntax is available (currently write-only). The OWL Plugin is also able to read, edit and write RDF(S) ontologies. Note that since the Semantic Web vision is strongly based on linking ontologies through ontology inclusion, the OWL Plugin allows users to directly import existing ontologies from the Web. Beside these file-based formats, the system can be used to create large OWL/RDF databases, using Protégé's native database support. The system has been successfully tested with ontologies with tens of thousands of classes.

### 2.2 Editing OWL Ontologies

OWL is a very rich ontology language with more built-in semantics than related languages such as Protégé's OKBC. In particular, it is possible to define classes by their logical characteristics by means of so-called class descriptions. For example, the class Parent can be defined to consist of all Animals that have at least one child. The OWL Plugin uses a symbolic notation for these expressions, and provides comfortable editors for expression editing. Beside this it provides several custom-tailored widgets for editing annotations, superclasses, equivalent classes, disjoint classes, property restrictions, domains, ranges, XML schema datatypes, etc. Some of these can be seen in Figure 1.

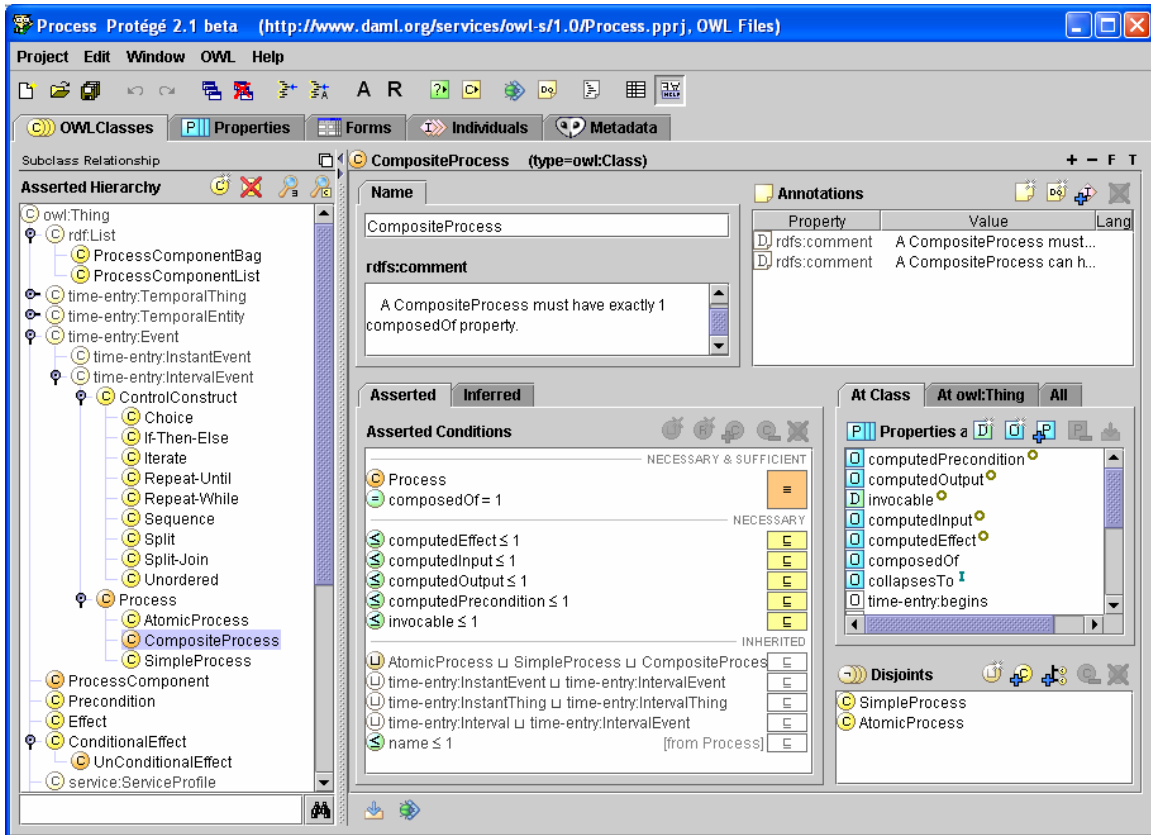


Figure 1: The Classes tab of the OWL Plugin provides custom-tailored editors for OWL expressions

## 2.3 Reasoning and Classification

A cornerstone of OWL is its foundation on description logics. The well-defined semantics of description logics can be exploited by reasoners such as Racer or FaCT to find inconsistencies and misclassifications, and to reveal misunderstandings. The OWL Plugin provides access to these reasoners by means of “check consistency” and “classify” buttons. The results of the classification are shown in separate trees as shown in Figure 2.

## 3 Architecture of the OWL Plugin

As illustrated in Figure 3, the OWL Plugin extends the core Protégé system. Protégé’s metamodeling architecture allows users to build new languages on top of it. We have exploited this capability to define the additional meta-classes of OWL (such as owl:ObjectProperty and the logical class definition types). The OWL Plugin provides its own API with optimized support for handling OWL ontologies. As a result, the Protégé OWL Plugin can serve as an extensible platform for custom-tailored OWL-based services such as OWL-S web services or SWRL rules.

## 4 Outlook

Since its first beta releases in late 2003 the OWL Plugin has become a de-facto standard tool in the Semantic Web community. Many users from around the world have it in routine use, and several developers are writing plugins on top of the OWL Plugin. The

increased expressiveness of OWL compared to traditional frame-based systems make OWL an interesting alternative to projects that aim at building semantically rich domain knowledge representations.

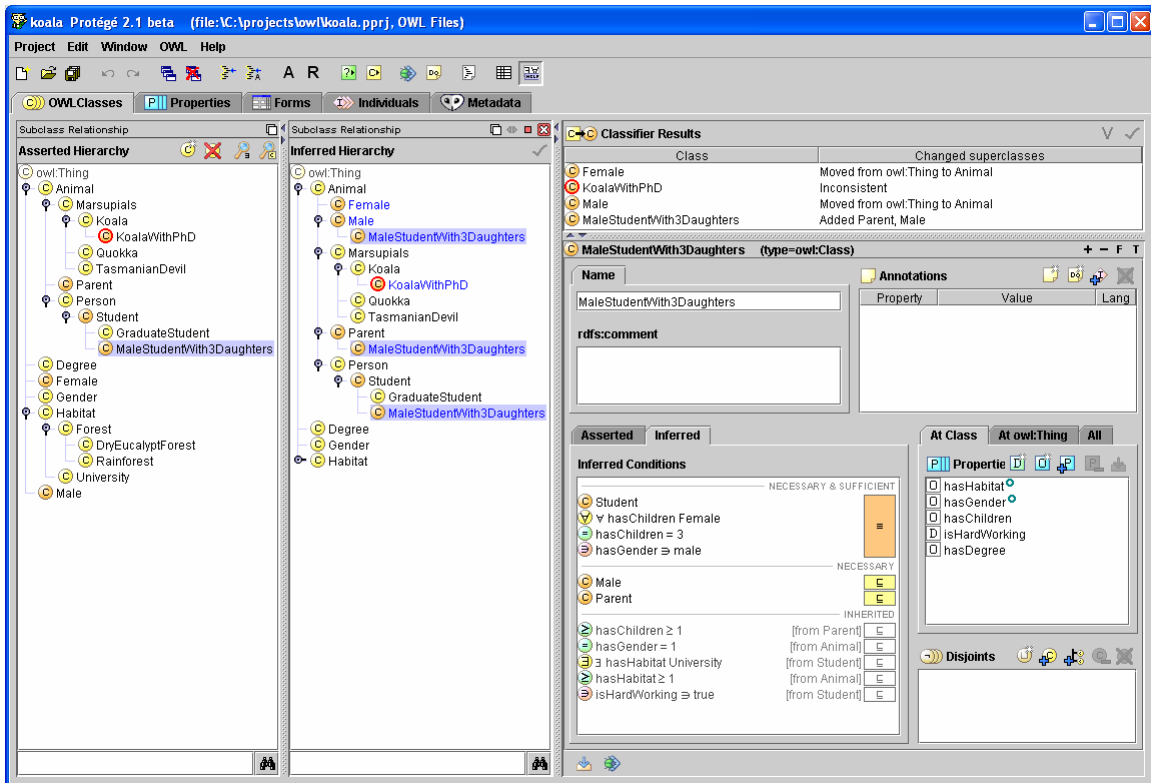


Figure 2: The OWL Plugin can be used to invoke classifiers and to compare classification results

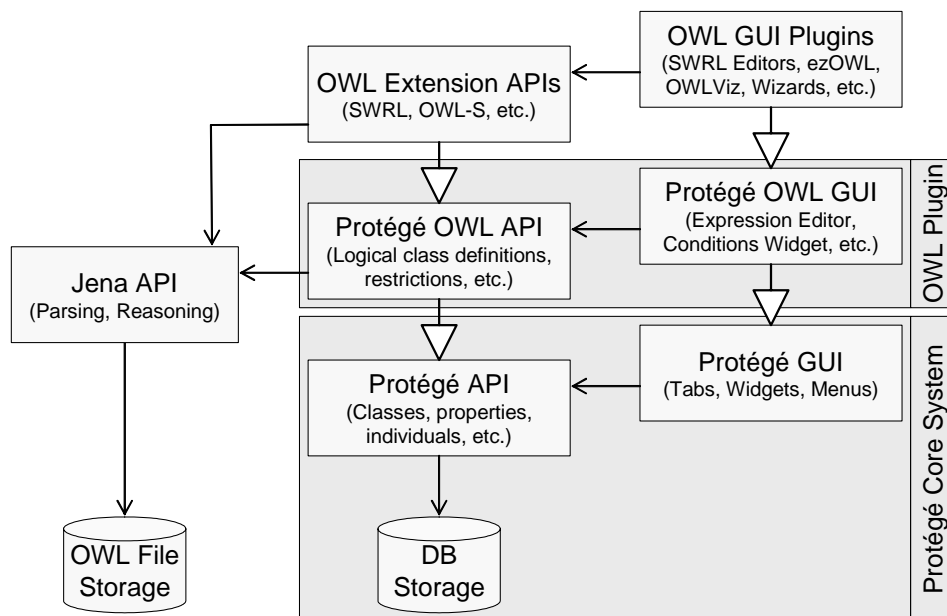


Figure 3: The OWL Plugin's architecture is an extension of the Protege core system