

Introducing WebProtégé 2 as a Collaborative Platform for Editing Biomedical Ontologies

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ABSTRACT

We present WebProtégé 2, a Web-based tool for the collaborative editing of OWL ontologies. WebProtégé 2 is “Google docs” environment for ontologies which allows users to create and upload ontologies. It contains various tools that are designed to support collaborative ontology editing such as ontology change tracking, watches, notifications and issue tracking. Users can download a snapshot of an ontology at any point. In addition to this WebProtégé 2 also features a simple user interface that offers quick and easy editing of commonly used OWL 2 axiom and class constructors. This interface works particularly well for biomedical ontologies which typically fall into the lightweight OWL2EL profile. WebProtégé 2 is available to use at <http://webprotege.stanford.edu>.

1 INTRODUCTION AND BACKGROUND

The Web Ontology Language (OWL 2) is a W3C recommendation for representing ontologies and is the most widely used ontology language today. Many biomedical ontologies are written using OWL 2, indeed, with the availability of tools to translate between the OBO and OWL 2 and greater availability of OWL tools, more and more ontologies are being developed in this standard. The Protégé ontology-development environment is the most widely used freely available tool for OWL ontology development. We have been expanding Protégé capabilities to support web-based collaborative development of ontologies. In this demo, we present WebProtégé 2, our latest tool which has several key new features: It serves as a “Google docs” environment for ontologies, enabling users to upload their ontologies in order to enable their collaborators to participate in the development and to initiate new ontology projects. WebProtégé 2 is also the first collaborative tool to support OWL 2. Finally, because many of scientists in general, and biomedical experts in particular, who contribute to ontology development are not ontology experts themselves, we have created a simple user interface in WebProtégé 2, which makes describing classes or updating information as simple as filling out a web form.

2 WEBPROTÉGÉ 2: MAIN FEATURES

Consider the following scenario: A biomedical scientist needs to develop an ontology to describe data on brain development—a subject that is not well covered by biomedical ontologies today in repositories such as BioPortal. She logs in to WebProtégé 2 and creates a new project for her ontology. She can then “share” this project, adding the names of her collaborators whom she wants to contribute to the ontology to the list of those who can access her

ontology. Now, any time this scientist or any of her collaborators log into WebProtégé 2, they can see their ontology under development. As one of them creates or edits a class, others can see the changes immediately. They can comment on the changes and carry out discussion write in the tool—with the discussions linked to the class that they are discussing. If they log in after a few days, they can see the summary of changes to the ontologies and classes on their “watch list.” As the project matures, they can invite others to participate and comment or choose to publish the ontology in a public repository for the broader community to use. They can access and process their ontology using any other tools that can understand the OWL 2 standard, such as reasoners, visualization tools, and query tools.

This scenario relies on several new features that we have introduced in WebProtégé 2 and that we detail in the rest of this section.

2.1 “Google docs” for ontologies

WebProtégé 2 is a Web application. Users do not need to install anything—they create and edit ontologies in their Web browser. We use the “Google docs” analogy because WebProtégé 2 assumes a very similar metaphor. When a user logs in, she sees the ontologies that she owns and administers, the ontologies that other users shared with her, and ontologies that are visible to everyone. Thus, users have complete control of who has access to their ontology and we expect that the access policy for each ontology might change as it matures. For each user with whom the ontology owner shares the ontology, she can choose whether that collaborator can only view the ontology, comment on it, or edit it.

Users can also upload OWL 2 ontologies that they have developed elsewhere or that their colleagues shared with them.

2.2 OWL 2 support

WebProtégé 2 is underpinned by the OWL API, the de-facto standard API for working with OWL 2 ontologies meaning it “natively” supports OWL 2. The configurable user interface supports class expression editing in a similar way to Protégé 4, giving users access to the full power of the language.

2.3 Collaboration Tools

WebProtégé 2 has various built in tools that are designed to support collaborative ontology editing. In particular:

- **Change tracking**—WebProtégé 2 tracks changes to all ontologies in a project. The changes made can be viewed in a number of ways including viewing changes over a particular

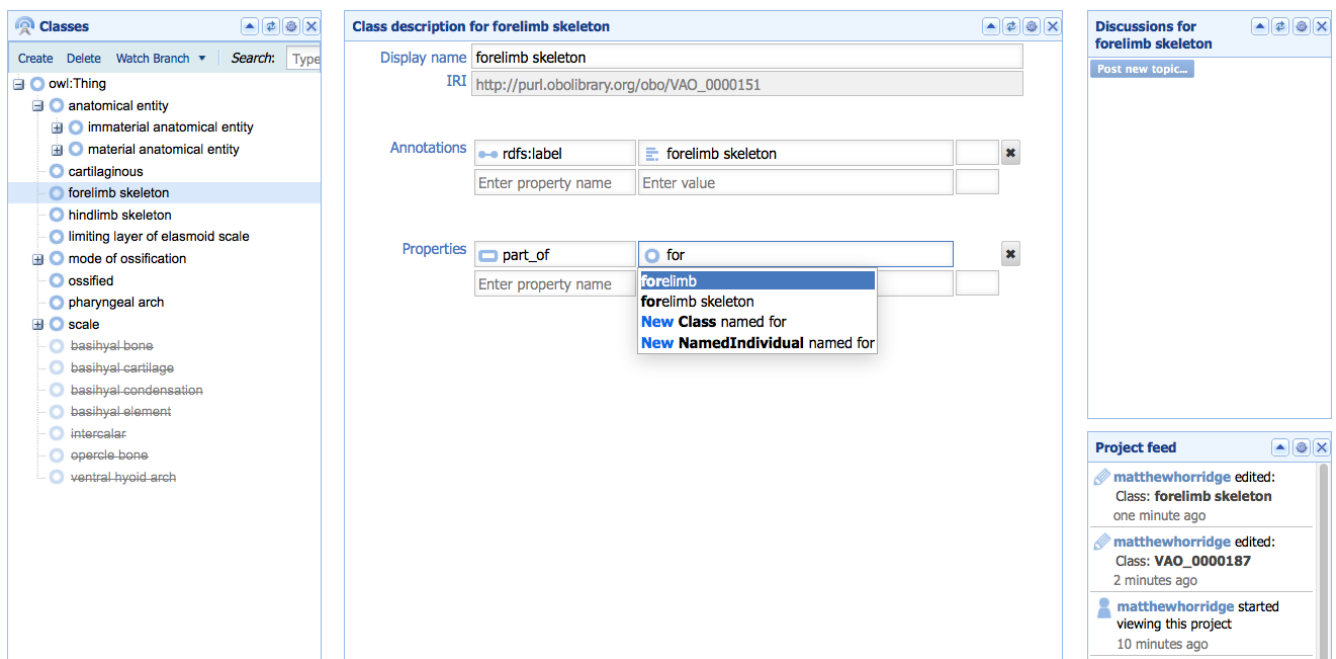


Fig. 1. A screenshot of a WebProtégé 2.2 screen for editing a class in OWL.

time period, viewing changes made by a particular author, or viewing changes that affect a particular entity (class, property, individual etc.).

- **Revision based change application**—Since WebProtégé 2 has a powerful change tracking mechanism it is possible to download a snapshot of an ontology at any point since it was created or uploaded. Typical revision based operations such as rollback are also supported.
- **Watches**—Users can “watch” ontologies for changes. They can watch changes that affect specific entities, subclasses of a given class, or watch ontologies in their entirety. When changes occur that fall into a scope of a watch, the user for that watch is notified via email.
- **Discussions**—WebProtégé 2 supports threaded discussions for entities and change sets. Users can use discussions to raise and manage issues.

2.4 Simplified Ontology Editing

Finally, we have expended significant effort to make WebProtégé 2 an easy-to-use OWL editor for the majority of our users in the biomedical domain. Figure 1 shows a screen capture of this user interface which allows users to edit ontologies in a simple looking Web-form. This user interface captures commonly used OWL class expression and axiom constructors, in particular those used in biomedical ontologies, and obviates the need for users having to learn a special OWL syntax. The interface is fast and easy to use

with context sensitive auto-completion and support for on-the-fly object creation.

3 DISCUSSION

We envision that not every user in biomedical informatics would want to edit their ontology on our server. There can be proprietary, privacy-related, or other reasons for keeping the ontology on a server behind a firewall, for example. For these users, we distribute WebProtégé 2 as a `war` file, which they can install on their own web server. Our wiki page has detailed installation instructions.

Finally, while our default OWL 2 configuration by design provides a very simple form for editing ontologies, one of the key Protégé features is the ability of user to customize the user interface in many different ways. Users can choose which components they see on the screen, specific widgets, or renders, for various components. For example, a project administrator may choose to limit the view of some of the users only to classes and annotation properties, or not to display notes and comments for another set of users. Essentially, every component on the screen is customizable.

Since we released WebProtégé 2 as a beta release, we have over 500 new ontologies that our users have created or uploaded; and over 300 new user accounts.

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