A Prototype DAML+OIL Ontology IDE

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Introduction

The emergence of the Semantic Web opens up boundless possibilities by enabling agents to reason about its content and provide rational responses to unanticipated situations. However [Lassila & McGunniess, accessed 2001] observes that acceptance by the mass (people outside the KR community) is critical to the success of the Semantic Web. Looking back at the Web revolution of the nineties, we see that there were at least two key enablers of its mass acceptance. One was the standardization and global acceptance of HTML and the related protocols and the other was the free availability of universal and easy to use Web processing tools like Netscape. Similarly, in the case of the Semantic Web, considerable development and standardization effort is resulting in the evolution of DAML+OIL as the de-facto ontology language. However, at present, most of the native DAML+OIL processing tools are built by KR specialists for KR specialists. As a result they do not attempt to hide the details of an ontology building task from the user. The situation can be compared to the "edit code - compile it - link it - load it and then run it" days of programming. It is conceivable that an integrated development environment (IDE) to handle DAML+OIL ontology building details (such as creating, locating, reusing, merging, validating) will add to the appeal of the Semantic Web. In this short paper, we describe a DAML+OIL ontology development project at Embry Riddle Aeronautical University (ERAU) where a prototype DAML+OIL IDE to support knowledge workers is presently being developed. We describe the project, identify its specific requirements - as related to ontology building, consider adaptation of a few available tools, and then present a high level description of the IDE under development.

The WOSE project

The Web-enabled Ontology of Software Engineering (WOSE) project at Embry Riddle Aeronautical University was conceived in an attempt to address the need for alternative approaches to collection, categorization and dissemination of software engineering body of knowledge (SwE BOK). The Joint IEEE and ACM Software Engineering Coordinating Committee has identified that achieving consensus by the profession on a core body of knowledge is crucial for the evolution of software development practices into a professional engineering discipline. There are many ongoing efforts to achieve this consensus [Hilburn, accessed 2000] but the successes have been very limited.

We propose an ontology driven approach to the SwE BOK development. It is interesting to note that although it seems that the use of ontologies should be an intuitive choice for representing an evolving body of knowledge, we did not find many applications of ontologies in this area. The knowledge acquisition community has used KA^2, a collaborative environment in developing a "research topic ontology" for the community [AIFB, accessed 2000].

The details of the WOSE project may be found at http://java-emporium.com/WOSE. One of the major tasks of the project is to enable geographically dispersed SwE BOK authorities to collaborate on building an initial DAML+OIL ontology of SwE BOK. This involves development of the DAML+OIL IDE. Details of the project tasks may be found at http://java-emporium.com/WOSE/Tasks.html.

WOSE specific requirements

The knowledge workers in the WOSE project are faculty members and practitioners with experience in software engineering, but not necessarily with much interest in KR intricacies. Given this background, we have identified the following requirements for the IDE:

- **Reuse**: We would want the tool to explicitly encourage the user to start from one or more existing ontologies. We will provide search and visualization support to facilitate this.
- **Diagnostic**: We would want the tool to identify and report the logical inconsistencies of ontology merges. It should also provide validation support of a new ontology.

- **Remote ontology access**: We would want the tool to access URIs of DAML+OIL files
- **Visual Browsing:** We would want the tool to have a drag and drop merging facility and graph visualization support for the DAML+OIL ontologies.

Survey of the Existing tools in light of the requirements

Since there is no native DAML+OIL IDE [DAML , accessed 2001] we have looked at some other ontology building tools that may be adapted to suit our purpose. All of the tools that we looked at support DAML+OIL through some export/import or wrapper function. The following table shows the tools in terms of our requirements.

Requirements	*Ontoedit*	*OilEdit*	*Chimaera*	*Protégé*
Reuse	Some	Some	Some	Some
Diagnostics	Some	Some	Excellent	Some
Remote ontology access	None	None	Manual	None
Visual browsing	Some	Some	Some	Some

Since we did not have a clear winner, we have decided to develop a DAML+OIL IDE for the SwE BOK knowledge workers of the WOSE project.

Description of the tool

Functionally the tool integrates four existing DAML+OIL/ontology building resources namely the catalog of the DAML+OIL ontology library, the publicly accessible DAML+OIL ontologies on the Internet, ***Chimaera's*** diagnostic services and the DAML+OIL validator. The XML format of the DAML+OIL ontology library is used to present the user with a tree type rendering of information. The interface is a typical JTree rendering, with the left pane showing the tree and the right pane showing the content of each selected node. The selected node (a DAML+OIL ontology URI) will be displayed as a graph using techniques borrowed from RDF visualization. The user will be able to initiate a merge by dragging and dropping tree nodes. The ontologies will then be submitted to ***Chimaera*** (implemented using the OKBC API) and the results returned and automatically submitted for addition to the DAML+OIL library. The tool will also have an interface with the recently developed DAML+OIL validator. Please see http://students.db.erau.edu/~qasema/May15Arch.jpg for a functional diagram of the tool.

Since we are implementing an emerging technology we need a highly adaptable architecture. The software has frequent use of adapter objects to support this open architecture. The development is hosted on the sourceforge.net

Conclusion and future work

We expect the alpha version of the tool to be completed by mid-July. At that point we would want to validate the tool by:

- Giving the same ontology building task to two test subjects; one uses the IDE and the other uses a combination of the other tools
- Identifying a reuse metric (one that shows that Ontology X has better reuse than Ontology Y)
- Using this reuse metric to measure the improved reuse (if any)

Reference

[AIFB accessed 2000] http://www.aifb.uni-karlsruhe.de/WBS/broker/KA2.html Web site for Institut für Angewandte Informatik und Formale Beschreibungsverfahren accessed 2000

[DAML accessed 2001] http://www.daml.org/tools/wishlist.html accessed 2001

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