Semantic Web Framework for Development of Very Large Ontologies

Sergey Yablonsky

***Abstract*—This paper deals with the development of the Semantic Web framework for very large ontologies. The Semantic Web is often associated with specific XML-based standards for semantics, such as RDF and OWL. Application of lexical ontologies such as WordNet and others for different tasks on the Semantic Web requires their representation in RDF and/or OWL formats with possibility of the different ontology mappings, semantic workflows, services and other semantic technologies.**

***Index Terms*—Semantic Web, OWL, RDF, Resource Description Framework.**

I. Introduction

THE Semantic Web, a Web with the meaning**,** is often associated with specific XML-based standards for semantics, such as RDF[1] and OWL. If HTML and the Web made all the online documents look like one huge book, RDF, schema, and inference languages will make all the data in the world look like one huge database [1]. The Semantic Web Layer Cake (Fig.1) shows that there are different layers in the Semantic Web and that they do different things. Some of the layers can take different forms. Each of the layers is less general than the layers below.

RDF (Resource Description Framework) is a markup language for describing information and resources on the web. RDF represents data as a set of statements consisting of a 'subject', a 'predicate', and an 'object'. Each statement is also known as a 'triple' or a 'relationship'. The Subject and the Predicate are named resources. A resource is represented by a URI. The Object can be a literal or another resource, see Table I.

TABLE I
EXAMPLE OF RDF DATA

(Subject)	(Predicate)	(Object)
<SergeyYablonsky>	<name>	"Serge Yablonsky".
<SergeyYablonsky>	<email>	"serge_yablonsky@hotmail.com".
<SergeyYablonsky>	<PhDAdviser>	<AndreySukhonogov>.
<AndreySukhonogov>	<email>	<ASukhonogov@rambler.ru>.

Putting information into RDF files, makes it possible for computer programs ("web spiders") to search, discover, pick up, collect, analyze and process information from the web. The Semantic Web uses RDF to describe web resources.

Nowadays there exists a linked set of different Semantic Web resources as it is shown in Fig.2. In Fig.3 the Linking Open Data (LOD) Constellation is shown.

The objective of the Linking Open Data (LOD) community is to extend the Web with data commons by publishing various open datasets as RDF on the Web and by setting RDF links between data items from different data sources. All of the sources on these LOD diagrams are open data.

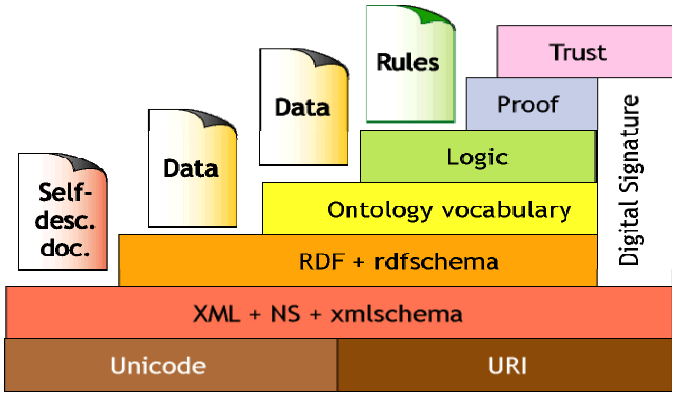

Fig. 1. The Semantic Web Layer Cake (http://www.w3.org/2000/Talks/1206-xml2k-tbl/slide10-0.html).

The Linking Open Data project is a community-led effort to create openly accessible, and interlinked, RDF Data on the Web. The data in question takes the form of RDF Data Sets drawn from a broad collection of data sources. There is a focus on the Linked Data style of publishing RDF on the Web. The project is one of several sponsored by the W3C's Semantic Web Education & Outreach Interest Group (SWEO).

OWL stands for Web Ontology Language. Web Ontology Language is designed to be used by applications that need to process the content of information instead of just presenting information to humans. OWL facilitates greater machine interpretability of Web content than that supported by XML and RDF by providing additional ology vocabulary along with a formal semantics. OWL is built on top of RDF. OWL has three increasingly-expressive sublanguages: OWL Lite (hierarchy with simple constraints), OWL DL (maximum expressiveness, computationally complete, compatible with Description Logics), and OWL Full (very expressive, no computation guarantees, RDF).

Among the most important Web resources are those that provide services. By "service" we mean Web sites that do not merely provide static information but allow one to effect some action or change in the world, such as the sale of a product or

Manuscript received November 15, 2008. Manuscript accepted for publication February 21, 2009.

Sergey Yablonsky is with Graduate School of Management, St. Petersburg State University, Information Technologies in Management Dpt., Volkhovsky Per. 3, St.-Petersburg, 199004, Russia**,** (e-mail: serge_yablonsky@hotmail.com).

[1] http://www.w3.org/RDF and http://www.w3.org/TR/owl-features