Chapter 8

OWL FOR THE NOVICE: A LOGICAL PERSPECTIVE

Jeff Z. Pan
Department of Computing Science, University of Aberdeen, UK

Abstract: In order to implement the Semantic Web vision, the W3C has produced a standard ontology language OWL (Web Ontology Language), which is largely based on Description Logics. OWL facilitates greater machine interpretability of Web content than that supported by XML, RDF, and RDF Schema (RDFS) by providing additional vocabulary along with a formal semantics. In this chapter, we aim at introducing some basic notions of OWL from a logical perspective. After presenting OWL in the context of the Semantic Web, this chapter will introduce the reader to the syntax and semantics of OWL and summarize the relations between RDF and OWL, in terms of syntax and semantics. Furthermore, it discusses the following questions that new users of OWL often ask: (i) What can OWL ontologies be used for? (ii) Are there any recent extensions of OWL? (iii) Are there any standard query languages that we can use to query OWL ontologies?

Key words: OWL, Description Logics, Ontology, extensions of OWL, query language.

1. HEADING FOR THE SEMANTIC WEB

In Realizing the Full Potential of the Web [5], Tim Berners-Lee identifies two major objectives that the Web should fulfill. The first goal is to enable people to work together by allowing them to share knowledge. The second goal is to incorporate tools that can help people analyze and manage the information they share in a meaningful way.

The Web's provision to allow people to write online content for other people is an appeal that has changed the computer world. This same feature that is responsible for fostering the first goal of the Web, however, hinders
the second objective. Much of the content on the existing Web, the so-called *syntactic Web*, is human but not machine readable. Furthermore, there is great variance in the quality, timeliness and relevance [5] of Web resources (i.e., Web pages as well as a wide range of Web accessible data and services) that makes it difficult for programs to evaluate the worth of a resource.

The vision of the Semantic Web (SW) is to augment the syntactic Web so that resources are more easily interpreted by programs (or 'intelligent agents'). The enhancements will be achieved through the *semantic markups* which are machine-understandable annotations associated with Web resources.

Encoding semantic markups will necessitate the Semantic Web adopting an annotation language. To this end, the W3C (World Wide Web Consortium) community has developed a recommendation called syntax and semantics of OWL Resource Description Framework (RDF) [31]. The development of RDF is an attempt to support effective creation, exchange and use of annotations on the Web.

![Figure 8-1. RDF annotations in a directed labeled graph](image)

**Example (Annotating Web resources in RDF)**

As shown in Figure 8-1, we can associate RDF annotation to http://example.org/Ganesh.html and state that it is the homepage of the resource Ganesh, which is an elephant and eats grasses. We invite the reader to note that the above RDF annotations are different from HTML [50] mark-ups in that they describe the contents of Web resources, instead of the presentations of Web pages.