Chapter II

Enabling Technologies for the Semantic Web

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Editors’ Notes

Kevin has a clear mission: to present the Semantic Web notion for everyone. While several of the aspects of the Semantic Web will be explained further in other chapters, readers unfamiliar with the Semantic Web issues should start thinking of the importance of the Semantic Web as an enabler of more effective intelligent knowledge and learning infrastructures. We have placed this chapter after the corporate learning environment chapter for obvious reasons. We want to converge two pillars of critical importance: on the one hand, leading and state-of-the-art research on theoretical foundations of the next generation knowledge and learning management; and on the other hand, leading edge technologies as those of Semantic Web.

This objective is present in every chapter of the book. We want theories and technologies to be applied in specific contexts toward the development of socio-technical systems aiming to provide a performance driven by knowledge and learning.

It is again worthy to mention, our involvement in the Special Interest Group on Semantic Web and Information Systems of the Association for Information Systems (http://www.sigsemins.org). We encourage you to visit our portal and consider becoming part of this community. An excellent point of reference for issues related to the Semantic Web is the AIS SIGSEMSIS Bulletin, the official quarterly newsletter of the AIS SIGSEMSIS, where research papers, research center presentations, and interviews of the leaders of SW provide important knowledge for the field. Moreover, the International Journal on Semantic Web and Information Systems published by IDEA Group Publishing, http://www.idea-group.com, sponsored by AIS SIGSEMSIS, provides leading edge research outcomes. It provides an excellent addition to your portfolio of scientific journals.
Abstract

Before understanding the Semantic Web and its associated benefits, one must first be somewhat familiar with the enabling technologies upon which the Semantic Web is based. The extensible markup language (XML), uniform resource identifiers (URIs), resource definition framework (RDF), ontologies, and intelligent agents are all key to the realization of the Semantic Web. Understanding these key technologies gives readers a firm foundation before progressing to subsequent chapters. This chapter provides a broad overview of each technology, and readers new to these technologies are provided with references to more detailed explanations.

Introduction

In its current form the Web makes effective searching and data exchange difficult. Today’s Web pages are designed for human use, and human interpretation is required to understand the content. The Web lacks the ability to automatically link documents on the basis of semantic similarities because content is not machine-interpretable (Lassila, 2002). This means that such linking requires human intervention to ascertain the semantic context and recognize similarities between documents. The American Heritage Dictionary (2000) defines semantics as the “meaning or the interpretation of a word, sentence, or other language form.” The critical term in this definition is meaning, and meaning requires understanding. Although computer software applications are unable to truly understand information, there are approaches that make it possible for applications to manipulate data “in ways that are useful and meaningful to the human user” (Berners-Lee, Hendler, & Lassila, 2001, p. 40). The Semantic Web is an extension of today’s Web in which documents are annotated in such a way that their semantic content is optimally accessible and comprehensible to automated software agents and other computerized tools. Thus, documents can be automatically linked on the basis of semantic similarities, eliminating the need for human reasoning to determine the meaning of Web-based data (Bonner, 2002).

There are several key technologies upon which the Semantic Web is reliant. The objective of this chapter is to introduce the reader to these concepts and to provide a brief overview of each (see Figure 1).

Background

Documents in the Semantic Web contain not only content, but also context. The meaning of the content is clearly specified so that documents can be linked to semantically similar documents to permit more effective discovery, automation, integration, and reuse across applications. “The Web will reach its full potential when it
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