Chapter IX

A Basis for the Semantic Web and E-Business: Efficient Organization of Ontology Languages and Ontologies

Changqing Li, National University of Singapore, Singapore
Tok Wang Ling, National University of Singapore, Singapore

Abstract

This chapter introduces how to effectively organize ontology languages and ontologies and how to efficiently process semantic information based on ontologies. In this chapter we propose the hierarchies to organize ontology languages and ontologies. Based on the hierarchy of ontology languages, the ontology designers need not bear in mind which ontology language the primitives exactly come from, also we can automatically and seamlessly use the ontologies defined with different ontology languages in an integrated environment. Based on the hierarchy of ontologies, the
conflicts in different ontologies are resolved, thus the semantics in different ontologies are clear without ambiguities. Also, these semantic-clear ontologies can be used to efficiently process the semantic information in Semantic Web and e-business.

Introduction

The Extensible Markup Language (XML) (Bray et al., 2004) developed by the World Wide Web Consortium (W3C) has recently emerged as a new standard for data representation and exchange on the Internet. However, the information exchange based on XML is at the syntactic level (Garshol & Moore, 2004). Nowadays, how to process and exchange semantic information becomes very important. Semantic Web and e-business are two important applications which need to process the semantic information. Semantic Web (Lee, 1999) means that the Web pages are annotated with the concepts (terms and relationships) from sharing ontologies; because Web information refers to the sharing ontologies, computers can automatically understand and process the semantic information. Similarly, when different partners (agents) of e-business refer to the sharing concepts in ontologies, they can semantically communicate with each other. This is a semantic e-business which is different from the traditional e-business. To process the semantic information, the traditional e-business is a person-to-person communication; now with ontologies the semantic communication of e-business partners is an agent-to-agent communication.

It can be seen that ontologies play a core role in processing semantic information. An ontology defines the basic terms and relationships comprising the vocabulary of a topic area, as well as the rules for combining terms and relationships to define extensions to the vocabulary (Gruber, 1993). How to organize ontologies and clearly define the semantics in ontologies are very important. Presently, the ontologies are built by different organizations for their own purposes, therefore we need to effectively organize different ontologies together with hierarchies, then the concepts of the ontologies can be efficiently used to annotate Web pages and e-business agents, and semantic information can be efficiently processed based on the well-organized ontologies.

To define ontologies, ontology languages are required. Ontolingua (Gruber, 1992) is an ontology interchange language which was proposed to support the design of ontologies. Loom (MacGregor, 1991), a knowledge representation system, is used to provide deductive support. We will further introduce the XML-based ontology languages in the “Background” section.

In this chapter, we propose hierarchies to effectively organize ontology languages and ontologies and discuss how to efficiently process semantic information in Semantic Web and e-business. The rest of this chapter is organized as follows. In
Related Content

Semantic Knowledge Transparency in E-Business Processes
[www.igi-global.com/chapter/semantic-knowledge-transparency-business-processes/28900?camid=4v1a](www.igi-global.com/chapter/semantic-knowledge-transparency-business-processes/28900?camid=4v1a)

Which Move to the Middle: Industry Consortia or Private Exchanges?
[www.igi-global.com/article/move-middle-industry-consortia-private/1857?camid=4v1a](www.igi-global.com/article/move-middle-industry-consortia-private/1857?camid=4v1a)

Privacy Factors for Successful Ubiquitous Computing
[www.igi-global.com/article/privacy-factors-successful-ubiquitous-computing/3922?camid=4v1a](www.igi-global.com/article/privacy-factors-successful-ubiquitous-computing/3922?camid=4v1a)
Managerial Succession and E-Business
www.igi-global.com/chapter/managerial-succession-business/41217?camid=4v1a