Chapter 7.2
Challenges on Semantic Web Services

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ABSTRACT

The promise of being able to support Business-to-Customer applications with a rapidly growing number of heterogeneous services available on the Semantic Web has generated considerable interest in different research communities (e.g., Semantic Web, knowledge representation, software agents). However, in order to overcome the challenges of the current Web services, new level of functionalities is required in order to integrate distributed software components using existing Semantic Web standards. In this chapter, the authors discuss and suggest insights into new solutions to the main challenges in the area of Semantic Web services: composition, discovery and trust. For the first problem they suggest to use program transformation coupled with services’ descriptions. For the second problem (discovery of Web services) a solution based on the authors’ mapping algorithm between ontologies is suggested. While, for the last problem a solution based on fuzzy voting model is outlined. Through the chapter, the authors work with an investing scenario, in order to illustrate our suggested solutions to these three challenges.

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INTRODUCTION

Web services technology has greatly advanced since its first emergence. Although, it has been adopted worldwide and is successfully used in the industry, it is still in the focus of attention of many research communities. The most active research is to automate interactions with and between Web services. One of the methods that may be used to achieve this is taking advantage of the semantic annotation of services and application of Semantic Web technologies, thus using Semantic Web services. A Semantic Web service (SWS) is defined as an extension of Web service description through the Semantic Web annotations, created in order to facilitate the automation of service interactions (McIlraith et al., 2001). These annotations are usually expressed using ontologies.

Ontologies are explicit formal specifications of the terms in the domain and the relations among them (Gruber, 1993). They provide the mechanism to support interoperability at a conceptual level. In a nutshell, the idea of interoperating Semantic Web services, being able to exchange information and carry out complex problem-solving on the Web, is based on the assumption that they share common, explicitly-defined, generic conceptualizations. These are typically models of a particular area, such as product catalogues or taxonomies of medical conditions. However, ontologies can also be used to support the specification of reasoning services (McIlraith et al., 2001; Fensel & Motta, 2001), thus allowing not only “static” interoperability through shared domain conceptualizations, but also “dynamic” interoperability through the explicit publication of competence specifications.

The promise of being able to support Business-to-Customer applications with a rapidly growing number of heterogeneous services available on the Semantic Web has induced a lot of interest within different research communities e.g. Semantic Web, knowledge representation, software agents. However, in order to overcome the challenges of the current Web services, new level of function-
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