

Semantic Web Services Discovery System with QoS for Enhanced Web Services Quality

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Abstract. Semantic Web Services are the key technology providing services for the users' convenience in the semantic web environment. Many companies in various fields are researching and developing languages for constructing Semantic Web Services such as DAML-S, WSDL, X-LANG and BPEL4WS. DAML-S is a method that accesses the existing Web Service method from a semantic web environment. However, the current Semantic Web Services Discovery System does not provide sufficient processing of quality factors (performance, accessibility, availability, reliability and transaction) nor reliable and accurate service results desired by the user through a UDDI search method. The present study analyzes the disadvantages of the current web services and suggests a Semantic Web Services Discovery System based on QoS applying semantic web technologies as a solution to the problems. The suggested system provides a UDDI and DAML-S based discovery engine to allow efficient web service discovery and composition.

Keywords: Semantic Web Services, QoS(Quality of Services), Information Retrieval, DAML-S(DAML+OIL Services), UDDI(Universal Description, Discovery, and Integration).

1 Introduction

Semantic Web Services enable discovery, execution and composition of automated web services by combining web services based on standards, such as SOAP, WSDL and UDDI, with semantic web technologies, such as RDF, DAML+OIL and OWL. The weak points of former methods have been improved to enable effective Web Services registration, search, organization, execution and composition [7].

However, DAML-S does not support automated web services yet. First, the system does not use the appropriate method for expressing the information with restrictions of conditions and it does not response to user's requests. Second, quality of service (performance, transaction and reliability) is insufficient.

For such reasons, this paper suggests the Semantic Web Services Discovery System to solve the problems. Suggested system is capable of searching for general web documents, UDDI and semantic web documents.

2 Methodologies for Web Services Quality Evaluation

2.1 Web Services Requirements for Quality Evaluation (Evaluation Factors)

The requirements for web service quality evaluation can be categorized as suggested in Table 1 below.

Table 1. Web Services Requirements for Quality Evaluation

Factor	Definition
Performance	Performance is a qualitative aspect that can be measured by execution time etc. The quantity that is processed during a certain period of time and the waiting time between the point of service request and reply.
Reliability	Reliability refers to the processed rate of the data transmitted during a certain period of time. The web service’s reliability is determined by the number of success and failure.
Transaction	The transaction technology plays a very important role in web service automation and is a prerequisite for realizing faultless web services. Transaction refers to the state of having every processed unit satisfy “ACID,” atomicity, consistency, isolation and durability

2.2 Problem Analysis of Former Research and Studies

Based on web services related quality evaluation factors, this section will deal with the problems with the current web services framework in the semantic web environment. The problems can be described largely in four aspects as outlined below.

Table 2. Problem Analysis of Web Services by Quality Evaluation Factors

Factor	Problem Analysis
Performance	Bottlenecks can occur due to limits of transmission protocols and messaging systems such as HTTP and SOAP. Also, other web services methods currently used do not process reliable messages and the waiting time, message processing and transferring time is too long resulting in poor performance.
Reliability	The current methods are not equipped with the base technologies for processing in the message sending and receiving ends, which is required for reliable messaging. Furthermore, they do not support standardization and interoperability.
Transaction	Lacks in monitoring functions for efficient web service support and fault preventing functions for preventing faults from occurring during execution.