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Semantic Web-Services or Semantic-Web Services?

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Abstract. The emergence of the Semantic Web together with the promise of Web Services, a new level of service on top of the current web is envisaged as the new silver bullet and considered as the next great cure-all for IT's ill. However, in order to employ their full potential, appropriate description techniques for such services need to be developed, and even though the future looks bright, promising and interesting, one should proceed with caution as potential pitfalls lie ahead. In this paper a brief overview of how to best ensue such issues is given, together with a personal clarification to which this paper is entitled.

1 Introduction

Academic and industrial bodies have been considering the issue of Web Services as being the next step forward in the area of eBusiness / eCommerce over the World Wide Web (WWW). A number of efforts have been made and are evolving, through the World Wide Web Consortium (W3C), to define standards, specifications and architectures for the spreading of this new breed of web applications. Tim Berners-Lee, Director of the W3C, referred to the future of the current WWW as the "Semantic Web" — an extended Web of machine-readable information and automated services that extend far beyond current capabilities. The explicit representation of the semantics underlying data, programs, pages, and other Web resources, will enable a knowledge-based Web that provides a qualitatively new level of service. Automated services will improve in their capacity to assist humans in achieving their goals by "understanding" more of the content on the Web, and thus providing more accurate filtering, categorization, and searches of information sources. This process will ultimately lead to an extremely knowledgeable system that features various specialized reasoning services. These services will support users in nearly all aspects of daily life — making access to information as pervasive, and necessary, as access to electricity is today. In this short paper we will highlight the main issues concerning a current debate around this research area, namely the uncertainty of differentiating between Web Services that are optimized using current semantic research enabled over the web (referred to as Semantic Web-Services) and Semantic Web enabled Web Services (referred to as Semantic-Web Services).

2 Where is the Dilemma?

Web Services basically involve three main issues, namely, the description language of such services, WSDL (Web Services Description Language); a protocol for communicating with the services, SOAP (Simple Object Access Protocol); and the UDDI, which is a registry where services are published. On the other hand Semantic Web offers an easier way to publish data that can be accessed and re-purposed as needed, thereby creating an ideal environment for higher level services over the web to become a reality. What is surely required, is a markup language that is descriptive enough that a computer can automatically determine its meaning. The following is a list of tasks such a language would be required to perform:

- Discovery: A program must first be able to automatically find, or discover, an appropriate Web service. Neither WSDL nor the UDDI allows for software to determine what a Web service offers to the client. A Semantic Web-Service describes its properties and capabilities so that software can automatically determine its purpose, while on the other hand a Semantic-Web service would be automatically understood in an already semantically-enabled web.
- Invocation: Software must be able automatically to determine how to invoke or execute the service. For example, if executing the service is a multi-step procedure, the software needs to know how to interact with the service to complete the necessary sequence. A Semantic Web-Service provides a descriptive list of what an agent needs to do to be able to execute and fulfill the service whereby the inputs and outputs of the service are discribed differing from a Semantic-Web Service.
- Composition: Software must be able to select and combine a number of Web services to complete a certain objective. The services have to interoperate with each other seamlessly so that the combined results are a valid solution.
- Monitoring: Agent software needs to be able to verify and monitor the service properties while in operation.

When Web markup languages evolve to the point that they can perform the above tasks, Web Services can begin to prosper. Semantic Web-Services can be considered to be all those Web Services that have and will continue to be developed before the Semantic Web itself becomes a reality. Once this second generation web is in place, then we can start developing real Semantic-Web Services.

3 Conclusion

There are many ways in which the two areas of Web Services and the Semantic Web could interact to lead to the further development of higher value-added Web Services. Berners-Lee has suggested that both of these technologies would benefit from integration that would combine the Semantic Web's meaningful content with Web Services' business logic.

Areas such as UDDI and WSDL are ideally suited to be implemented using Semantic Web technology. In addition, SOAP could use Resource Description Framework (RDF) payloads, remote RDF queries and updates, and interact with Semantic Web business rules engines, thereby laying the foundation for Semantic Web Services.

The W3C is engaged in building the Pyramid of Web Markup Languages, which starts with HTML and XML and continues upward to include RDF and the most recent Web Ontology Language (OWL). The off-spring of OWL is OWL for Services (OWL-S).

However, the technology issues of the Next Generation Web create many problematic questions like logic loops, syntax errors and trust-worthy published information, that must be solved before the full power and capability of the Semantic-Web Services are available.

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