

Electronic Services: Concepts, Methodologies, Tools and Applications

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and flexible behaviors and becoming mutually stronger when allied.

Semantic Web

One aim of introducing Web Services is to achieve machine-to-machine communication. With the basic Web Services technologies, this can be achieved at a certain level such as invocation between service requesters and service providers, but many other forms of communication, such as service discovery, service selection and service composition, cannot be accomplished efficiently and dynamically. With the development of Semantic Web technologies, such as ontologies, semantics can be used in conjunction with Web Services to offer better services.

Knowledge discovery is a key issue in distributed systems. Take service discovery in the Web Service world as an example—there may be many services that can solve a particular problem on the Internet, but how does one find them? Or, if someone has developed such a service, how can they let other people know about it? Further, as a customer, how can I tell which of the various available services is better than the others? These needs are very familiar to us in the real world and to resolve them, we read reviews, receive ‘word of mouth’ opinion, etc. The question is, how can we achieve this in the cyber world?

Web Services within the basic SOA concept can solve some of these problems. For example, service providers hide functionalities through service interfaces and publish machine-readable descriptions of their services in publicly accessible registries. Service consumers discover these services by querying the registry and bind to the selected services dynamically.

The Semantic Web has made further strides towards solving this problem. It is an evolution of the World Wide Web in which information is machine processable (rather than being only human oriented), thus permitting browsers or

other software agents to find, share and combine information for us more easily.

Data and the relationships among the data are well understood by the machines that process them. This allows the machines to do more than simply display the requested web pages to the user; software will be able to analyze and process metadata—data about the data—to find the best pages to display to a particular user or to deliver to another machine.

Data that is generally hidden away in HTML files is often useful in some contexts, but not in others. The majority of data on the Web is in this form at the moment, which makes it difficult to use on a large scale, because there is no global system for publishing data in such a way that it can be easily processed by anyone.

The main problem with the use of standards for Web Service description (e.g. WSDL) and publishing (e.g. in this case, a semantic broker) is that the syntactic definitions used in these descriptions do not completely describe the capacity of a service and cannot be understood by software programs. It requires a human to interpret the meaning of inputs, outputs and applicable constraints as well as the context in which the services can be used.

Semantic Web Services (SWS) research aims to automate the development of Web-Service-based applications through Semantic Web technology. By providing formal representations based on ontologies, we can facilitate the machine interpretation of Web Service description. Thus, a business organization can view a Semantic Web Service as the basic mechanism for integrating data and processes across applications on the Web.

WEB SERVICE AVAILABILITY

The term “*availability*” indicates whether a service is ready to respond immediately to a request, or not (Erradi, Padmanabhuni & Varadharajan, 2006). This is useful for some busy and popular services within a system—for example, a con-