CS551 – Paper Critique
Student Name - Dhananjay Indurkar
Email ID: di5x7@umkc.edu

What are Web Services?

By Christopher Ferris and Joel Farrell, IBM
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Fulfilling the Web Services Promise

By Heather Kreger, IBM
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Summary of the papers

The authors present a formal definition of a Web Service and further refinements to it. They then discuss the service-oriented architecture by identifying the key elements - service provider, service requestor and the service discovery services.

The second paper does a comparative study of the technologies necessary for Web Services implementation. It enumerates the standard and specifications areas for Web Services, and the challenges being faced in the technical implementation. It reviews the underlying technologies in each of the three sections in the Web Services stack – interaction (between the service provider and the service requester), description of the service and the discovery agencies. Suggestions to make the future Web Services even better than their current implementation are include.

The Web Services stack originates at the lower level of the protocol stack and builds up from TCP/IP (wire layer as the author calls it) to XML and SOAP (the Description layers). The description block describes service-specific information such as the taxonomy of that particular Web Service, security requirements and cost and quality parameters. It contains the presentation layer that describes the user-interface for the given Web Service. The bottom-up ordering is - XML schema, interface description, implementation description and the policy and presentation layers. Next group in the description block consists of the orchestration, composition layers and the service and business level agreements.

The discovery agencies form the topmost part in the Web Services stack. The technologies identified with them have their role in enabling service descriptions before they are published, support the discovery of such descriptions and provide inspection and monitoring services on the sites that host these services. The layers of the stack transparent from the outside view handle the security, management and quality of service parameters and issues. The technologies used in each layer of the Web Services stack combine to form a complete infrastructure for use in B2B and Enterprise Application Integration (EAI).

Standards for the wire stack are derived from the network and messaging layers of the Internet. Bindings between the wire stack and the existing message queue technologies and message-oriented middleware have been developed for improved reliability and performance while keeping intact the interoperability and loose coupling achieved with XML and SOAP.

For the Description Stack, the WSDL is used to provide the standard interface (port numbers) and implementation description. The next generation of WSDL targets these areas and is expected to be completed by the end of year 2003. Multiple platforms already have included a support for specifications that are in the WSDL format.

The Discovery Agencies stack is mapped to a Universal Description Discovery and Integration (UDDI) for publication and discovery. Joint work by IBM and Microsoft on another standard, Web Services Inspection Language (WS-Inspection) is underway.
Primary security concerns with the Web Services model are identified in the Web Services Security Roadmap. The security specification in the Roadmap outlines a message security model with some additional security specifications.

Web Services interfaces must be defined and standardized. One of the critical infrastructure standards that should be completed first is security. The WS-Security working group is working its way through it. Another infrastructure element of critical importance is the business process automation (BPO). IBM, Microsoft and BEA are doing considerable work in this area.

Of the least developed standards are the management and quality-of-service (QoS) because of several aspects needing careful analysis.

Strength

Web services make it possible for service providers and vendors to sell their services by publishing their availability over the World Wide Web.

Benefits of the web services include the decoupling of service interfaces from implementations and platform considerations, the ability to perform dynamic service binding and a move closer to cross-language, cross-platform interoperability. These benefits originate from the standard XML interface and access descriptions given by the WSDL (Web Services Description Language). The WSDL description is helpful in enterprise application integration, B2B integration and grid computing.

Web services can bring together applications running on diverse platforms, enable database information exchange and allow applications originally meant for internal use be made available through the Internet. Web services have also found a good market when they are developed as utilities or as pay-per-use program components.

Weakness

The web services framework relies extensively on the discovery agencies to advertise their presence. A poor implementation of the discovery mechanism would result in a big setback to the web service's reach to its intended customers and markets.

The Interoperability specifications have not been fully prepared yet. The Web Services Interoperability Organization needs to put up the upcoming standards for interoperability of Web Services fairly quick. These still evolving infrastructure standards must be finished and deployed to have other layers and components begin building their framework over them.

Interesting Points

The concept of publishing the service and its availability is a new approach to marketing of software artifacts. Also of interest is the mechanism that the discovery agencies use to find out the existence and availability of the desired service.

Even when some of the important layers in the Web Services stack have not been fully standardized, the current state of support for Web Services provides an excellent application integration technology.

Critical Questions

1. How is the service discovery accomplished?

2. Does requiring the web service description adhere to a particular description language like WSDL affect its ability to target a larger audience?

3. How well a service is advertised depends not only on the WSDL description but to a large extent also on the efficacy of the discovery agencies to which this description is published to.

4. Tight binding amongst the interacting components of the Web Service and extensive support for interoperability in the middleware area, the development tool and environment level is required.