WEB SERVICES

web application components

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About the Tutorial

Web services are open standard (XML, SOAP, HTTP, etc.) based web applications that interact with other web applications for the purpose of exchanging data. Web services can convert your existing applications into web applications.

In this tutorial, you will learn what exactly web services are and why and how to use them.

Audience

This tutorial will be useful for all those readers inclined to learn the basics of web services and implement them in practice.

Prerequisites

This is an elementary tutorial that introduces the concepts of web services. It does not require the readers to have a prior knowledge of any technology in particular, however it would certainly make you comfortable if you have a basic understanding of XML, HTTP, TCP/IP concepts.

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1. What are Web Services?

Different books and different organizations provide different definitions to Web Services. Some of them are listed here.

- A web service is any piece of software that makes itself available over the internet and uses a standardized XML messaging system. XML is used to encode all communications to a web service. For example, a client invokes a web service by sending an XML message, then waits for a corresponding XML response. As all communication is in XML, web services are not tied to any one operating system or programming language—Java can talk with Perl; Windows applications can talk with Unix applications.
- Web services are self-contained, modular, distributed, dynamic applications that can be described, published, located, or invoked over the network to create products, processes, and supply chains. These applications can be local, distributed, or web-based. Web services are built on top of open standards such as TCP/IP, HTTP, Java, HTML, and XML.
- Web services are XML-based information exchange systems that use the Internet for direct application-to-application interaction. These systems can include programs, objects, messages, or documents.
- A web service is a collection of open protocols and standards used for exchanging data between applications or systems. Software applications written in various programming languages and running on various platforms can use web services to exchange data over computer networks like the Internet in a manner similar to inter-process communication on a single computer. This interoperability (e.g., between Java and Python, or Windows and Linux applications) is due to the use of open standards.

To summarize, a complete web service is, therefore, any service that:

- Is available over the Internet or private (intranet) networks
- Uses a standardized XML messaging system
- Is not tied to any one operating system or programming language
- Is self-describing via a common XML grammar
- Is discoverable via a simple find mechanism

Components of Web Services

The basic web services platform is XML + HTTP. All the standard web services work using the following components:

- SOAP (Simple Object Access Protocol)
- UDDI (Universal Description, Discovery and Integration)

- WSDL (Web Services Description Language)

All these components have been discussed in the Web Services Architecture chapter.

How Does a Web Service Work?

A web service enables communication among various applications by using open standards such as HTML, XML, WSDL, and SOAP. A web service takes the help of:

- XML to tag the data
- SOAP to transfer a message
- WSDL to describe the availability of service.
- You can build a Java-based web service on Solaris that is accessible from your Visual Basic program that runs on Windows.
- You can also use C# to build new web services on Windows that can be invoked from your web application that is based on JavaServer Pages (JSP) and runs on Linux.

Example

Consider a simple account-management and order processing system. The accounting personnel use a client application built with Visual Basic or JSP to create new accounts and enter new customer orders.

The processing logic for this system is written in Java and resides on a Solaris machine, which also interacts with a database to store information.

The steps to perform this operation are as follows:

- The client program bundles the account registration information into a SOAP message.
- This SOAP message is sent to the web service as the body of an HTTP POST request.
- The web service unpacks the SOAP request and converts it into a command that the application can understand.
- The application processes the information as required and responds with a new unique account number for that customer.
- Next, the web service packages the response into another SOAP message, which it sends back to the client program in response to its HTTP request.
- The client program unpacks the SOAP message to obtain the results of the account registration process.

2. Why Web Services?

Here are the benefits of using Web Services:

Exposing the Existing Function on the Network

A web service is a unit of managed code that can be remotely invoked using HTTP. That is, it can be activated using HTTP requests. Web services allow you to expose the functionality of your existing code over the network. Once it is exposed on the network, other applications can use the functionality of your program.

Interoperability

Web services allow various applications to talk to each other and share data and services among themselves. Other applications can also use the web services. For example, a VB or .NET application can talk to Java web services and vice versa. Web services are used to make the application platform and technology independent.

Standardized Protocol

Web services use standardized industry standard protocol for the communication. All the four layers (Service Transport, XML Messaging, Service Description, and Service Discovery layers) use well-defined protocols in the web services protocol stack. This standardization of protocol stack gives the business many advantages such as a wide range of choices, reduction in the cost due to competition, and increase in the quality.

Low Cost Communication

Web services use SOAP over HTTP protocol, so you can use your existing low-cost internet for implementing web services. This solution is much less costly compared to proprietary solutions like EDI/B2B. Besides SOAP over HTTP, web services can also be implemented on other reliable transport mechanisms like FTP.