Web Development

Web Service

CME4414 Advances in Web Technologies

Web Service – Different Definitions

- Any piece of software makes itself
    - available over the internet
    - uses a standardized XML messaging system
- Self-contained, modular, distributed, dynamic applications that can be
    - described,
    - published,
    - Located
    - invoked

over the network to create products, processes, and supply chains

- XML is used to encode all communications to a web service
- Web services are built on top of open standards such as TCP/IP, HTTP, Java, HTML, and XML.

Web Service – Different Definitions

- **XML-based information** exchange systems
- Use the Internet for direct *application-to-application interaction*
- Collection of
  - open protocols
  - standards
- used for exchanging data between applications or systems

Web Service

Generic

Service offered by an electronic device to another electronic device, ***communicating with each other*** *via the World Wide Web*

utilized for *machine-to-machine communication*,

for transferring **machine-readable file formats** such as

- XML
- JSON

Web Services

- Available over the Internet or private (intranet) networks
- Uses a standardized XML messaging system
- Not tied to
  - any one operating system
  - programming language
- Self-describing via a common XML grammar
- Discoverable via a simple find mechanism
- Web application components
- Can be published, found, and used on the Web

Web Service

AJAX

Asynchronous JavaScript And XML (AJAX)

- Dominant technology for web services

Developing from the combination

- HTTP servers
- JavaScript clients
- Plain Old XML (distinct from SOAP & W3C WSs)

- now it is frequently used with JSON instead of XML

REST

Representational State Transfer (REST)

- Architecture for well-behaved web services can function at Internet scale
- In a 2004 document, the W3C sets following REST as a key distinguishing feature of web service

Web API

- A web API is a development in web services
    - where emphasis has been moving to simpler representational state transfer (REST) based communications
- Restful APIs do not require
    - XML-based web service protocols (SOAP and WSDL) to support their interfaces

W3C Web Services (Specific)

In relation to W3C Web Services, the W3C defined a web service as:

- A web service is a software system designed to support interoperable
  - **machine-to-machine interaction** over a network
- It has an interface described in a machine-processable format (specifically WSDL)
- Other systems interact with the web service in a manner prescribed by its description using SOAP-messages,
  - typically conveyed using HTTP with an XML serialization in conjunction with other web-related standards
- W3C Web Services may **use SOAP over HTTP protocol**, allowing less costly (more efficient) interactions over the Internet

Component 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)

Web Service Describe

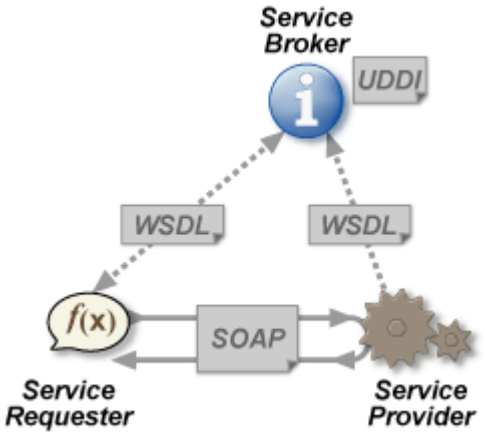
Standardized way of integrating web-based applications using

- XML, SOAP, WSDL and UDDI open standards over an Internet Protocol backbone

- XML is the data format used to contain the data and provide metadata around it
- SOAP - used to transfer the data
- WSDL - used for describing the services available
- UDDI - lists what services are available

Web Services Architecture

- Service provider sends a WSDL file to UDDI.
- Service requester contacts UDDI to find out who is the provider for the data it needs,
- Contacts the service provider using the SOAP protocol.
- Service provider validates the service request and sends structured data in an XML file, using the SOAP protocol
- This XML file would be validated again by the service requester using an XSD file



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

Example

Interacts with a database to store information

- 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
- Web service unpacks the SOAP request &
- Converts it into a command that the application can understand

Example – cont'd

- Application processes the information as required
- Responds with a new unique account number for that customer

- 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

API & Web Service

API (Application Programming Interface) and Web service serve as a means of communication

- Web service facilitates interaction between two machines over a network
- An API acts as ***an interface between two different applications*** **(**they can communicate with each other)

API vs Web Service

- An API is a method by which the **third-party vendors can write programs** that interface easily with other programs
- A Web service is designed to **have an interface** that is depicted in a **machine-processable format** usually specified in Web Service Description Language (WSDL)
- **HTTP** is the **most commonly used protocol** for communication
- Web service uses
    - SOAP,
    - REST,
    - XML-RPC (remote procedure call protocol)

- API may **use any means of communication** to initiate interaction between applications(system calls are invoked using interrupts by the Linux kernel API)

API vs Web Service

- All Web services are APIs
- *Web services might not perform* all the operations that an API would perform
- A Web service uses only three styles of use: SOAP, REST and XML-RPC for communication
- A Web service **always needs a network** for its operation

- All APIs **are not** Web services
- API may **use any style** for communication
- API **doesn't need a network** for its operation

References

- Programming the World Wide Web / Robert W. Sebesta, University of Colorado at Colorado Springs. -- Eighth edition

- https://en.wikipedia.org/wiki