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Critical Review On Web Services And Legacy Systems - And Its Migration

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Abstract

Over the years there has been an incredible amendment within the storage and exchange of information. For the method of exchanging information and use of services offered by totally different organizations, a special technology with commonplace design is formed. Introduction of those new technologies has simplified the ability of services offered by totally different organizations in electronic business eventualities. One of these technologies is web services. Web service design describes the principles behind successive generation of e-business design, presenting a logical evolution from object-oriented systems to systems of services. In this paper we discussed web service technology and its standard architecture. We discussed various approaches to moving legacy system to the web service environment.

Keywords: web services SOAP, UDDI, WSDL XML, legacy system, migration.

1. INTRODUCTION

Web services is an effort to take the web from a content delivery network for server-human interaction to a network for server-to-server interaction. The software which provides service can be registered, discovered and connected to. In today's market, we find many distributed system technologies with their own strengths and weaknesses. These technologies under different circumstances may or may not be better. Hence most of these technologies are surviving. Web services technology promises to overcome the limitations, complexities and interoperability problems of CORBA and DCOM[1]. It takes the help of the existing component –based technologies and the web. Though these technologies CORBA DCOM and web services working on similar lines, in managing the communication between the clients and the remote server objects through a well-defined interface, they have their own architecture, strengths and weakness[2]. CORBA, DCOM and the other technologies have proved their ability to provide high performance, dependability and scalability solutions for a variety of distributed computing problems[2]. Hence the role of web services technology should be the integration of these mature technologies. The below Table 1 provides an overview of comparisons between the three technologies and several architectural dimensions [1] [2]. The major distinction between the prevailing technologies and therefore the new breed of technology that is taged as web service is standardization.

Table 1 shows architectural comparison between CORBA, DCOM, WEB SERVICES

ASPECT	CORBA	DCOM	WEB SERVICES
Support and development organization	Given by OMG	Given by Microsoft	Not given by any specific organization
Language support	Language independent	Language independent(partially)	Language independent
Middleware service	Gives built-in middleware service	Gives built-in middleware service	Allows to work with server supplied middleware service
Operating system	Operating system independent	Operating system dependent	Operating system independent
Architecture	Architecture independent	Architecture dependent	Architecture independent
Error handling	IDL exception	HRESUL or error objects	SOAP fault messages
Firewall traversal	Not firewall friendly	Not firewall friendly	Firewall friendly
Data model	Object oriented model	Object oriented model	Message exchange model
Protocol	I IOP	ORPC	HTTP

2. LITERATURE SURVEY

Z.Zhang et al.[5] propose a reengineering approach that applies a hierarchical cluster algorithmic program to grasp the legacy code so as to extract it for web service construction. The cluster technique is employed to extract freelance services from legacy code, The technique supports service identification and packaging providing legacy code as web services. Z. Zhang et al.[6]current project on the look and development of pass-through authentication(PTA) web services for on-line electronic payment application. The application is an on-line synchronous/asynchronous payment process application than can perform real-time or batched payment transactions. Though this approach exposes business logic in legacy code as services, the most concern isn't to attain SOA design, rather to reveal the legacy systems practicality as web services. Marchetto and Ricca [7] present a stepwise approach for Java where one candidate service is migrated to a web service in each migration step. The goal of their approach is to get a "preliminary" service-oriented implementation of the initial system, not essentially the best one.

3. WEB SERVICE ARCHITECTURE

Web services are varied and many. They offer any service let it be minor or major and related any field. It may be a movie review or weather information. It also provides the complete package of hotel – airline booking. The technical infrastructure ensures services from different vendors; these vendors interoperate among themselves and create a complete business. A web service is a technology specification with set of rules and guidelines to develop interoperable distributed applications [3]. Web services are not a direct software technology to install and use. Operating with web services is nothing but operating with multiple technologies, ideas and protocols along to develop interoperable distributed applications. A complete web services architecture and web services standards: Web services depends on several enabling technologies including XML, SOAP,UDDI, and WSDL. The web service triad includes service broker, a service provider and a service requester. The below figure illustrates the web service architecture. Service provider is the server application that contains interoperability business components. Service clients are the client application that calls business method of business component. Service registry is an UDDI registry, for describing web services components that allows business to register with an internet directory. Service provider is the server application that contains interoperability business components. Service clients is the client application that calls business method of business component. Service registry is an UDDI registry, for describing web services components that allows business to register with an internet directory. Service provider is the server application that contains interoperability business components. Service clients are the client application that calls business method of business component. Service registry is an UDDI registry, for describing web services components that allows business to register with an internet directory.

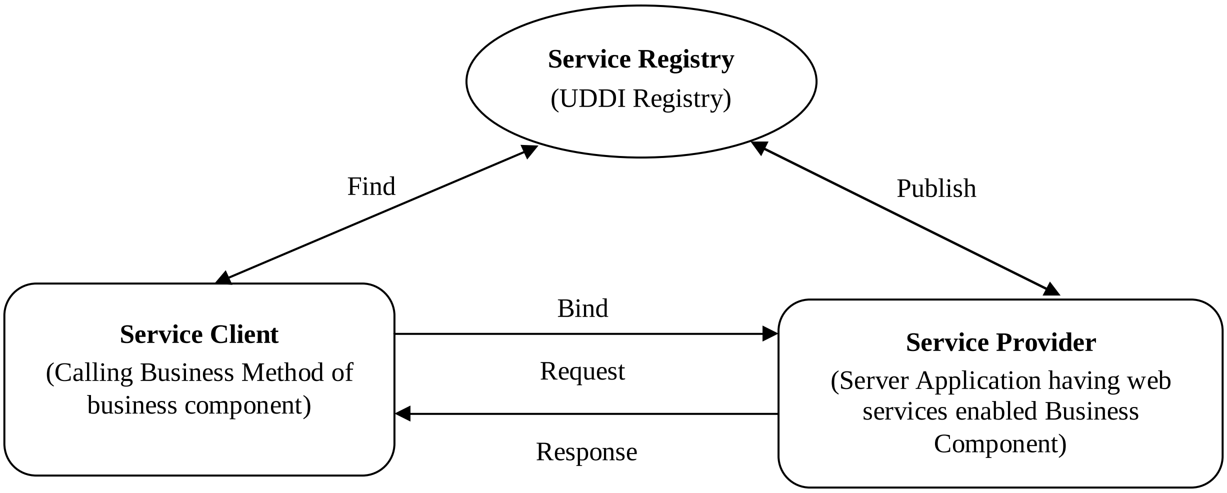

Service Registry
(UDDI Registry)
Find
Publish
Service Client
(Calling Business Method of business component)
Bind
Request
Response
Service Provider
(Server Application having web services enabled Business Component)

Figure 1 Web Services Architecture

Programmer develops service provider application having web service enabled business component. Programmer generates WSDL, a document for that web service enabled business component. Programmer publishes the WSDL document in the UDDI registry for global visibility. This WSDL document contains XML based details about the web service enabled business component. Service clients finds WSDL document from the service registry. Service client understands WSDL document and develops the client application by using certain API. Service client sends request to service provider application by invoking certain business method. Business method generated result comes to the service client as response.

4. THE ROLE OF XML

XML is a family of technologies that have opened up new potentialities for exchanging information across the World Wide Web and building communication infrastructures. XML DTD, XML XSD are the two different techniques which can be used to define set of rules to construct XML documents/XML information. These rules contain tags and attributes which have to use to create XML document, the structure hierarchy of tags in XML document etc. XML namespace is a library that contains set of XML tags. Each namespace are known with its URI. XML provides a language neutral method for representing information.

A WSDL document contains the entire details regarding web services, business component in the form of XML document. There are three parts in WSDL file: what, where and how ?. “what” consists of types. It includes the exchange of messages and data type between client and server. “where” consists of service element. This brings together the port type, the binding and the actual URL of the web service. “how” consists of binding components. This explains the technical implementation details.

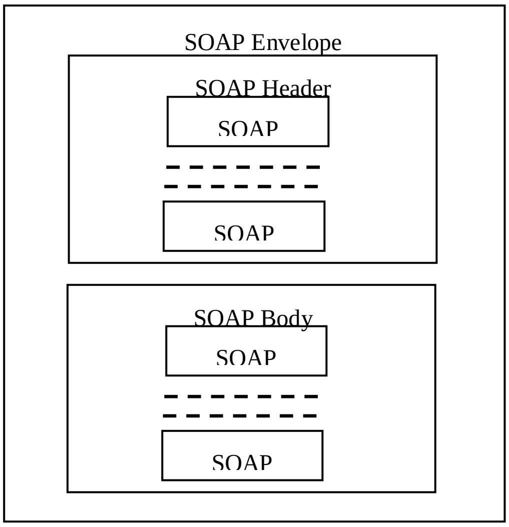
UDDI is the XML-based registry where the WSDL document of web service will be maintained. Web Services application providers are listed in a registry of service providers using UDDI. Similarly, client applications locate Web Services application providers using UDDI. In web service environment, service client interact with service provider by using SOAP over HTTP protocol. That means HTTP request contains SOAP request message as body. Similarly HTTP response contains SOAP response message as body. SOAP is an XML based protocol. It always carries data in the form of XML tags and attributes. SOAP can't run as an independent protocol, so it must be embedded with the main application level protocols like HTTP, SMTP and etc. In Web service, service client sends its business method call based request to service provider as SOAP request embedded with HTTP request. Similarly service provider sends its business method execution result as SOAP response embedded with HTTP response.

4.1 How XML document becomes SOAP?

To clarify this, we use a simple music store document music.xml. As the music.xml contains only details about CDs and music, it is overly simplified. With over simplification it cannot become a SOAP document. To make it a SOAP document the XML should be wrapped inside a SOAP body and this SOAP body should be wrapped within a SOAP envelope. This SOAP envelope consists of elective header block, declaration of namespaces, encoding style directives for the serialization of data. Now this whole thing should be bound to a protocol. A SOAP envelope contains two primary components a header and a body. They could contain multiple blocks of information.

```
<? Xml version=”1.0” encoding =”UTF-8”?>
<Music Store  xmlns=”urn:orielly-Jaws-samples”>
<CATALOG>
<CD>
<TITLE>Empire Burlesque</TITLE>
<ARTIST>Bob Dylan</ARTIST>
<COUNTRY>USA</COUNTRY>
<COMPANY>Columbia</COMPANY>
<PRICE>10.90</PRICE>
<YEAR>1985</YEAR>
</CD>
<CD>
<TITLE>Hide your heart</TITLE>
<ARTIST>Bonnie Tyler</ARTIST>
<COUNTRY>UK</COUNTRY>
<COMPANY>CBS Records</COMPANY>
<PRICE>9.90</PRICE>
<YEAR>1988</YEAR>
</CD>
```

Figure 2: SOAP Message Structure



The following listing shows music.xml wrapped by an envelope to make it conform to SOAP.

```
<? Xml version =”1.0” encoding =”UTF-8”?>
<SOAP-Env:Envelope
          xmlns:SOAP-Env=http://schemas.xmlsoap.org/soap/envelope/
            xmlns:xsi=http://www.w3.org/1999/XMLschema-instnace
            xmlns:xsd=http://www.w3.org/1999/XMLshema>
<SOAP-Env:Header>
-----------
-----------
</SOAP-Env:Header>
<SOAP-Env:Body>
<<CATALOG>
<CD>
<TITLE>Empire Burlesque</TITLE>
<ARTIST>Bob Dylan</ARTIST>
<COUNTRY>USA</COUNTRY>
<COMPANY>Columbia</COMPANY>
<PRICE>10.90</PRICE>
<YEAR>1985</YEAR>
</CD>
<CD>
<TITLE>Hide your heart</TITLE>
<ARTIST>Bonnie Tyler</ARTIST>
<COUNTRY>UK</COUNTRY>
<COMPANY>CBS Records</COMPANY>
<PRICE>9.90</PRICE>
<YEAR>1988</YEAR>
</CD>
</SOAP-Env:Body>
</SOAP-Env:Envelope>
```

5. WEB SERVICES CHARACTERISTICS

5.1 XML-based

XML acts as a knowledge representation layer for all Web services protocol and technologies that are created. These technologies can be interoperable at their core level. XML eliminates any networking, operating system or a platform binding that a protocol as a knowledge transport.

5.2 Loosely coupled

In this web service consumer is not tied to that web service directly. The interface can change overtime. Though the interface changes overtime it compromises about/or the clients ability to interact between different systems. This enables the software systems more manageable. Simpler integration is allowed between different systems.

5.3 Ability to be synchronous or asynchronous

The asynchronous capability is key factors in enabling loosely coupled systems. In this invocation the client need not wait for the service and retrieves the result later. Where as in the synchronous invocation the client waits for service to complete its operations and receive results when the service is completed.

5.4 Supports remote procedure calls

It enables the clients to operate its functions procedures and methods on remote objects by using XML based protocol. This supports RPC by providing services of its own. This service enables the clients to go for a remote procedure operation. This expose the input and output parameter a web service must support. EJB and.NET component has gained performance and can be distributed and accessible through a variety of RPC mechanisms are supported by the web service. Which provides them the services of their own which is equivalent to a traditional component or by translating incoming invocations into EJB and.NET component invocation.

5.5 Supports document exchange

One of the key benefits of XML is its generic approach. It represents not only data but also complex documents. When the documents represent a current address then the documents are simple. They become complex when they represent an entire book or RFQ. For a smooth effective business integration it supports the exchange of documents with transparency.

6. MIGRATION OF LEGACY SYSTEMS TO WEB SERVICES

A legacy system being associate archaic structural and extraordinary important platform of technology; might it be a system, language or program developed by mistreatment the phased out languages & tools of programming; has moved out of the aisles of data technology in use and so is tough to keep up and inflexible however despite of the actual fact these area unit most vital and have sturdy impact on the organization. As they support basic and complex processes of the organization they're continuing to be used [4]. The legacy systems lawfully have restrictions to archaic hardware, code and even the phased out know how of the people who possessed the ability set regarding that; because the succeeding generation isn't adaptive to the passed technology; or doesn’t choose to learn it. Integration with newer systems might also be tough because new code might use utterly totally different technologies [4].

6.1 The Migration Steps are

- Apprehend business practicality,
- Take an in depth revision of legacy application
- Determine the optimum migration resolution in reference to your specific state of affairs
- Determine technological needs
- Identify and Mitigate risks

- Assure effective realization likewise as swish migration by constant observance and project management

CONCLUSION

While CORBA is the most mature technology to integrate legacy systems and heterogeneous, DCOM is the most suitable technology for windows-based networks. Compared with CORBA and DCOM, Web service is less powerful but it is more impressive in its simplicity and extensibility. The web service has huge industry backing, which is not found to any other technology. We can use web service not only to develop scratch level distributed application, but also to convert the existing business components into interoperable business components. Because of its high ambitious goals and its ability to solve interoperability problem many clients were attracted to this web service. This serves as platform for a completely automated infrastructure for electronic commerce and integration of the inter enterprise application. It has clear potential benefits in legacy migration systems only thing is it has to choose a relevant migration strategy. Though there is no single approach which is applicable to every situation, it can be selected by examine its maturity, strengths and weakness of each of them for any given project.

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