

Design & Development of a REST based Web service platform for mobile applications integration on Cloud

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Abstract

Web services applications are extremely distributed applications which will be accessed remotely to attain business goals by execution of services offered by many different heterogeneous partners. A web service provides a way of communication over the net or the cloud, it work as a utility service that's continuously accessible. Its system structure support interoperable, scalable and versatile machine to machine interaction over a network. A classical approach to the current subject is use of SOAP and WSDL messages to exchange the structured info or data. They usually conveyed using HTTP in conjunction with XML serialisation and alternative web related standards.

This paper explores a comparatively advanced alternative approach to the SOAP/WSDL stack i.e. REST primarily based web services specifically on Cloud. The word form REST stands for representational state transfer, this primarily implies that every unique universal resource locator is a illustration of some object. The Web service uses HTTP protocols like GET methods to fetch data from web server. When client executes a query, the server responds the query with the resource that is requested by the client. You then may use a POST, PUT or DELETE to change the object.

Keywords: *Web Service, SOAP, WSDL, HTTP, XML, REST, GET, PUT, DELETE, POST.*

1. Introduction

The use of internet has grown in recent years and has evolved over time, also its users have grown over time. Initially the internet used to provide static contents but now because of the massive expansion of its users, many companies are attracted who have tried to create services to move their businesses online.

Because of the increasing users, many companies created portals or platform for single point access to its users by

means of internet. The integration was done to provide users with all the resources or thing needed just at one place that is on demand services.

Several companies are now involved in delivering web services over cloud. The web services are now being used in several domains as given below:

Medical Care: Health services are highly benefited from web services over cloud. Having all the information about patients at one place can become a matter of life and death.

Tourism Sector: The customers can be benefited from the use of web services over cloud, planning a holiday trip usually involve Hotel accommodation, Flights and hiring a vehicle, having all these information at one place and by integrating different service providers at one place by means of building an intelligent system using cloud and web services.

Banking Services: Web service integration is being carried out and implemented by many secure web sites for online banking.

Software Development: Web services and cloud are now being used by software developers to develop many applications and software by using cloud platform of service providers.

In Mobile Cloud Computing, the mobile client consumes web service or cloud services with the help of internet as a communication medium for interaction.

2. Study and Review of Literature

Some literatures are reviewed for the purpose of identifying the prior and present work on Web Services

(especially RESTful Web Services) with their objectives. These details are compiled in the following manner:

The Importance of Web Services using the RPC and REST Architecture[1], According to the author this paper describes the difference between the architecture of RPC and REST Web Services. This paper explains that by using XML languages, Web Service software application can be accessed. It shows how the applications can communicate with each other using remote procedure calls and asynchronous messages with the help of web services over cloud using XML and JSON languages.

Using REST Web-Services Architecture for Distributed Simulation[2], According to the authors, Web Services technologies using XML are used in distributed simulation software and provide scalability and flexibility in many applications. By using services as Uniform Resource Locator(URIs), The RESTful-CD++ simulation Server provides Web Services. Hence, it can be combined or mixed together with other applications and simulation software. On the contrary by using many Remote Procedure Calls(RPCs) and URIs, SOAP uses internet as a communication medium for data or information transfer. RESTful-CD++ is the only existing RESTful system. Further, The paper also explains our web service objectives are better fulfilled by REST than SOAP.

The Architecture of the Apex Platform, Salesforce.com's Platform for Building On-Demand Applications[3], According to the author, increasing users of cloud and customers in recent years and its success and adoption of cloud computing by many organisations or on demand services, has completely changed the whole software organization and industry. To be successful and be a market leader, On demand application must be designed, with its core elements. As with any new design architecture, all the core attributes and features must be

designed and implemented in initial application, then only the platforms can emerge and encapsulate core computing services, and more focus on innovation and value can be done by application developers. With the Apex platform, first on-demand platform was delivered by Salesforce.com, Apex platform enabled developers and application programmers to develop on-demand applications and softwares easily because of its simplicity and syntax similarity with traditional programming languages.

Web Services Implementation Methodology for SOA Application[4], According to the authors, this paper describes the popularity of Web Services technology has been discussed in this paper and its increasing trend in developing SOA Software, and need of Web Services, The gaps in agile software methodology have been identified and many development challenges have been identified through this paper for web services.

K. Mukherjee and G. Sahoo (A Secure Cloud Computing[5]), In this research paper authors proposed a new framework for secured use of cloud computing. They have focused on security aspects of web services of cloud. The author also explained and defined the potential of the web services in terms of dynamically updates and interoperability.

Web Services in Mobile Devices[19], This paper describes various aspects of web services in mobile devices, i.e. what are the limitations of mobile devices, connectivity issues, how to optimize the web service, comparing different protocols and frame work that can be used, performance analysis of SOAP and RESTful web services, various libraries that can be used to create web services.

A Comparison of Application Models, Information Systems & Database Technologies[21], Review of results, its overview, has been done by author in this research paper, various models has been proposed through this paper for cloud computing. The author also explains future directions and scope of cloud computing and research areas in this field and has highlighted those areas. The paper also explained how these can be used in building and designing of future mobile applications.

3. About the Salesforce.com Platform

Salesforce.com is a market leader in its CRM solution to its client. Salesforce Force.com platform provides platform as service. About 90 percent of the cloud computing companies are using salesforce.com platform to transfer from traditional architecture to cloud architecture. Even developers find very easy to shift from traditional languages like Java and .Net to Apex language because most of the syntax are almost same. It is one of the highest rating companies in the world. Therefore it is expanding very quickly in Cloud computing arena than other cloud computing service providers in the market.

3.1 Characteristics of Cloud

On Demand Self Service

Enables consumer to get computing resources as when required without human interference.

Broad Network Access

Cloud service are accessed via network usually internet from broad range of client platform such as mobile phones, laptops and desktop computer.

Resource Pooling

Cloud have large and flexible resource pool to meet customers needs and it uses Multi Tenant Model.

The resources are Compute, Storage and Network that are assigned dynamically to huge pool of customers who do not have any knowledge from where the resources are coming from.

Rapid Elasticity

Scale IT resources rapidly as required to fulfill changing needs without interruption of services. Resources can be scaled up and down dynamically.

Metered Service

Consumers are billed and charged based on metered usage of cloud resources that is cost on pay per use.

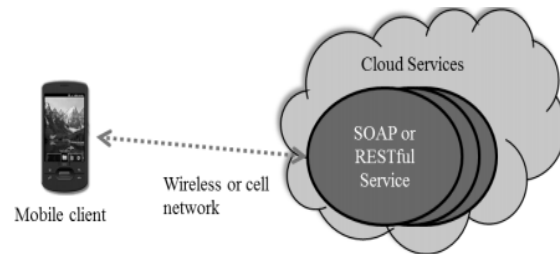


Fig. 1 Consuming WS from Mobile Client

3.2 Types of Cloud

Public Cloud

In this type of cloud, the IT resources that are made available to general public are owned by the cloud service providers.

Risk in public cloud is that there is no control over the resources and security of confidential data.

Examples of public cloud are Google Apps and Sa les force .com.

Private Cloud

The private cloud can be classified into two main categories as follows :-

On-premise private cloud

This type of cloud is hosted by organization with their own data center. It is best suited for organization which requires complete control and configurability of infrastructure and security of data and information over cloud.

Externally hosted private cloud

This type of cloud is externally hosted by a cloud provider. Where provider facilitate exclusive cloud environment for specific organization with full security and privacy.

Examples include VMware, EMC, IBM, CISCO and Oracle etc.

Hybrid Cloud

Organizations consume resources from both private cloud and public cloud.

This architecture has the ability to add private cloud with resources of public cloud.

Community Cloud

In this type of cloud architecture cloud infrastructure is shared by several organizations and support specific

community that has shared concern such as security, policies and vision.

Examples of community cloud are the agencies in state government operate under same guidelines, they share same infrastructure and they spread cost among themselves. This allows organizations to access vast pool of resources then in private cloud with higher level of security.

3.3 Cloud Service Models

There are basically three types of cloud service models as follows :-

IaaS(Infrastructure as a Service)

It provides capability to consumer to hire infrastructure components.

Amazon Elastic compute cloud that provide resizable compute capacity on pay per basis.

EMC Atmos online provide storage as a service.

PaaS(Platform as a Service)

Provide consumer to deploy consumer created or acquired applications on cloud provider infrastructure.

Consumer is charged for operating system, database and infrastructure.

Consumers use these platforms that typically have an IDE which include editor, compiler, and deploy capabilities to develop their applications.

Examples include Google apps, Microsoft Azure and Salesforce.com Platform.

SaaS(Software as a Service)

Provide capabilities to consumer to use providers application running in cloud infrastructure.

The Client need not to install the software on the system such as Laptop and PC, Service provider provides all the resources on pay per basis for given time period.

Examples include Google Docs and Salesforce.com.

3.4 Cloud Challenges

Users perspective to cloud challenges are as followed :-

Security and Regulation

Consumer may have critical data which calls for protection and continuous monitoring of its access. Consumer may not know in which location data is being stored.

Network Latency

Consumer may access cloud services from anywhere, resources are distributed. The resources may not be close consumer location, resulting in high network latency.

Supportability

Cloud may not support all customer applications and these customer applications may not be compatible with cloud platform.

Interoperability

Lack of interoperability between applications of different cloud service providers creates complexity and high migration cost of consumers.

Service providers perspective to cloud challenges are as followed :-

Service warranty and Service cost

Cloud service provider usually publish a service level agreement(SLA), So that their customers are aware of availability of service, quality of service and downtime.

Huge number of Software to Manage

Providers such as SaaS and PaaS manage number of Platforms, Software to meet the needs of customers. This requires provider to process enough number of license of various softwares.

No Standard Cloud Access Interface

Cloud service provider usually offer proprietary applications to access their cloud but consumer may want an Open API to access the cloud.

4. Methods and Models Used

The objective of this paper is to identify gap between the existing web services over cloud or traditional web services that were used earlier and studying the methodologies of existing web services, that is our first step in the project.

Studying the advance RESTful web services is the next step in the project in order to identify steps needed for the development of web service as a middleware to transfer data between Mobile client and Cloud Platform like Salesforce.com

The final step to take the pragmatic approach by starting with the pre-requisite for the SFDC-Mobile Device (www.telerivet.com). These pre-requisite are as follows:-

Telerivet.com mobile user account.

Setting up a free developer account at Salesforce.com.

Configuring and setting up <http://telerivet.com/> which a Remote Site in Salesforce.

To transmit the data, Open standards Java Script Object Notation(JSON) and Representational State

Transfer(REST), a HTTP RESTful web service are used. Therefore knowledge of JSON String is must.

The integration coding will be done using APEX Language of Salesforce and based on the MVC Architecture. So the implementation knowledge of the APEX programming is mandatory to develop custom components like visual force pages, classes, triggers and batch etc.

Table 1: Showing comparison between REST and SOAP

	<i>REST</i>	<i>SOAP</i>
Uniform	YES	NO
Transport	HTTP Only	TCP, FTP, HTTP
Payload	XML, RSS	XML(SOAP)
Service	WADL	WSDL
Service	It is not strictly	UDDI
Service	Mashups, do it	do it your self
Service	URI	URI, Web Service

Conclusion

This paper has explored, designed an alternative to the SOAP approach to Web service integration and has discussed how REST can be applied in the context of intelligent systems. The proposed approach was implemented through Custom Modules as described in the “methods and models used for the proposed work”. These Custom Modules are developed using “Apex” a proprietary language of force.com platform.

These modules can be tested on the test data sets through test cases on Salesforce, which is atleast 75%, mandatory limit for the deployment of application on “Production” Environment.

Being lightweight, REST-based platforms built over HTTP, have almost all that is needed to process messaging between agents. Also in REST no additional protocols and toolkits are needed, thus improving efficiency in data transportation.

As REST is completely embedded in the World Wide Web, thus, a REST-based platform over HTTP can be used to provide scalability, which supports many mobile agents accessing same services simultaneously at same time

In Future, with a similar technical approach, the idea can be extended which requires funds and resources to actually implement sending of messages from salesforce.com platform to mobile devices rather than just simulating.

Also mobile to mobile device integration can be implemented and security features can also be included for message security using cloud.

Stegnography can also be used for message security for future directions for integrating mobile application using cloud.

Interoperation and functionalities sharing of applications, more complex intelligent mobile applications can be built, without negative effects on other applications.

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