

# Design and Development of a SOAP based Web Service Platform for Applications Integration with cloud computing

Awfa Hasan Dakheel

University of Babylon , Collage of Basic Education, Iraq

[awfahasan@gmail.com](mailto:awfahasan@gmail.com)

## Abstract

The purpose of cloud computing is the use of internet based web service, Salesforce is a cloud computing platform used to access to the different organizations information using application programming interfaces(API) in a simple, powerful, and secure way . The client application-Salesforce integration based Web services (SOAP) used is for data transportation or data exchange over cloud. The result of implementation of integration can be previewed through (Developer Console) at Salesforce side.

**Keywords:** Cloud Computing, Web Service, SOAP, WSDL, WSC.

## الخلاصة

ان الغرض من الحوسبة السحابية هو استخدام الانترنت باعتماد خدمة الويب،(Salesforce) هي عبارة عن منصة الحوسبة السحابية تستخدم للوصول إلى معلومات منظمات مختلفة باستخدام واجهات برمجة التطبيقات (API) بطريقة بسيطة وقوية، وأمنة. ان دمج تطبيق العميل – (Salesforce) باعتماد خدمات الويب (SOAP) تستخدم لنقل البيانات أو تبادل البيانات عبر السحابة.نتيجة تنفيذ هذا الدمج يمكن معاينتها من خلال (Developer Console) على جهة (Salesforce).

**الكلمات المفتاحية:** الحوسبة السحابية، خدمة الويب، بروتوكول وصول الكائن البسيط، لغة توصيف خدمة الويب، وصلة خدمة الويب.

## 1.Introduction

Simple Object Access Protocol (SOAP) is a protocol which is based on (XML) language to provide communication between applications in cloud systems [Hadi Razzaghi *et al.*, 2013][<http://www.techterms.com>][ <http://www.w3.org/TR/soap>]. Amazon and Google provide SOAP-based procedure to carry out search and other activities. These procedures can be invoked by other applications that provide higher-level services to the users[Abraham S., *et al.*,2011].(SOAP)-based Web services application programming interface provides access to the Salesforce a cloud platform ,(SOAP) which is utilize in this paper to communicate and transfer data from one application to another using the cloud platform such as Salesforce. The intended aim of this work is to integrate applications that run outside the Salesforce user interface to another application on cloud environment by using (SOAP) web services.

## 2.Cloud Computing

Cloud computing is considered a new technology which provides tremendous resources such as hardware and software ,to be utilized as a service for consumer through internet [Hadi Razzaghi ,*et al*,2013][ M.Priyadharshini,*et al*,2013]. Cloud computing is a model for software development and the technology infrastructure for a service including data is hosted in internet instead of investing in hardware, software, or maintenance. [Phil Choi,*et al*,2016]. Cloud Computing shifts the computation from local, individual devices to distributed, virtual, and scalable resources, thereby enabling end-users to utilize the computation, storage, and other application resources, which forms the Cloud, on-demand.[ Fatos Xhafa and Nik Bessis,2014].

A “cloud” word can be defined as the service provided to customers, and the architecture of cloud computing can be expressed by using (XaaS) that means (Every thing as a service), so based upon the services offered, clouds are classified to the Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-service (IaaS) and so on [Danish Jamil and Hassan Zaki,2011][Enumi Choi and Ian Lumb,2009].

Salesforce is a cloud computing platform can be used to provide programmatic access to the different organizations information and provide powerful Customer relationship management (CRM) which is a Software-as-a-Service. Apex language is a property language of Salesforce ,it is a strongly typed, object-oriented programming language, the syntax of apex being much like Java and .Net, Apex allows developers to create business logic and build Visualforce pages to design applications and softwares [Apex Workbook,2016] [ Phil Choi,*et al*,2016] . Visual force page is analogous to HTML in the traditional Net Beans or Dot Net.

The goal of this work is to design and develop an (SOAP) based web service platform for applications of integration with cloud computing ,(SOAP) is used to exchange the information between web applications in cloud computing system.

### 3. Web Service

Web service can be defined as a mechanism that allows two applications to exchange data over the Internet, even though they run on various platforms, or written in various languages .Web services are typically application programming interfaces (API) or web APIs that are accessed via Hypertext Transfer Protocol (HTTP) and executed on a remote system hosting the requested services [S.Bhayal,2011].Hence web service is working as a response to a request which provides an interoperable architecture over network .It has an interface described in a form of extensible markup language XML (WSDL). The web service description language (WSDL) is a language used to describe a web service's capabilities, specifying what functions are available and the types of their input and output [Abraham S., *et al*.,2011].SAOP protocol governs the format of the web service request and response [Changbin Wang and Yuan Xu,2010].In this paper we explain how (SOAP)-based Web services application programming interface is utilize to communicate and transfer data from java client application to Salesforce cloud platform .

### 4.MVC

Salesforce a cloud platform uses the standard Model View Controller design sample. The (MVC) is a software architecture sample which separates the representation of information from the user's interaction with it.

**Table 1 : (MVC) Design Sample.**

Sample	Salesforce.com implementation
Model	sObjects are the model that can be stored in the Salesforce platform database. Salesforce uses sObjects to represent the whole system and data schema.
View	Visualforce is used to describe the front end to users. It depicts the data to users as HTML in traditional .Net or Net beans.
Controller	Means the classes written in apex language that are used to represent the actions when users react with Visualforce page.

### 5. Integration Architecture

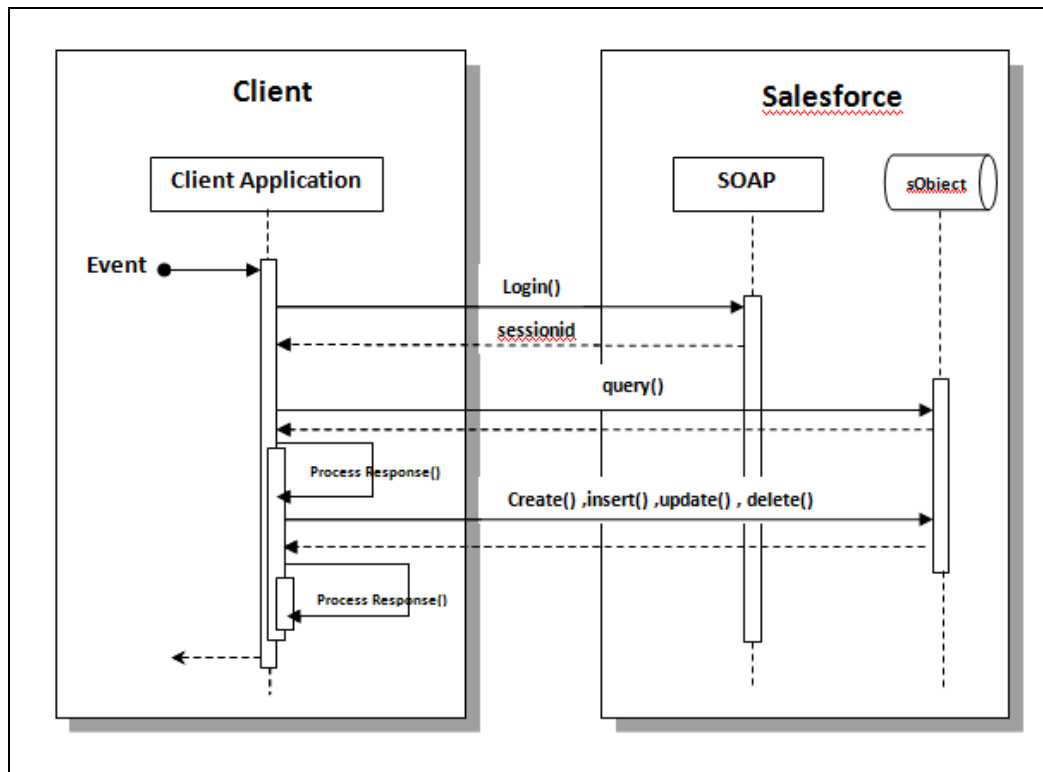
The requirement of this work is to integrate java client application with the Salesforce, a cloud platform using Web services (SOAP) as a middleware to send data and provide (IaaS) (Integration as a Service) on demand by the java client application . To implement this integration (WSDL's) must be downloaded from the Salesforce user interface. (SOAP) has three (WSDL) options:

- 1-Enterprise WSDL :it is a robustly typed and it closely represents the object model in Salesforce and it is used to build client applications for a schema of a single Salesforce organization because it is bound to all of the unique objects and fields that exist in that organization's data mode.
- 2- Partner WSDL: is more elastic and generic in nature ,it represents a loosely-typed data model consisting of name-value pairs instead of specific data types.the partner WSDL is used to build an integration that can work with multiple Salesforce organizations.
- 3- Metadata WSDL:it is for users that used the Salesforce Metadata API calls to retrieve, deploy, create, update, or delete metadata information of Salesforce organizations.

The client application needs to import the (WSDL) generated from Salesforce into their system, create the relevant request message, and invoke the web service [Anupam Rastogi ,2015].

The java client Application - Salesforce integration in this work named (SFDC).Client application in (SFDC) is an application runs out side the Salesforce user interface .It is run on a desktop and it is treat the cloud platform as a data source to design and develop an (SOAP) based web service.

(SOAP) allows communicating and transferring data from java client application to Salesforce to query the database, and execute each operation that writes to a Salesforce object like create(), update(), and delete() as single-object operation. The SOAP request- response sequence represents the service requests and responses when the client application prepares and submits a service request to salesforce via (SOAP), Salesforce processes the request and returns a response as it is shown below:



**Figure 1. Diagram of java Application- Salesforce Integration(SFDC).**

## 6. Design & Development

This client Application - Salesforce integration (SFDC) provides synchronous communication based: the service oriented architecture (SOA), which uses the (SOAP) services for data transportation or data exchange over cloud using web service. In this work, (SFDC) is created to implement the java client Application - Salesforce integration, (SFDC) is created through the following steps:

- Install (WSC) .
- Generate JAR files.
- Download WSDL Files From Salesforce instance.
- Generate java Program
- Execute Transaction using SOAP.

Salesforce use Web Services Connector (WSC).It is a java environment of client application which is the favored tool for working with salesforce.com. (WSC) is a code-generation tool the runtime for library for uses Web services, employs the (WSC). The operations are performed with a few lines of code that would take many more lines of code with other Web services clients.

The (WSC) invoked the enterprise and partner WSDLs, and the Metadata WSDL. These WSDLs are downloaded from Salesforce user interface to establish a integration between Salesforce - java client application , and then save each WSDL to a directory on the computer . After that the WSDLs are converted to the java archive (JAR) by downloading the wsc-xx.jar, that's it can be downloaded from <http://code.google.com/p/sfdc-wsc/downloads/list> . The java client application uses the Salesforce enterprise or partner WSDL to generate client stubs that are in turn used to invoke (SOAP).

The Java code of client-side is generated through writing Java applications programs with (WSC) that use the (SOAP).

The result of (SFDC) implementation is viewed through the (Developer Console). It is a collection of tools that working with Apex code to execute Apex methods within an Apex class or object in Salesforce. The (Developer Console) is used also to appoint the information level of gets contained in debug levels [Apex Workbook, 2016]. A debug level contains a set of log levels for debug log categories, such as (Database, Workflow, and Validation, ...etc), and amount of information that is logged for different events and the information's amount logged for each category. The following table explains the description of each category of (Developer Console) :

**Table 2. Showing the Categories of (Developer Console)**

The Categories	Description
Database	Contains the database activity information, and contains every DML or inline SOQL or SOSL query.
Workflow	Contains information for workflow rules, flows, and processes, like the rule name and the actions taken.
Validation	Contains the validation rules information, like the name of the rule and whether the evaluated rule is true or false.
Callout	Contains the server request-response XML that is sent and receiving from an external web service. Useful for Force.com web service API calls or troubleshooting debugging, when user accesses to external objects via an OData adapter for Salesforce Connect.
Apex Code	Contains the Apex code information. It also can contain information such as log messages generated by DML statements, inline SOQL or SOSL queries, the start and completion of any triggers, and the start and completion of any test method.
Apex Profiling	Contains cumulative profiling information, such as the limits for your namespace and the number of emails sent.
Visualforce	Contains the Visualforce events information, contains serialization and deserialization of the view state or the evaluation of a formula field in a Visualforce page.
System	Contains the calls information of all system methods such as the System.debug method.

The following figure shows the (SFDC) Implementation in (Developer Console) of Salesforce :

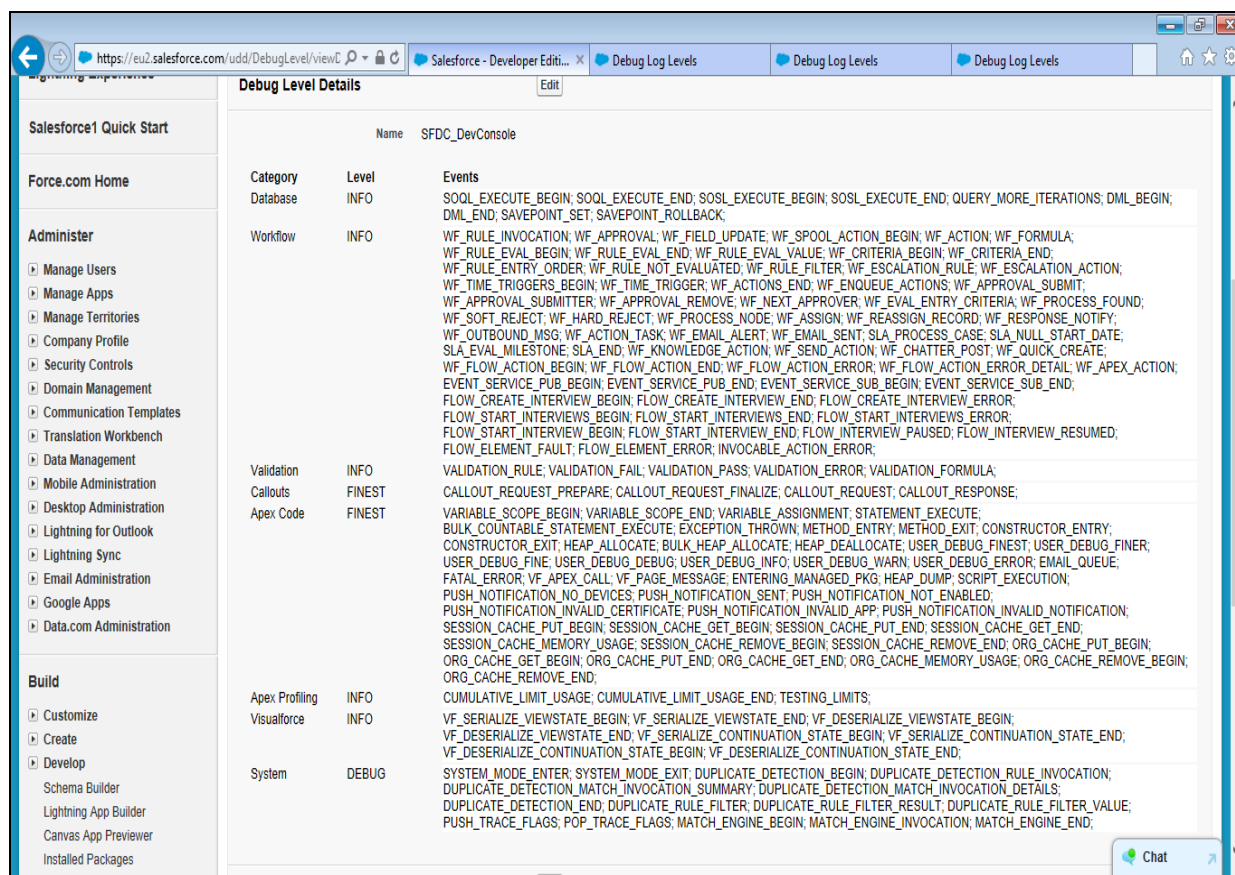


Figure 2. The details of a (SFDC) implementation in (Developer Console).

## 7. Conclusion

The java client Application – Salesforce integration (SFDC) provides synchronous communication which uses the (SOAP) services as middleware for data transportation or data exchange over cloud using web service. The java language is used to implement the Integration Code in (SFDC), java language at the client application side is used to develop apex class at Salesforce side. In (SFDC) the (SOAP) is allowed for communicating and transferring data from java client application to Salesforce to query the data base, and executed every operation that writes to a Salesforce cloud platform like create(), update(), insert() and delete() as single operation. The result of (SFDC) implementation can be previewed through (Developer Console), it is a Salesforce collection tools for apex code execution. it specifies the debug level of information amount and information level that is logged for different events and for each (Developer Console) category of (SFDC) implementation.

## 8. References

- Abraham S., Henry F., S. Sudarshan, "Database System Concept", sixth edition, published by the the Tata McGraw-Hill pp. 1017-1018, 2011.  
 Apex Workbook , Winter 17, pp.1- 4 , 2016.  
 url: [https://resources.docs.salesforce.com/sfdc/pdf/apex\\_workbook.pdf](https://resources.docs.salesforce.com/sfdc/pdf/apex_workbook.pdf).

- Anupam Rastogi, " Force.com SOAP API Sample WSDL Structures",2015.  
url:<https://developer.salesforce.com/blogs/developer-relations/2015/06/salesforce-soap-api-sample-wsdl.html>.
- B.P.R. Enumi Choi and Ian Lumb, "A Taxonomy and Survey of Cloud Computing Systems", Fifth International Joint Conference on INC,IMS and IDC,pp. 44-45, 2009.
- Changbin Wang and Yuan Xu, "Web Services Integration Method", 2010.  
url: <http://publications.lib.chalmers.se/records/fulltext/129251.pdf>.
- Danish Jamil and Hassan ZAKI, "Security Implication of SOAP and Webservice Interfaceto the Cloud Computing System ", International Journal of Engineering Science and Technology , (IJEST), SSN : 0975-5462 Vol. 3 No. 4, 2011.
- Fatos Xhafa, Nik Bessis," Inter-cooperative Collective Intelligence: Techniques and Applications ", published by Springer,vol. 495,pp.41,2014.
- Hadi Razzaghi Kouchaksaraei and Alexander G. Chefranov, " CounteringWrapping Attack on XML Signature inSOAP Message for Cloud Computing".2013.  
url:<http://adsabs.harvard.edu/abs/2013arXiv1310.0441R> .
- M.Priyadharshini,I.Suganya,N.Saravanan," Asecurity Gateway for Massage exchange in Services by Streaming and Validation", International jornal of Innovative in computer and communication Engineering Vol.1,Issue 3, 2013.
- Phil Choi,Chris McGuirem,Caroline Roth,"Force.com Platform Fundamentals", Version9.2,pp. 359,2016.
- S.Bhayal, "Astudy of security in cloud computing, ProQuest Dissertation Publishing", 2011.
- SOAP (Simple Object Access Protocol) Definition, 2013.  
url:<http://www.techterms.com/definition/soap>.
- W3C, "SOAP Specifications" ,2007. url: <http://www.w3.org/TR/soap/>.