

# Survey on Web Service Composition and Invocation

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## ABSTRACT

*The popularity of Service Oriented Architecture is increasing day-by-day. Web service facilitates the availability of any module of software over the internet and provides a standard mechanism for messaging (XML). HTTP is being used widely on World Wide Web which increases the popularity of web services. This helps to make use of existing standalone application to get exposed as a service which will be easily available to other for use. Exposing the application as service means the composition of service which will be invoked by the client. Thus, Great importance has been given for invoking the web service available on network and composition of SOAP, REST and Non-web services. Major efforts are to be taken, firstly, on invocation and composition of heterogeneous web services with different protocols. This paper focuses on the survey of Web Services, BPEL Engine, Orchestration of Web Services and BPEL. It also presents the efficient orchestration by using the heterogeneous nature of Web Services.*

**Keyword:** - Web Services, SOAP, REST, BPEL Engine

## 1. INTRODUCTION

Web services are software components that communicate using pervasive, standards-based web technologies including HTTP and XML-based messaging. Protocols such as SOAP (Simple Object Access Protocol) and REST (Representational State Transfer) are basically used in Web Services. SOAP Protocol is transfer protocol which used services to publish the business logic. REST is an architectural style which used URI to publish the business logic. While using SOAP, data format is stick to XML while in REST it works with plain text, XML, JSON.

Since based on open standards such as HTTP and XML-based protocols including SOAP Simple Object Access Protocol) and WSDL (Web Service Description Language), Web services are hardware, operating system and programming language independent. This means that applications written in different programming languages from different platforms can seamlessly exchange data over intranets or the Internet using Web services. Web services are designed to be accessed by other applications and vary in complexity from simple operations to complex process, for example, getting weather details online, to processes running customer relationship management.

Web services provide several benefits such as interoperability with the platform, language-independent XML technologies and by using ubiquitous HTTP, the application can communicate with any other application using web services. The client only needs to deal with WSDL definition to effectively exchange data with the service. Underlying data stored and implementation is completely hidden. This allows an organization to integrate

applications with relative ease. Web services are versatile in design and they can be accessed by the client application or by another web service. Code reuse is another side of interoperability. As it uses existing web infrastructure and ubiquitous protocol, the implementation cost is low.

## 2. LITERATURE SURVEY

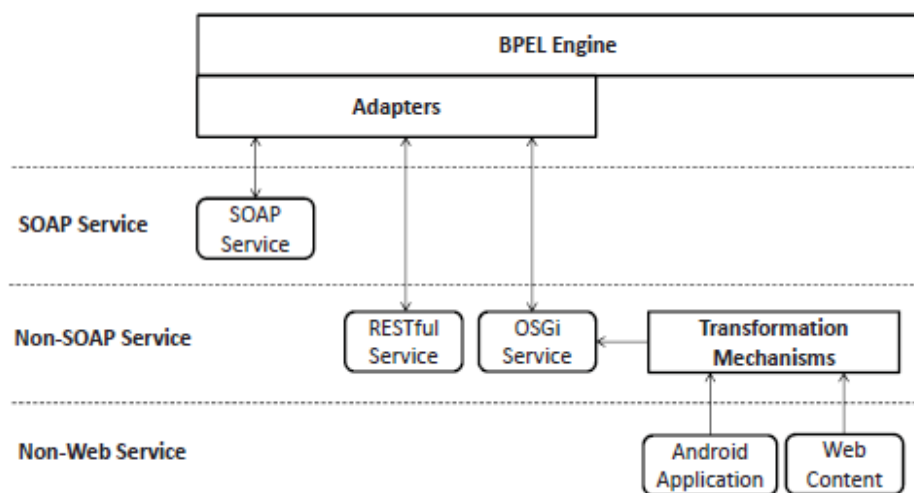
For the complex service which provides atomic operation, composite web services serves more benefits to the clients. Recently BPEL has been extended to support the composition of the web services, e.g. REST and OSGi. For serving the clients which are written in varying languages REST architecture principles are used. This addresses on how the resources are addressed and transformed over HTTP. BPEL (Business Process Execution Language) is a process execution language based on XML. BPEL allows Web services to interconnect and share data in a service-oriented architecture. Thus business process can be described as

- Business process: models actual behavior of a participant in iteration for business
- Business protocol: specify the exchange behavior of messages of parties involved in protocol without knowing internal behavior.

Process description for business rules is called as abstract processes. Programmer uses BPEL for execution of the processes, process can be a workflow which help to perform operation in step by step manner. Workflow consist of number of activities, each having individual operating functionality. These activities are integrated according to business logic for achieving particular goal. E.g. Migrating data from one system to another system. Workflow can be design which may have activities individually for fetching data, updating the data and dumping the same in another system considering integrity of the data.

### 2.1 Paper-1

In this paper authors have proposed an approach for Invocation and Composition of Web Services with two prominent attributes. First is Adapter pattern in which extended BPEL engine is bundled with adapters for invoking and composing of SOAP, REST and OSGi services. Second is the Transformation mechanism which enables the conversion the Android activities and Web contents into OSGi services. The conceptual model of the architecture is given below:



**Fig -1:** Conceptual Model of Service Invocation and Composition [1]

From the perspective of resource consumption in mobile environment, Engine can be a more suitable frame work for heterogeneous service composition and invocation.

## 2.2 Paper-2

To build a larger system and reusing existing systems, Service integration and orchestration plays an important role. Most widely used services are Web applications and SOAP based services. Services are heterogeneous which brings several challenges while Service integration and orchestration. The use of adapters and converters are not much efficient. This paper presents an approach for efficient orchestration by integrating numerous dis parate services such as SOAP services and REST services.

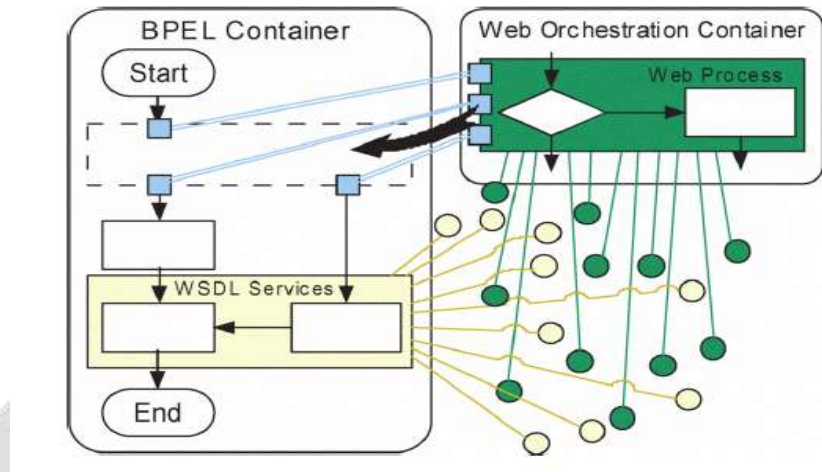


Fig -2: Hybrid Orchestration [2]

Paper discussion is on Service centric and Web Centric approach. In Service oriented approach, services need to have WSDL interfaces included in orchestration engine while in Resource oriented approach there is no WSDL interfaces. Resources are identified by URI and uses an existing architecture of Web.

## 2.3 Paper-3

Web Service composition allows to fulfill the changing requirements of users by integration of existing services. This paper focuses on a framework for dynamic composition. This framework uses SOAP and REST services to develop composite services. Framework proposed “Model-driven Dynamic Composition of Heterogeneous Service” is introduced. This MDCHS framework is built based on three views. First is Data view which contains Meta model and their relationships; the second is Process view, which consists of composition phase and the third is the component view, which shows abstract view of component and their interactions. To cover the process of service composition each view provides instructions. Meta model deals with all required elements for SOAP and RESTful service composition.

## 2.4 Paper-4

This paper proposes the schema for composing OSGi services. It orchestrates atomic services which increase the potential of OSGi services. Numerous services are offered from combinations of these atomic services. This paper presents transparent BPEL solution without breaking OSGi standards. Atomic service composition is not much flexible because of syntactic matchmaking which is given by OSGi standard. Thus to overcome this Semantic OSGi platform is defined for OSGi service composition.

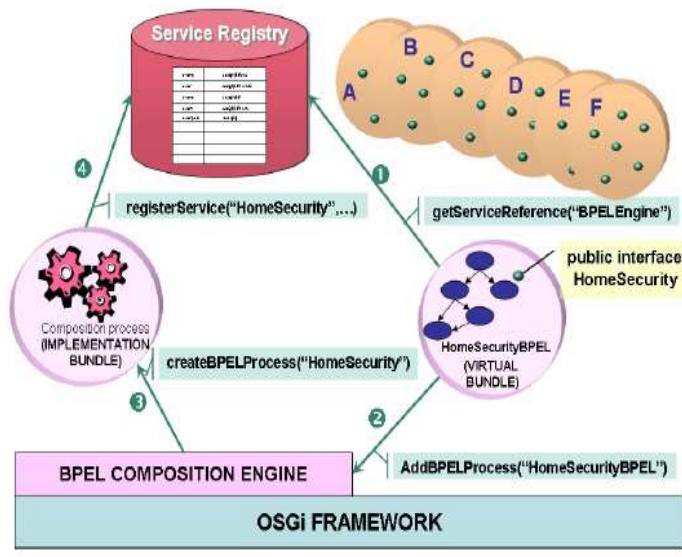


Fig -3: Registering an OSGi composite service [4]

### 2.5 Paper-5

This paper proposes a framework of WS Binder which is used for dynamic binding. It helps for dynamic binding of service composition based on preferences. It supports runtime recovery and provides rebinding. Binding and Mapping mechanism consist of Pre-execution workflow global binding, the second is Run-time local binding and the third is Run-time workflow slice re-binding. Architecture of WS Binder is given in Fig-4. Binding is determined by considering by considering functional policies and by local and global optimization criteria.

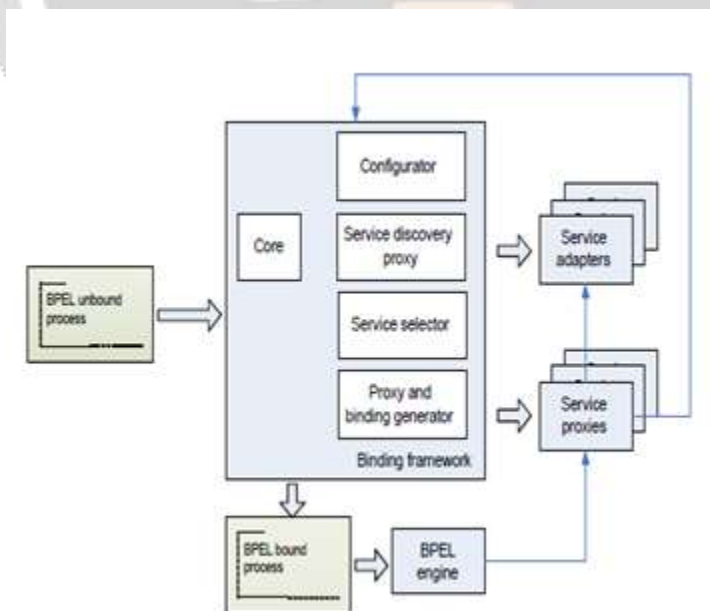


Fig -4: WS Binder architecture [5]

2.6 Paper-6

Paper describes the framework for Business objects are compressed and transmitted to client side in form of RDF. This information is stored in local storage which is persistent. This messages are in compressed form which helps to store large number of business objects. Business manager is responsible for local service calls, updating and loading business processes. Data Connection Manager is responsible for parsing SOAP files. Framework supports for remote invocation.

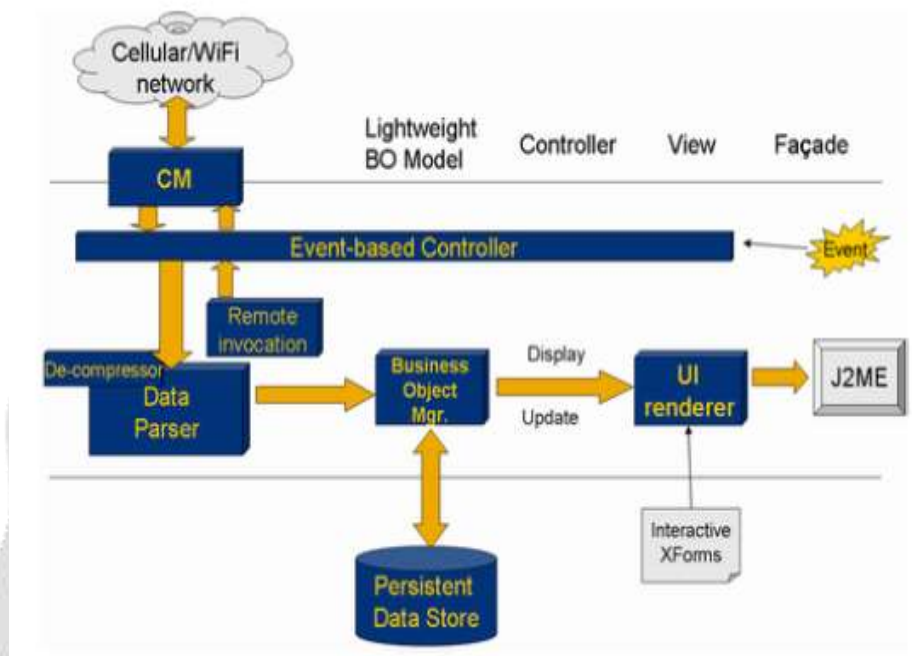


Fig -5: Mobile Client Framework [6]

3. COMPARISON

Sr. No.	Paper Name	Advantages	Disadvantages	Result
1	A Framework for Composing SOAP, Non-SOAP and Non-Web Services	<ul style="list-style-type: none"> <li>• Less network Traffic</li> <li>• Spends less turnaround time</li> </ul>	Framework is based on Static invocation	<ul style="list-style-type: none"> <li>• Composition framework for SOAP, REST and OSGi services.</li> <li>• Request-response SOAP messages is not transferred from server side SOAP service.</li> <li>• Request-response is send directly to BPEL engine.</li> </ul>
2	Integration and Orchestration of Heterogeneous Services	<ul style="list-style-type: none"> <li>• Efficient for large scale integration of heterogeneous web services</li> <li>• More robust</li> </ul>	Orchestration of only SOAP and REST is considered	<ul style="list-style-type: none"> <li>• Orchestration of SOAP and RESTful web services.</li> <li>• SOAP-WSDL orchestration is conducted for BPEL orchestration.</li> </ul>

		orchestration <ul style="list-style-type: none"> <li>• Performance increased by minimizing integration of heterogeneous Web Services</li> </ul>		
3	MDChES:Model-Driven Dynamic Composition of Heterogeneous Service	<ul style="list-style-type: none"> <li>• Enhance the performance</li> <li>• Reduces complexity</li> </ul>	Qos , Discovery and Selection is not considered	Framework via three different views: data, process, and component view.
4	Enhancing Residential Gateways: OSGi Service Composition	<ul style="list-style-type: none"> <li>• Increases the potentiality of OSGi Services</li> </ul>	Syntactic match making is not flexible	Framework based on Semantic OSGi platform, which combined with the BPEL-style solution fits all the OSGi service composition requirements
5	WS Binder: a framework to enable dynamic binding of composite web services	<ul style="list-style-type: none"> <li>• QoS optimization</li> <li>• Preexecution and runtime binding is supported</li> </ul>	Binding not considers customized Qos	Framework for enabling dynamic binding of service compositions according to some functional and non-functional preferences and/or constraints
6	Service-Oriented Architecture for Mobile Applications	Overcomes occasional connectivity and limited memory	Service Oriented architecture in Mobile applications without OSGi services	Methodology helps for migration of desktop application into mobile applications

#### 4. CONCLUSIONS

The above papers describes the various areas of Web Services. The survey of these paper collectively helps to hike the knowledge of Web Service working, Orchestration of Web Service, Web Services applications such as in Mobile phones, Integration of Web Services with BPEL, Improving the flexibility by providing common platform for composition and invocation, Dynamic binding and invocation. Study of these factors allows to grow up the knowledge in the area of Web Services which is becoming very popular due to SOAP and HTTP protocol.

#### 5. ACKNOWLEDGEMENT

The authors would like to thank the researchers as well as publishers for making their resources available and teachers for their guidance. We are thankful to the reviewer for their valuable suggestions. We also thank the college authorities for providing the required infrastructure and support.

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