

# A Survey on Dynamic Web Services Composition Existing Methods and Related Techniques

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**ABSTRACT-** In recent time, as technology is the basic need and web service is emerging as the solution for many problems. Web is the biggest source of information and services. Most of the services are already in existence. The web service composition means to develop new service by composing the related existing services. Optimize Web service selection is still a challenging task. In this paper, we present our observation and a technical survey on ‘Dynamic Web Services selection and Composition Techniques’ after a long term study and review various papers.

**Keywords:** Web Service, Web Services Composition

## I. INTRODUCTION

In this Computerized Era, approximately everything, from shopping to travelling, is available on the web. Web Service are scattered over the network. The nature of web services is heterogeneous and dynamic [1]. Platform and language dependency is not the constraint for web services [1][2]. Web services can be created and updated very dynamically. These available web services can be used to improve the business performance by reusing the available web services. To increase the business performance we need to compose these heterogeneous, platform and language independent services together. For that manual composition is not a solution so we want an computerized composition method. In this paper we are performing a survey on existing automated web service composition methods and analysing their performance. Web service is a self contained, modular application which is located and invoked over the internet. A web service can be considered as a module which can be identified by a unique URL. To enhance the performance of B2B collaboration inside and outside the boundary of the organization we need to compose these available web services.

Web Services can be categorized as -

**Standalone Web Service:** Single functionality services are called as standalone services.

**Composite Web Service:** complex service and a combination of various functionalities and combination of various services is called as composite web services.

### Stand alone Web Service



### Composite Web Service



Fig. 1

## II. INTRODUCTORY APPROACH TO WEB SERVICE COMPOSITION

In traditional approach of Web Service Composition, the services are gathered and then combined manually based on the particular requirement. To do so, two approaches were taken into consideration- Top Down and bottom up Approach. In Top -down Web Service composition approach, first we find out a workflow, and then we find out the Services which can be added to complete the workflow. In bottom-up approach, we collect all the related Web Services and then define the workflow consisting of all the services to achieve the desired functionality. Both the approaches involve a lot of manual effort which is time consuming as well. To overcome the effort and make it faster, automation approach is required for composition of services. However, creating fully automatic system is an issue with bunch of quality of service constraints.

## III. CHALLENGES OF AUTOMATIC COMPOSITION

Web services are heterogeneous in nature. Though they have a very big advantage of being language platform independent, but due to their scattered nature, it is very challenging to compose these services. In fully automated approach, the manual effort is needed for defining starting and ending points and certain criteria. However, the approach addresses the functional requirement of system and non-functional requirements are not taken into consideration. Discovering the non-functional aspects of the solution could be really challenging task, but it can not be ignored. In a long term, these non-functional aspects can result into complex issues.

There is huge number of web services with the similar functionality. Those having similar functionality are

distinguishable via QoS values. Several QoS factors are as follows:-

**Throughput:** - Throughput is known as the business rate able to produce a product for a given unit of time.

**Response time:** - Response time is the diversity between time takes place in respond and request of service

**Cost:** - Cost is usually a budgetary calculation of time, resources, material, effort and utilities consumed, risks incurred, and opportunity in production and delivery of a good or service

**Reliability:** - Reliability in the broad meaning in the science aimed at forecast, analysing, prohibit and assuage failures over time.

**Network delay:** - The delay of a network describes about what time it used for a piece of data to transfer across the network from one source or endpoint to another. It is normally calculates in multiples or parts of seconds.

**Reputation:** - Reputation of a social entity (a person, a social group, an organization) is an assumption about that entity, normally a result of social evaluation on a set of criteria.

**IV. RESEARCH REVIEW FOR AUTOMATED COMPOSITION**

Web service composition can be considered of four types:-

- Semantic based
- Model driven based
- Ontology based
- Context based

Summary of web service composition approaches:-

**Features of web service languages:-**

Web service composition is an important element of service oriented architecture. web service composition provides the reusability benefits. Overview is presented in various web service composition languages namely BPML, BPEL4WS, OIL, DAML and WS-CDL.

**BPML:** - The Business Process Management Initiative (BPMI) has formed a standard BPMN as Business Process Modelling Notation. The BPMN 1.0 defines was liberated released in May, 2004. This specification shows the result of performance of BPMI Notation working group. The main objective of the BPMN effort is to give notation which is understandable by all business users, from the business

analysts that define the starting outline of the processes, to the technical developers important for implementing the technology that will perform those processes, and at last, to the business people who will regulate and supervisor those processes. BPMN will also be supported with a private model that will facilitate the generation of executable BPEL4WS. Thus, BPMN adds a levelness bridge for the distance between the business process design and process fulfilment. BPMN specifies a Business Process Diagram (BPD), which is based on a pictorial representation technique tailored for creating pictorial sketch process of business operations.

| Approach             | Semantic based | Model driven | Ontology driven | Context based |
|----------------------|----------------|--------------|-----------------|---------------|
| Context support      | no             | no           | no              | yes           |
| Execution monitoring | no             | no           | no              | yes           |
| Semantic support     | yes            | no           | yes             | no            |
| Transaction support  | no             | yes          | no              | no            |
| QoS monitoring       | no             | yes          | yes             | yes           |
| Coordination         | no             | yes          | yes             | no            |

Table :-1

**BPEL4WS:-** Today we use web services for communication with each other, announce them, and are exposed and request using wide specifications of industry. However, until last week, associating these services together into a business scheme or a combination gave the user number of clashing specifications to choose from as was the option with WSFL from IBM and XLANG from Microsoft. BPEL4WS as The Business Process Execution Language for Web Services represents the combination of WSFL and XLANG, and with profit, will become the basic of a common for web service composition. BPEL4WS combines the best of both WSFL (groundwork for graph adapted processes) and XLANG (skeletal constructs for processes) into one adhesive package that supports the application of any kind of business process in a very basic pattern. In addition to being an application language, BPEL4WS can be used to explain the interfaces of

business processes as well using the notation of basic processes. We will describe further on this in future articles.

**OIL:** - This document explained the OWL Web Ontology Language. OWL is basically to be used when the information of documents wants to be processed by any operation, as equivalent to situations where the data only wants to be show to humans. OWL can be used to clearly show the meaning of terms in meanings and the relationships between those terms. This shows the terms and their interrelationships is called ontology. OWL has more facilities for expressing explanation and interpretation than XML, RDF, and RDF-S, and thus OWL goes behind these languages in its capacity to represent machine understandable content on the Web. OWL is a review of the DAML+ OIL web ontology language whole lessons learned from the design and application of DAML+OIL.

**DAML:-**DAML (DARPA Agent Markup Language) is an html language for the DARPA as U.S. Defence Advanced Research Project Agency that is based on the Extensible Markup Language (XML). DAML is described to have a higher capacity than XML for explaining objects and the relationships between objects, to express meaning, and to develop a higher level of property of a product or system among Web sites. As the central research and development agency for the U. S. Department of Defence, DARPA was serving as a means of pursuing an aim in the creation of the Internet and many of its technologies. DARPA is constructing DAML as a technology with the ability to acquire built into the language by the nature of agents, programs that can dynamically identify and comprise sources of information, and communicate with other agents in an autonomous fashion.

**WS-CDL:** -The WS Choreography Definition Language (WS-CDL) is an XML-based language that describes peer-to-peer combination of Web Services participants by defining their common and integral observable behaviour; where arranged message exchanges result in accomplishing a common business goal. The Web Services Choreography specification is aimed for composing interoperable peer-to-peer collaborations between any types of Web Service participant  
Regardless of the auxiliary platform or programming system used by the implementation of the hosting environment.

Web service languages comparison:

|                         | BPML   | BPEL4 WS | OIL    | DMAL   | WS-CDL |
|-------------------------|--------|----------|--------|--------|--------|
| Semantic support        | no     | no       | high   | high   | no     |
| Transaction Support     | medium | medium   | medium | medium | medium |
| Exception handling      | high   | high     | high   | high   | medium |
| Collaboration support   | medium | high     | high   | high   | low    |
| Business collaboration  | no     | medium   | no     | no     | no     |
| Software vendor support | high   | high     | low    | low    | medium |
| Workflow control        | high   | high     | high   | high   | low    |
| Role modeling           | low    | low      | no     | no     | high   |

Table :-2

QoS aware web service composition approaches:-

| categories      | Sub-categories      | techniques               |
|-----------------|---------------------|--------------------------|
| Static approach | Local optimization  | Dynamic programming      |
|                 |                     | DFS                      |
|                 |                     | Simple additive weighing |
|                 | Linear optimization | Linear programming       |

|                       |                     |                          |
|-----------------------|---------------------|--------------------------|
|                       | approximation       | Genetic algorithm        |
|                       |                     | Particle swarm algorithm |
|                       | Pareto optimization | Genetic algorithm        |
|                       |                     | Particle swarm algorithm |
|                       |                     | Weighing                 |
|                       | Dynamic approach    | Internal adaption        |
| Strengthened learning |                     |                          |
| Graph based approach  |                     |                          |
| Heuristic algorithm   |                     |                          |
| External adaption     |                     | Social network analysis  |

Table :-3

**CONCLUSION**

In this paper a survey has been performed on web service composition methods. Several QoS parameters have been discussed for the optimum web service selection. Web service composition algorithms are categorized based on their nature.

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