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QoS Web Service Composition

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***Abstract*--** With the rapid increase of Web services, quality of service (QoS) has become an important factor in differentiating different services. In this paper, we look different factors involved in finding the quality of service in composition of web services and the components involved in web services.

***Keywords*--** *Web service composition, web service framework, components of web service composition.*

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I. INTRODUCTION

Web services are the software services that are used by different users over the network popularly using XML standards. They need to communicate to each other and for that XML communication is used. The communication in XML is done by sending request message packet from client end and sending response message by service providers.

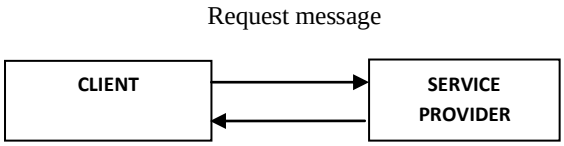

Figure 1: Communication of Client and Service

It is however important that web services abstract the details of functioning of the applications and the location of service providers. Web services can be combined with other web services according to the requirements of the user. This is known as web service composition. With web service composition many different vendors are combined according to some business norms, to provide different but related services to the user.

As the web service composition escalates, Quality of Service (QoS) has become crucial factor in prosperity of different business vendors. QoS determines the usability of the service involved in web service composition by providing the consideration of different factors that influence the popularity of the services. QoS involves non functional properties that can be applied to stand-alone or composition of web services.

II. QOS FACTORS FOR WEB SERVICE COMPOSITION

Web service Composition is a compilation of several services aggregated to execute in a sequence form. A complex composition problem that is parallel implementation, branching, and loops is usually an NP-hard problem. QoS involves various non-functioning properties. Various Qos factors are Execution Cost, Execution Duration, Execution Reliability, Availability, Reputation of Business vendor or product etc.

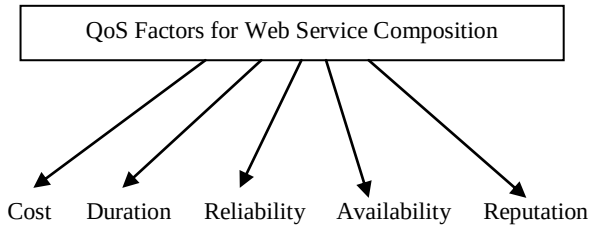

Figure 2: QoS Service for Web Service Composition

Selection of services is dependent on web service composition. In order to reason about Web services, a framework is needed which captures the QoS from a user's perspective. Such framework must take into account the fact that QoS involves multiple dimensions, and the fact that the QoS of composite services is determined by the QoS of its underlying component services [2].

III. REVIEW OF RELATED WORK

Several studies are conducted that focus on the web service composition and need of QoS factors and their usage etc. Many papers are studied and many QoS issues regarding web service composition are analyzed.

Liangzhao Zeng et al. describes that AgFlow is a QoS-aware middleware supporting quality driven Web service composition. The AgFlow platform has been used to validate the feasibility and benefits of the proposed approaches [2]. Farhan Hassan Khan et al. describes the dynamic web services composition algorithm to solve the composition issues related to data distribution, reliability, availability and QoS. They presented a framework in which

multiple repositories and WSDBs have been introduced in order to make system more reliable and ensure data availability by using Apache Java implementation of Universal Description Discovery and Integration and RUDDI to access the JUDDI so that, Service providers can perform various operations in UDDI registries like save, edit and delete services and businesses by using RUDDI [3].

Deivamani Mallayya et al. consider different QoS properties in their studies like, Execution Cost, Response Time, Reputation, Frequency, and Execution Rate for defining web services composition [4]. M. Allameh Amiri and H.Serajzadeh consider non-functional factors such as execution cost, execution time, availability, successful execution rate, and security while quantifying QoS [5].

IV. RADICAL SERVICE INVOLVED IN QOS

Different radical service of quantifying quality factors in QoS are:

1) Execution Cost: Execution cost is the amount of money that the service requester has to pay to use different composite services. The cost factor Cst can be measured in the terms of amount payable for the service s by using task t.

$$Cst, \text{ where } \in \{1..n\}, t \in \{1..n\}$$

2) Execution Time: It is the time quality factor that is calculated by the taken by the difference between the times when request has been made with the time when final result has been displayed to the user. The execution time Tsr can be measures in the terms of execution time between moment s at which request has been made to the service and the moment r when the final result is shown to the user.

$$Tsr \text{ where } \in \{1..n\}, t \in \{1..n\} \text{ (n is number of services involved)}$$

3) Availability: Availability Tav is the factor is the probability of the total amount of time interval during which service is made available to the user Ts or provides responses during last time interval Time θ

$$Tav=Ts/\theta$$

4) Reliability: The reliability qrel(s) of a service s is the probability that a request is correctly responded within the maximum expected time frame indicated in the Web service description Nc(s) is the number of times that the service s has been successfully delivered within the maximum expected time frame, and K is the total number of invocations [2]

$$qrel(s) = Nc(s)/K$$

5) Reputation: Reputation quality factor determines by the review of the product and by the review of work done by that business vendor that provides services to the user. Reputation Rp is calculated by using the sum of the ranking factor Rf provided by total number n of users.

$$Rp=\sum Rf/n$$

V. WEB SERVICE COMPOSITION FRAMEWORK

We propose a prevalent framework for dynamic Web services composition. This framework describes the abstraction of the user from the implementation details of the different web service composition and involvement of different business vendors in this composition.

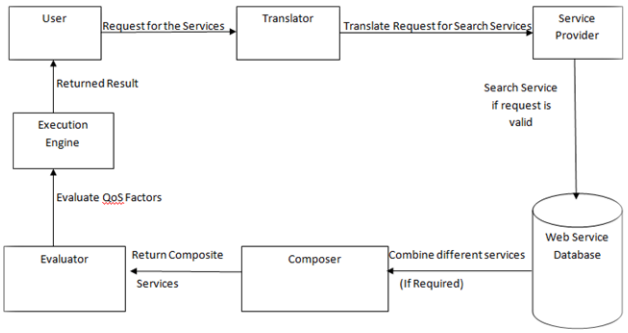

Figure 3: Web Service Composition Framework

From figure 3 it is clear that the web service composition includes different components.

1) User: User is the most important component of the web service composition. This component can be a software or actual client that generates request for various web services by the client software. The request of the client is generates dynamically, as the requirement of the related web services occurs according to execution of some events.
2) Translator: Translator is the software that can be run on the client's machine or on the service provider's machine. This component is enjoin, as the user may have the different architecture from service providers and to make the service provider understand the request made by the user, request must be converted to the protocols used by service provider.
3) Web Service Database: Web Service Database (WSDBs) stores the necessary information regarding, how to combine multiple web services, how to contact different business vendors dynamically to composite web service according to the request made by user. It is a component that every business vendor have, to store above information and stores the information regarding web service provider by that vendor.

4) Composer: Composer is a software that is responsible for composition of different web services, according to the requirement occurs by the user. This software is run on almost all business vendors that can provide the facilities of web service composition.
5) Evaluator: Evaluator plays a crucial role in optimizing the QoS request made by user. It evaluates the optimization of the composite web service, according to the quality optimizing factor selected by the user. This QoS factor varies by different user, as one user may want composition of web service according by minimum cost, while other user may wants to minimize the execution time and can bear the high cost involved in execution of these composite web services.
6) Execution Engine: Execution engine helps the client to use the resultant composite services. Execution engine is run on every client's machine that wants to use the composite web services. This component is enjoin to provide the facility to run the different services according to the client's machine architecture.

VI. CONCLUSION AND FUTURE WORK

This paper involves study of different web service composition factors. Quality of factors are also included in the paper to determine the QoS optimization. This study also enlists some of the components involved in web service composition. In addition, it also explains how these components works in a collaborative way for using of services or optimizing QoS according to different factors selected by different users. The future work will further consider some other quality factors like accessibility, security, regulatory, transaction etc. and further the implementation of all these factors in real application using programming principles.

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