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Improved framework for Web Service Life Cycle Activities based on Composite Web Services

Jyoti Parashar[1]
Research Scholar /MMICT&BM
Maharishi Markandeshwar University, Mullana
Ambala, Haryana, India

Atul Garg[2]
Associate Professor/MMICT&BM
Maharishi Markandeshwar University, Mullana
Ambala, Haryana, India

Abstract: ***The growth of the Internet and Web has already had a significant impact on education, business, banking, entertainment, government, shopping, communication and working life etc. The Web Developers may face serious problems in successful development, deployment and maintenance of Web Services. Further, these days the client's requirements are increasing day by day. So, to provide the accurate and composite results the developer the composite Web Services came into existence. But, the composite Web Services the new problems arises and in its result the Web Life Cycle Activities are affected. In this research paper an improved Web life cycle framework is proposed to decrease the basic problems of Web information retrieval.***

Keywords: WSMO, WSMX, Security, Ontology, Web Service, Web Life Cycle Activities

I. INTRODUCTION

The Web services paradigm which finds roots in Service-Oriented Computing improves flexibility and dynamic interoperation of distributed and heterogeneous Web services. The main benefits of Web services are interoperability and reusability. This new concept leads to development of new paradigm that enables an interaction or interoperation between different applications. For example, during online shopping client access a Web service and for online payments a different Web application is required which combines the online service provider's Web service with the payment provider's (e.g. Bank) Web service. In this way the life cycle of the Web service is effected and the user is totally unaware from the background work. In results the users face multiple problems like performance, time, security and reliability in various Web applications. At higher level integration is required to manage the protocol stack based on messages centered and on network protocol semantics. Thus, it enables loose integration of business functions. The integration and application of Web Services can be done in an incremental manner using existing languages, platforms and by adopting existing legacy applications.

Web service life cycle is a fundamental topic for Web services and service computing. A Web life cycle activities can be well-thought out as a consistent and a secure way of managing the Web services.

A Web service has become an principle part of the Web World managing and sharing the resource of the business. Web services are expected to be the key technology in enabling the text installment of the Web in the form of the Web service. This has fundamental implications in both technologies and business applications. Software can be redelivered and paid for as flowing streams of services as opposed to packaged products. It is possible to achieve automatic and dynamic interoperability between systems to accomplish business tasks.

As W3C defined [17], "Discovery is the act of locating a machine process description of a Web service related resource that may have been previously unknown and that meets certain functional criteria". Really Web service detection is the route of finding a proper Web service for a given task. Many times, it is not possible to fulfill the client's requirements with a single Web service there should be a possibility to combine existing services together in order to satisfy the request requirement. So, in result many researchers in academia and industry are working in this area. Then the Internet will become a global common

platform where organizations and individuals communicate with each other to carry out various commercial activities and to provide value-added services.

Most of current approaches related to WSC (Web Service Composition) applied following techniques: HTN [1], Golog [2], classic AI planning [3], rule-based planning [4], model checking [5], theorem proving [37], Semantic Based [6], QoS4WSC [34] etc. Some approaches need too much human effort and some overlook the problem of discovery. The barriers to providing new offerings and entering new markets will be lowered to enable access for small and medium-sized enterprises. The dynamic needs/requirements become achievable and may be even mandatory for competitive advantages [7].

Web Life Cycle Activities are affected due to Composite Web Services are analyzed and compared in [18]. The authors discuss the Web life cycle from the evolution of the Web to modern world. In their research the authors discussed that how Web life cycle activities are affected when new requirements of the users are fulfilled with the new technologies.

In this research paper the paper is organized in the following format: in section II the current challenges are discussed and an improved Web life cycle is proposed. In last section conclusion of this work is discussed.

II. IMPROVED WEB LIFE CYCLE FRAMEWORK

In this era, with the revolution of electronic devices and media each and every person wants to be online every time. So, people are connected with each other using Internet and Web. For various purposes only one Web services is not able to provide the desired result. On Internet there are various Web applications which help to connect more than one service (for example billdesk). Connection or interoperation of more than Web service is known as Web composition. Further, Web composition affect the Web life cycle [18].

The renowned researches were proposed various Web life cycle frameworks according to requirement and to improve the performance or other parameters of the Web compositions. Nolan et al., [36] introduce an architectural framework to tackle the difficulties that arise when service requests cannot be perfectly matched to existing service descriptions. This is done by enriching service descriptions during service negotiation and selection phase with additional information regarding negotiated functional and nonfunctional parameters which is stored in an additional ontology document.

Yu and Lin [35] proposed use of a Quality of Service (QoS) broker to build decisions in service selection and service composition in multimedia Web services. During their research, multimedia data is transferred throughout a separate socket connection established among the client and the server. The authors think it is best to use a separate socket connection as the size overhead is vast under the current Web service standards.

Basically the security problems that are likely to affect Web services are the same as those that have affected the conventional Web-based systems. Many of these were in depth [9, 10, 11, 12, 13, 14 & 15]. The current situations as follows: security is critical to the adoption of Web services by enterprises but as it stands today the Web services framework does not meet basic security requirements. The fact that Web services involve exchange of messages means that securing the message exchange is an important issue to consider when building and using Web services.

In the Web services context security means that the recipient of a message should be able to verify the integrity of the message and to make sure that it has not been modified. The recipient should have received an encrypted message with the identity of the sender [16].

It can be seen from the literature, various theories and techniques are developed to improve the Web Services. With the heterogeneous information, huge number of users and more and more Web Applications on Web, still there are few challenges which need to be improvement. The basic challenges are as follows:

a) ***Optimization Web Services:*** It is very difficult to optimize different Web application which is required for Web Composition. On Web the various Web applications are scattered on different servers throughout the world. So, it's a challenge to combine and optimize different Web Application.

b) ***Web Service Composite correctness:*** It is very difficult to choose the correct related Web application required for the need of the users. And if that is found than it may possible that could be developed in a different programming language. So, to combine and correlate to different type of Web Applications is a critical issue.

c) ***Web Automatic Composition:*** Many composition approaches aim to automate composition which promises faster application development and safer reuse and facilitates user interaction with complex service sets. Moreover, an "intelligent" composition engine selects adequate services and offers the composition transparently to the user. The main problems to identify customer services and its rerated Web service than to compose the two different Web Applications [21].

d) ***Scalability:*** This represents the ability of the Web service to process multiple requests in a certain time interval. Composing two Web services is not the same as composing more Web services. In a real-world scenario end users will typically want to interact with many Web services while enterprise applications will invoke chains of possibly several services. So, a vital issue is how the proposed approaches scale with the number of Web services concerned.

e) ***Time Limit:*** The Web service composition takes much time during composition. So, it reduces the performance.

f) ***Transaction failures:*** The Web Services in case to online money transfer are getting may face transaction failure problem. For example if a user want to do some transaction through OBC then during payment the online shopping Web Application is moved to Bank's Web Application. Then for login in OBC bank, the bank sends an OTP message to the client for security reasons. But, if client didn't get the message on time then the Web application of the bank shows the time out message to the client. In result, the client has to start his/her work from beginning.

g) ***Reliability:*** These systems cannot hold the pressure of exponential growth and were not to fault tolerant. With the combination of more services it is very difficult to make services reliability.

h) ***Web Caching:*** There is a possibility of mismatching of data in the local cache access patterns and Web server log records [24]. For example clients visited page hierarchy but due to data in caching server has recorded log differently as second time access of each page would directly been from cache. So the second entry of page is missed from log [24]. Atul [25] proposed portable extended cache memory to reduce Web traffic and to improve performance. In their research they keep the heavy information (e.g. audio, videos or heavy images) of related to the Web application at the client side. But, it could be a problem to combine their Web application with another Web Application.

i) ***Security:*** These days mostly people are using internet shopping. For internet shopping, the users have to use a shopping Web site and than for the payment they have to use a different Web site. These systems cannot hold the meet basic user security requirements. Fundamentally, each message exchange should be private and unmodified between the service requester and service provider as well as non-reputable. Further, to combine these two different Web sites third mediator Web application is required. It's a very complicated mechanism to manage all the Web application. And it there is any ambiguity it could be harmful in the case many. So, Web composition must be secure enough.

From the literature the researchers focused on different challenges of Composite Web Life cycle Activities. In this work an improved Web life cycle is proposed. The high Level view is shown in Fig1:

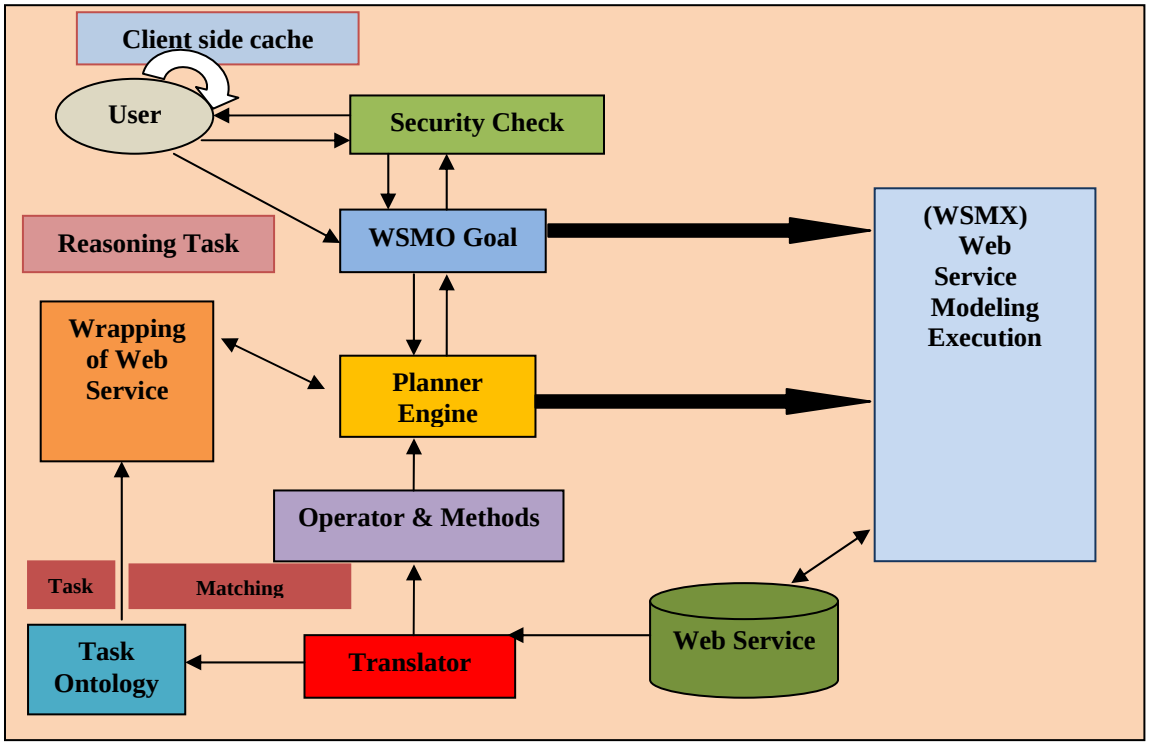

Fig: 1 High Level View of Improved Web Life Cycle Activities for Composite Web

Working Process:

In the literature, cache can improve the Web performance. Another aspect of Web is security and optimization. In this proposed framework, it can be seen if the client is using client side cache then Web life cycle activity will produce fast access. Because, the content which are available at the client side need not to search on the Web and it will improve the performance of the Web. For another aspect, the clients request are further divided into two parts one is secure and 2nd is normal Web access. If user is using a user-id and password to access the Web application then this is in the secure category (e.g. online banking). The another category consists the static web sites where user need not to input any user-id or password and he/she can get all information which is required (e.g. searching sites, college/university sites). In order to realize the proposed approach some specific extension has to be added to the WSMO framework. Fig 2 shows main components of the proposed framework for the Web service composition. The architecture consists of six main components:

1) Planner Engine:

This component is the backbone of the proposed framework where composition of services is planned. The component is responsible to compose two or more operators or methods to satisfy the task request using task decomposition. The planner uses the WSML-DL (Web Service Modeling Language) reasoned to find the matching operators and methods for a given task [34]. Note that in this improved framework if an atomic Web service can satisfy the user's goal then planner needs not to do anything [34].

2) Translator:

This component is used in the approach to translate each WSMO (Web Service Modeling Ontology) capability of service into an element in the task ontology using WSMO ontology. In addition the translator provides translating of WSMO service interfaces into a set of methods and operators. It will optimize the query of the user using semantic method. This will improve the performance of the Web service.

3) WSMX (Web Service Modeling Execution):

This component has a component-based architecture and is a reference implementation of WSMO (Web Service Modeling Ontology). The architecture takes care of non-functional properties during matching the semantic capability descriptions of Web services and goals, using discovery component of WSMX (Web Service Modeling Execution). It works its Mediator.

4) Wrapping of Web service:

According to [8] WSML-DL is semantically equivalent to OWL-DL (Web Ontology Language -DL). This component captures the expressive Description Logic and consists of a wrapper of WSML-DL expressions to a classical Description Logics syntax [33]. It is possible to perform ontology consistency entailment and instance retrieval in this component.

***5)* Security Check:**

This context provides details of the application-specific execution environment for these services and is typically included in the header of SOAP (Simple Object access Protocol) message. Contexts may be passed by value or by reference in which case they are retrieved using a Context Manager Service. WS-security [22] from OASIS defines the mechanism to include integrity confidentiality and single message authentication features within a SOAP message.

***6)* WSMO (Web Service Modeling Ontology):** is a conceptual model for relevant aspects related to Semantic Web Services. It provides interoperability of Semantic Web Services based on ontology [14]. The WSMO has four main components [32]:

I. Goals - The client's objectives when consulting a Web Service.

II. Ontologies - A formal Semantic description of the information used by all other components.

III. Mediators - Mediators represent a schema for multiple heterogeneous and independent information sources. This Mediator schema provides an interface which is used for location, model and transparency. A wrapper is used for each source to show its participation in the mediator system [39].

IV. Web Services - Semantic description of Web Services. May include functional (Capability) and usage (Interface) descriptions.

Step by step working:

1. To access the Web application, user write his/her request in the browser or double click on the main page of the Web service if that exists in his/her computer machine.
2. If the related required application is available on the local machine than it will provide the output to the user immediately with fast performance (by Client side Cache Mechanism).
3. For further links of the Web page the request of the user moves through WSMO to the server. Or, if user wants to access a normal Web application then WSMO (Web Service Modeling Ontology) will receive the request and send the request to WSMX (Web Service Modeling Execution) and then to Planner engine.
4. Then if user wants to access a Web site using his/her user id and password than the request will be checked at security check.
5. Then Security check verifies the authentication of the user and responds to the Web application as well as to the user.
6. Then mediator manages the Web application using Translator. Translator sends the information to operator and methods to do operations and to task ontology for wrapping of the Web Application.
7. If operator and methods send s the results to the planner engine.

8. Then planner engine collect and manage the information and respond to the client through WSMO.

The improved Web Life Cycle introduced in this work will improve the Web performance, quality and security of in information retrieval methods used in Web.

III. CONCLUSION

The work presented in this paper is an effort to improve the quality and security of Web services. In concept of Portable Extended Cache Memory [25] improves the performance of Web which also changes effect the life cycle of the Web cycle activities. The core idea was motivated from various online shopping Web Applications that are in became the backbone of the sales market. But, security, quality and their performance are the main issues. In this work, it is tried to improve the performance, quality and security of the Web. For security of Web Services a security checker is proposed before WSMA goal. And the translator will translate the input from the client with semantic techniques to provide the accurate and fast access to the clients.

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AUTHOR(S) PROFILE

Jyoti Parashar received the M.Sc degree in Computer Science & Applications from Maharishi Dayanand University, Rohtak in 2013. Presently pursuing M. Phil. from Maharishi Markandeshwar University, Mullana (Ambala), Haryana

Atul Garg received degree of Master of Computer Applications from Kurukshetra University, Kurukshetra in 2004 and completed his Ph. D degree from Maharishi Markandeshwar University, Mullana (Ambala) in 2013. Currently, he is working as an Associate Professor at M.M.I.C.T&B.M., Maharishi Markandeshwar University, Mullana (Ambala), Haryana. He is Senior Member of the association of Universal Association of Computer & Electronics Engineers (UACEE), Australia, member in the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering (ICST), Belgium and Member in the International Association of Engineers, Hong Kong. His area of interest is web, Query Optimizations and mobile ad hoc networks.

