Dynamic Aware Logistics Web Service Composition Based on QoS

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Abstract— Web services are highly essential as they are required for accomplishing tasks in a matter of second. Web services provide features such as e-Booking, e-Shopping, e-Banking that helps users to acquire everything from where they are. Currently web developers use semantic based descriptions of web services to select and compose them and provide a single composition plan to the users. Delivering a single plan to the users may not allow them to explore other good options that are available. In order to address this problem, we create multiple composite services dynamically and provide them to the user and allow to select an optimized composition based on the set of requirements. The proposed design allows users to calculate QoS for composite services with complex structures, taking into consideration of the probability and conditions of each execution path. The optimization methods not only consider the QoS of a single service but the total QoS of the composite service in order to get the global optimal solution.

Keywords— Web service, Quality of service, Service composition, Evolutionary algorithm, Service Composition

I. INTRODUCTION

With the proliferation of web services providing the same functionality, researches about practicability and adaptive capability of web services selection mechanism have gained considerable momentums. This methodology presents a dynamic web services composition algorithm based on the optimal path method of the weighted directed acyclic graph. Experiment results show that the algorithm can accelerate the speed of service selection, and bring great benefit to the application of web services composition. The Public Logistics Platform can comprehensively integrate the logistics resources, improve the efficiency of supply chain and save cost, stronger the competitiveness of supply chain as well. Given a departure and a destination city with a QoS constraint, to build a logistics path with composed services which can satisfies the QoS constraint and with the optimal QoS has become a problem demanding prompt solution. QoS-aware Service Composition is a research hotspot in recent year, it enable users to quickly composite web service to achieve complex functionality with low cost. Here are two directions in our future work: one is to search for the method of implementing run-time whereas, due to underutilization of feedback information, the massive useless redundant iterations result in low solution efficiency of the algorithm. The current approaches can solve some key issues in web services composition and give great illuminations to this paper; however, none of them gives an effective solution to address the issues of low efficiency in the large solution space. The MODIFICATION that we propose is the QoS-aware service composition problem is divided into four categories, Parallel, Loop, Sequential and Conditional according to the method used. The optimization methods are to choose services for every task then use the evaluation function to sort the composite service by their QoS and finally get the optimal result.

II. QUALITY OF SERVICE (QOS) MODELING

Quality of Service (QoS) modeling. In the presence of multiple Web services with overlapping or identical functionality, users unavoidably discriminate Web service offerings based on their QoS. QoS is a broad concept that encompasses a number of non-functional properties such as price, availability, reliability, and reputation. These properties apply both to stand-alone Web services and to Web services composed of other Web services (i.e., composite Web services).In order to reason about Web services, a framework is needed which captures their 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. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

III. MODEL OF WEB SERVICES COMPOSITION

The model of the composite web service is shown in Fig.1. Let CWS be a composite web service consists of m service tasks. CWS can be expressed as: CWS={ S1, S2.. ,Sm }, where Si (1 = i = m) is the ith service task.
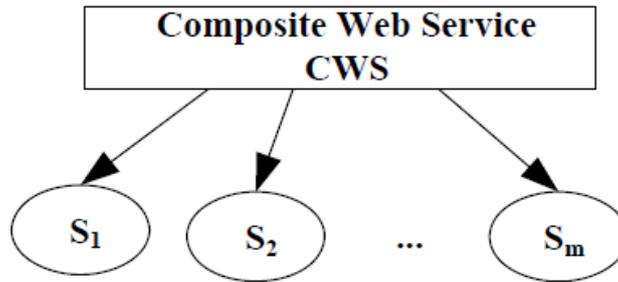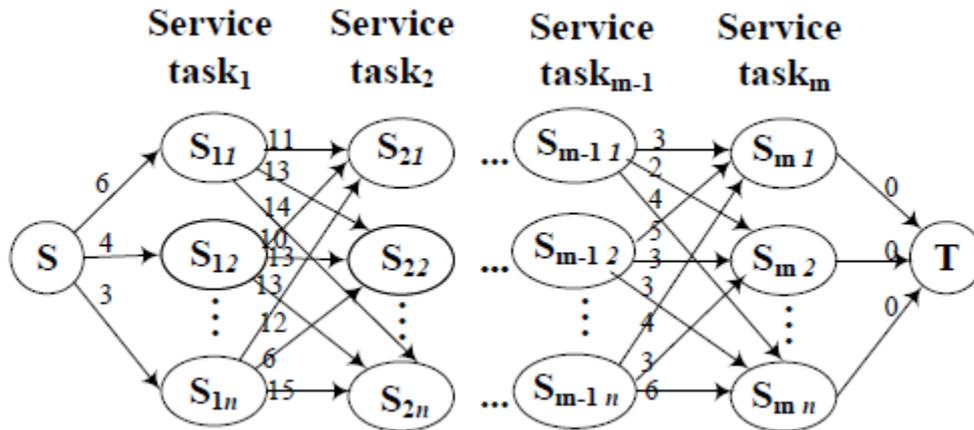
Fig.1 Model of Composite Service

Fig.2 Directed Acyclic Graph Composed by Candidate Services

There are n candidate atomic services with the same functions and different QoS for each service task. As shown in Fig.2, problem of web services composition can be solved by a directed acyclic graph and there will be nm alternative services composition schemas. Implementation of optimal web services composition can be transformed to the problem of finding an optimal path in the directed acyclic graph. It is crucial that the composite service should satisfy certain QoS constrains in practical applications, such as time, cost, reliability, availability and reputation, etc. We use QoS to evaluate the web services and the execution schema of composite web service. The composite web service composing from the atomic web services on the optimal path should best meet the QoS requirements of users.

IV. QoS-AWARE SERVICE COMPOSITION

In the web service composition area, QoS-aware service composition is to select suitable services based on the predefined business process and then bind them to the corresponding task in order to get the optimal QoS. The QoS-aware Service composition problem is a combinatorial optimization problem. QoS-aware service composition problem can be divided into two categories, the global optimization and local optimization problem according to the method used .The local optimization method is to choose services for every task then use the evaluation function to sort the composite service by their QoS and finally get the optimal result by greedy selection. The global optimization method not only considers the QoS of a single service but the total QoS of the composite service in order to get the global optimal solution. The selection of each service is relevant.

V. QoS BASED SERVICE SELECTION

A QoS property can be static or dynamic. A static QoS property value is defined at the time it is described whereas the dynamic QoS property value requires measuring and updating its value periodically. The QoS value from the service consumer's perspective can be positive, negative, close, or exact. For example, consumers expect to buy a service with low price and expect to retrieve the service in a low response time. Whereas performance, integrity etc., have positive trend in which the consumer expects the positives values are better.

A. Specification of Service Selection Approaches

The specification or description for non-functional based service selection approaches concentrates on many factors. These factors are separately identified and presented by analysing various techniques of non-functional based service selection approach. Table 1 depicts the QSS Specification and Description.

TABLE I

S No	Specification	Description
1	QoS Categorization	Describe the Ontology of QoS categorization with its identification value.

2	User Preferences	Describe the varying preferences for the non-functional criteria specified by the service consumer
3	Coordination Distribution	Describes how individual web service can interact in order to accomplish an application task. C – Centralized, CO – Coordination, GCO – Global coordination.
4	Level of Automation	List the manual process of selection mechanism, or semi-automatic service selection mechanism.
5	QoS Evaluation	Specify the evaluation criteria used to evaluate the non – functional properties
6	Aggregating the evaluation of QoS	This deals with aggregating individual scores to gain a final score for the service.

B. QoS Categorization:

QoS properties are designed in hierarchical way. This involves grouping properties by domains such as environment, performance or safety. Speed quality and response time on performance aspects while security, privacy and authentication are safety aspects. If such hierarchical structure exists then users should be able to express preferences at a higher level, while service provides will express their offerings in a fine way. Using WSML, the simplest way of modeling is done by assigning a simple value to non-functional properties of WSMO elements. The data value assigned to non-functional properties is used as an identifier during service publication. To specify QoS characteristics in particular it can be modelled separately with the use of building and defining QoS Ontology. Figure 1 depicts the QoS ontology with the assumed identifier value. W3C defines various QoS attributes such as performance, reliability, scalability, capacity, and so on. Here the figure 1 covers ontology of characteristics such as interoperability, capacity, integrity, environment, performance, reliability, security, business and availability. When a new service is published, the value of QoS characteristics in service description is matched with the value assigned in QoS ontology. By this way, the newly published services are aligned. Upon receiving the request from the customer, the system extract the services require and QoS characteristics specified and match with the QoS ontology to locate it.Page Style" of this document. The two level-1 headings which must not be numbered are "Acknowledgment" and "References".

*1) User Preferences:*Depending on the situation service requestors may have varying preferences for the non-functional criteria. In the same way, different requestors will have different preferences. A good mechanism should not only allow expressing values for each property, but preferably also represent the relations among the preferences. For example, a customer may consider the security property as more important than privacy when requesting a financial service. Hence, the selection approach needs to provide for mechanisms for users to specify their preferences, that is which of the non-functional properties they feel more strongly about and also relations between these properties.

*2) Coordination Distribution:*This describes how individual web service can interact in order to accomplish composite service selection process. The WS-Coordination defines how the coordination among the services need to take place, how the data items are to be exchanged in order to complete successful composition as part of business process defined in a Business Process Execution Language (BPEL) . The composition algorithms may be centrally cooperated or globally cooperated.

*3) Level of Automation:*Level of automation states the automation mechanisms like manual process of selection mechanism, or semi-automatic service selection mechanism or fully automated service selection mechanism involved in web service selection and composition. Most research contributions handling the service selection for service composition focus on automatic process without human intervention. For example human intervention may involve selecting QoS parameters used for selection, and changing preferences etc. Semi – automatic process involves little human intervention, the major task such as corrections and composing are done by the system. Fully automated service selection approach may also use agents in the web service selection process.

*4) QoS Evaluation:*It is difficult to predict how many non-functional properties will be available, and the type of these properties for a customer requested service. For example, the evaluation function to compute the speed criteria will be different from the function to calculate the location criteria. It is not easy to define a Universal evaluation function for all kinds of non-functional properties. Hence, the evaluation function for one property adapt to varying numbers of criteria, but should also automatically identify the measurement methods to be used to evaluate each criteria.

*5) Aggregating the evaluation of QoS:*After evaluation the next step is to aggregate individual scores to gain a final score for the service. In this step a suitable aggregation method needs to be selected. Global optimization or local optimization may be used. Using arithmetic or geometric means to aggregate QoS properties results in complex situations.

*6) Ranking Algorithm:*A service rank is a quantitative metric that shows the importance of a service within the process of service selection mechanism. It is known that semantic based service discovery concerns on the matchmaking process between customer's requirement and service profile or description. Its semantic matchmaking process plays a role as a ranking mechanism in service selection process. However ranking based on semantic similarity does not suit for efficient service selection. Because, from customers perspective, it is always not true that a web service with high semantic similarity is suitable than a web service with lower similarity. The other difficulty with semantic similarity is that the

users find it hard to distinct which service is better suitable between a pools of similar services. To achieve better ranking performance many ranking algorithms have been proposed in the literature. One such approach is to integrate more information besides semantic information. The information may range from time, place, location, customer and providers situation etc. The limitation with this approach is that the system becomes more complicated when new constraints are added. To overcome this, the authors have proposed a method a social collaborative filtering method for ranking. This method makes use of learning other user's previous experiences. This method is used most successfully in all kinds of recommendation systems but the limitations with this method are information distortion and independence of service selection.
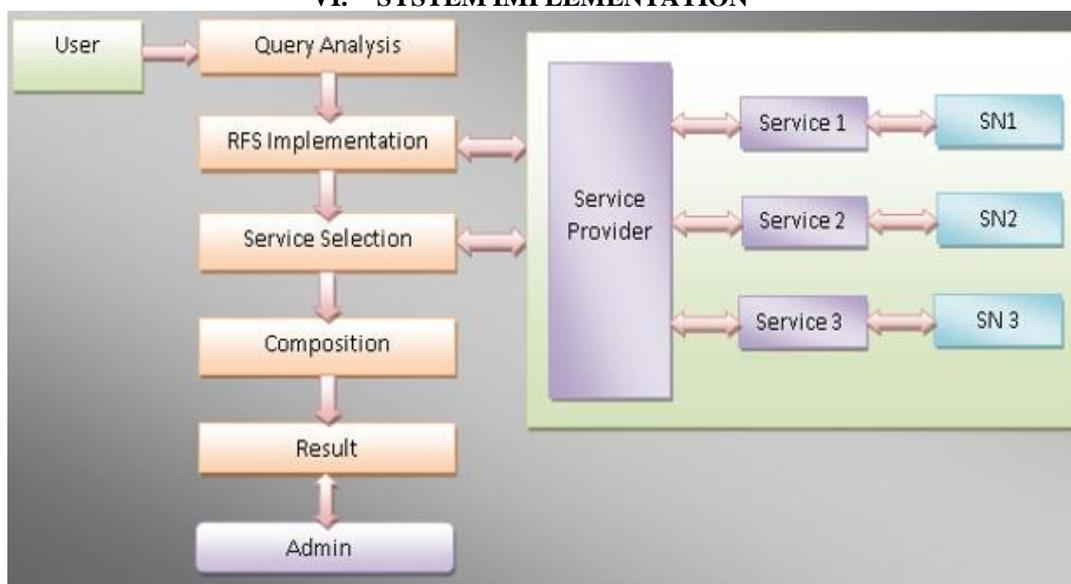
VI.   SYSTEM IMPLEMENTATION

Fig.3Service Selection Techniques

A. **Query Analysis:**A query that a user enters into a web search engine to satisfy his or her information needs. Web search queries are distinctive in that they are often plain text or hypertext with optional search-directives they vary greatly from standard query languages, which are governed by strict syntax rules as command languages with keyword or positional parameters. A user who is looking for information about different social networks that cover several topics or facets may want to describe each of them by a disjunction of characteristic words, such as vehicles OR cars OR automobiles. A faceted query is a conjunction of such facets; e.g. a query such as (electronic OR computerized OR DRE) AND (voting OR elections OR election OR balloting OR electoral) is likely to find information's of different social network about electronic voting even if they omit one of the words "electronic" and "voting", or even both.

B. **RFS Implementation:**The consumer details the technical and functional specifications that a service needs to fulfil. While defining the service requirements, the consumer also specifies non-functional attributes like characteristics of the human agent providing the service, constraints and preferences on data quality, and required security policies for the service. The technical specifications lay down the hardware, software, application standards, and language support policies to which a service should adhere. Once the consumers have identified and classified their service needs, they issue a Request for Service (RFS). If the user is not satisfied with the services discovered, they can change their requirements (say, by increasing the cost constraint) and/or policies and restart the discovery phase with a new RFS

C. **Service Selection:**By analysing the user query services are selected by comparing the specifications listed in the RFS with service descriptions. The selected service was constrained by functional and technical attributes defined, and also by the budgetary, security, compliance, data quality, and agent policies of the consumer. An organization can release the RFS to a limited preapproved set of providers. Alternatively, it can search for all possible vendors on the Internet. Selection of services from RFS can provide user requested composed information about different social networks which can be employed.

D. **Pattern Selection:**Calculations of QoS for composite services with complex structures are types of basic composition patterns for composite services are discussed: sequential, parallel, loop, and conditional patterns. In particular, QoS solutions are provided for unstructured conditional and loop patterns. It will generate a composition plan to meet the requirements specified by Requirement 1, which sets requirements only on the QoS of the web service composition. We first conduct iservice selection in which the proposed QoS analysis method is adopted to calculate QoS for composite services. Then, the result is compared with service selection results based on other- QoS calculation methods. Processed, taking into consideration of the probability and conditions of each execution path.

*Composition Environment:*Composition environment was created where the results of selected services are collected then composed based on the result set of the functional and non-functional attributes received.

VII.   DISCUSSION AND CONCLUSION

A systematic QoS analysis approach for dynamic composition is able to provide comprehensive QoS information for a composite service even with the existence of complex composition structures such as unstructured conditional patterns and MEME loop patterns. The QoS information generated by the proposed QoS analysis approach includes not only the QoS of the web service composition but also the QoS and probability of the execution paths with the help of logistic services. With the increasing availability of Web services as a solution to enterprise applicationintegration, the QoS parameters offered by Web services are becoming the chief priority forservice providers and their service consumers. Due to the agile and dynamic nature of the web, providing the suitable QoS for enterprisebusiness application is really a challenging task. In addition to this, modelling the QoS parametersalso relies on the consensus between service consumer and service provider. To achieve theconsensus among the service holders, their fuzzy view on QoS parameters have to be modelledand weighted in universal manner. This may cause service providers and consumers to betterunderstand about QoS characteristics. The measurement process for each QoS parameters isvery complex since it should consider what and how to measure, who does the measuring andwhere the measurements are taken.

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