A Generalized Webservice Selection Framework with Global Quality Constraints

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Abstract--**With the advant of SOA based webservices and its attractive features IT industrey started moving towards the novel service dellivery SaaS. Due to its widley utilization different service providers are offering their services through web. Performance of web services may fluctuate due to the dynamic Internet environment, which makes the Quality-of-Service (QoS) inherently uncertain and unsuccessful service integration. Upto now different types of performance evaluation metrics are used to find the service qulity, but they didn't consider the global quality parameters for generalization.In this paper, we are introduced a generalized service selection framework which utilizes the global quality params to identify the quality and multicriteria decision making approach to select the best service among the different service provides.This approach simulations shows that this is the better framework for quality assessing and service selection.**

Keywords-- **selection framework,Generalization , QoS, Global parameters,SOA,webservices.**

I. INTRODUCTION

In the last recent years a new technology called Web Services has emerged. The main characteristic of a web service is that it is a piece of software that the user can utilize but doesn't own, that is, the user doesn't install the software but uses it through the internet and standard protocols. With this new technology, a new architecture paradigm called SOA (Service Oriented Architecture) has appeared. This architecture is based on combining several web services, each one responsible to develop a concrete task, in order to obtain full-operational software. The web services that compose a SOA System might be able to perform a task in a certain time, might be unavailable in some cases, might have security policies, etc. All this attributes, named Quality attributes, are essential in order to choose the appropriate web service for a SOA System. Performance of web services may fluctuate due to the dynamic Internet environment, which makes the Quality-of-Service (QoS) inherently uncertain. With the increase of Web services in the Internet, selecting the optimal service from a set of functionally equivalent candidates becomes an important research problem. The previous researches [2, 3, 8] concentrated on the quality parameters to determine the service quality but they did not covered the all required global parameters.

In this paper, we propose an efficient and effective QoS-aware generalized service selection framework. Our framework first employs SLA model to compute the QoS uncertainty for pruning redundant services while extracting reliable services. It will consider all global parameter values of a service and then determine the their weights, in order to select the best service provider information. Then, mixed integer programming is used to select optimal services. The experimental results show that our approach can provide reliable and efficient optimal service selection for users.

II. LITERATURE WORK

The existing web service discovery ans selection model is facilitated by a set of standard protocols that allows a service provider to publish software components in the form of web services, a register to serve as the repository of available services, and a user to discover services suitable for business [6]. To evaluate the service quality of a provider previous approaches[2,3,8] can implimented some service attributes(Cost , Quality, Reputation) based selection algorithms.But they are not considered the Global quality params to assess the quality.Our Contributions in this paper are Global quality params based framework to estimate the service quality and selection.This approach utilize all global parms and their evaluated values to compare against the

user preferences, to select the scoring of each service provider. Therefore, we extended the SLA as Service Quality Evaluation Center architecture to overcome the service integration problems as shown in Fig. 1

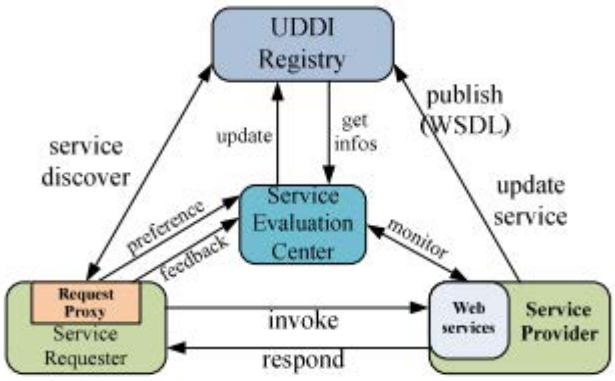

Figure 1. Extended Service Discovery Model

The new model could co-exist with the current web service publish and discovery model. There are four roles in this proposed model:

Web service Provider: provide Web services via Internet, publish WSDL document with QoS attribute nformation to UDDI Registry, execute calling request from users.

Web service Consumer: the consumers who invoke web services such as program, software module, or other web services. They request web service through service discovery and evaluation mechanism and then feedback. In the new model, we add Request Proxy to perform operations between requester and other roles.

UDDI Registry: the fundamental function of UDDI Registry is providing web services registration, publication, and discovery as a broker. UDDI specifications need to be extended to support that provider could publish their WSDL documents with QoS attributes information of web services to UDDI Registry, and thus service requesters can search candidate web services according to their non-functional characteristics.

QoS Service Center: as the extended role in the proposed framework, it is the key module to support QoS and user preference based web service evaluation. It collects the QoS information about candidate web services based on the global quality params that may provide qualified web services to users, stores and updates the QoS information in UDDI Registry, provides interface for user constraints and preference configuration, and executes web service filtering and evaluating process. In this framework, we model the Service Evaluation Center as an auxiliary component of UDDI Registry, and it could provide assessment function combined with UDDI Registry.

III. GLOBAL PARAMS BASED SERVICE SELECTION FRAMEWORK

This paper introduces a framework for global params based web service selection and rating. The key characteristic of the proposed framework is to consider the various global parameters for both the selection and the rating of web services, in this way not only alleviating a potentially tedious and time-consuming task, but also increasing the objectivity of the service qualityreports. The ultimate aim underlying the development of the framework is to reduce at selection time the risk associated with the utilization of external webservices in development projects.

A) Webservice Quality Factors and sub-charecteristics

A Software Quality model is a structured set of Quality Characteristics of Software. In order to evaluate the service quality information here we will describe the State of the Art of the different attributes related to QoS, from the basis of Global Quality Models. We introduced several Global Web service Quality Factors for classifying the web service quality in a structured set of characteristics and sub-characteristics as follows:

Functionality: Suitability, Accuracy, Interoperability, Compliance, Security
Reliability: Maturity, Recoverability, Fault Tolerance
Usability: Learnability, Understandability, Operability
Efficiency: Time Behaviour, Resource Behaviour

In a nutshell, the goal of quality Models is to group all quality attributes into a hierarchy of quality characteristics. The sum of all these quality characteristics and attributes applied to a Web Service is defined as QoS. As stated in ISO 8402 [8], QoS is “the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs”. A Quality Attribute is, nevertheless, not a quantitative measurement. We can’t state, for instance, that the time behavior of a web service is 40 ms.

Instead, we talk about Maximum response time, Latency, Average Execution Time, beyond others. These kinds of sub-attributes are known as Quality Metrics. As defined in [9] "a quality metric is a quantitative measurement of the degree to which an item possesses a given quality attribute".
For instance, from the quality attribute Availability we might be interested on several metrics:

- Mean Time Between Failure: Average time between failures of the service
- Average availability: The % of time the service is available
- Downtime per year: The time the service has been unavailable in a year.
- Service cost: Price, Penalty/Compensation, Billing.
- Service suitability: Business suitability, Usability.
- Service Aftereffect: Business effect, Return On Investment, Consumer Satisfaction.
- Service Brand Value: Recognition, Reputation.
- Performance: Response time, Maximum throughput.
- Stability: Availability, Accessibility, Successability.
- Access Control: Transport Level Access Control, Message Level Access Control

All the above metrics we have to consider before making a service selection or integation.based on the above factors, their weights and user preference our global qualiy selecton framework will evaluate the service selection and scoring.To monitor the service behaviour we extended the Service Level Agreement(SLA) with Service Evaluation Center(SEC). By using the network monitoring systems,[7] SEC can monitor the service provider offering service quality attributes information and compares the monitered information against the SLA contained user expectations and preferences, to reveal the customer satisfaction.These Customer satisfaction can be used to generate the feedback, either is in possitive or negative based on the expectency and disconfirmation theory[9] from market science.Obtained service behaviour and its values can be used by our framework to estimate the score of each serviece provider. These scores can be provided to user to select their interested service provider among all services.This will leads to the successful webservice integration environment for service consumers and there is no subjectivity and unfairness rating[1] problem.

B) Service Quality Attributes Monitoring

In order to calculate the QoS aggregation of several web service components, we need to know how these services are composed. In this paper we extended the SLA functionality by implementing the Service Evaluation Center (SEC). By using the network monitoring systems technology SEC will monitor the every service parameter perception information. SEC obtained perception information will compare against the user preferences and requirements. In SEC the aggregate functions for computing the Generalized QoS of several attributes (Response Time, Cost, Availability, bandwidth and Reliability) are implemented. Some algorithms for Optimizing web services may be interested in converting these products into summations in order to have linear functions. Most of the current approaches to calculate QoS aggregation consider Quality attributes as if it were deterministic values. However, because of the nature of web services, it's more realistic to take into account the randomness of these QoS attributes. Therefore it states the need of modeling them in a probabilistic form. By using the given below table.1 information SEC can evaluate the service attributes information, can be used to provide the scoring of each user. Our framework will forward this information to users that aids to users in service selection and integration.

Attributes	Aggregate Function
Response Time	$T = \sum_{i=1}^{n} (T_{si} + T_{ni})$ Where T_s= Response Time (without network time) T_n= Network transmission time.
Service Cost	$C = \sum_{i=1}^{n} C_{si}$ Where C_s= The cost of the service
Reliability	$R = \prod_{i=1}^{n} R_i$ Where R= Reliability (The probability that a request is correctly responded)
Availability	$A = \prod_{i=1}^{n} A_i$ Where A= Availability (The probability that a services is available)
Bandwidth	$B = \min_{1 \le i \le m} (B(s_i))$ Where B= Bandwidth

Table.1 Global Quality Parameters calculation.

C) Framework Implimentation

In this paper we proposed a framework which has four major modules like Consumer, SLA (Service Level Agreement), Service Providers and Service Evaluation Center(SEC). Consumer can start the selection based on the service quality features. Consumer selection information will be stored inside database like requirements table. SLA maintains all the service expectations about that particular service. These requirements can be co-inside with SLA requirements and for those services only the service certificate will be approved and that Certificate can be used as Trustworthiness certificate. SEC can moniters each service provider webservice quality params like Response Time, Cost, Availability,Bandwidth and Reliability information by using the table.1 given equations.After monitoring the services SEC will predict the values ofGlobal Quality attributes.

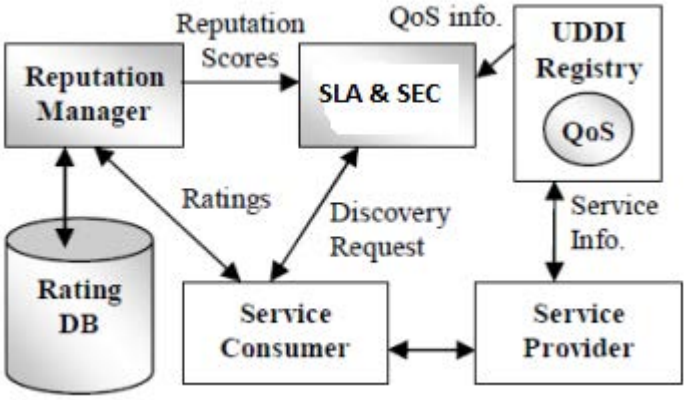

Figure .2. represents our framework implimenatation and its control flow

These attribute values can be trated as a user perception information.To evaluate the user satistfation of a service our SEC uses expectency disconfirmation theory approach.According to that theory user satisfaction is a measure of feedback.Exceeded perception will leads to more satisfaction and under achieved perception will leads to the dissatisfaction.It can compute the service feed back as $C_{sat} = f_p(v)+f_d(v - v_e)$.This calculation trats the expectation as a constant always 1.Now our system measure the feedback as follows.

FEEDBACK(s) = $f_p(v)+ f_d(v – 1) = f(v)$.

where f is an increasing function defined in [0,1] and bounded between f(0) = 0 and f(1) = 1. f should combine the characteristics of both the perception and disconfirmation functions, in particular, the concavity of the perception function and the convexity of the disconfirmation function. All the user behaviors features can be

located inside the trustworthy services. To start the selection at the consumer side we should place the all the features inside that particular service. Reputation can be defined based on the frequent item selection procedure to define the utility measurement identification.In this way our framework will evaluate each service information.

IV. EXPERIMENTS

We hereby consider a set of six instances of service S with six different quality and cost offers. We generate for each service a utility function, where utility stands for the measure of the conformance of the delivered service quality to the agreement. The utility of each service instance changes over time; it either increases, decreases or fluctuates around a utility value. Changes in utility series are generated randomly every M time units. Utility at time t represents the utility that a user has experienced before leaving a feedback at time t.Weuse our rating model [7] to derive feedbacks from utility values. We use the simple exponential smoothing (SES) forecasting technique to compute service reputation.

Simulation results show that the overall system evolves well over time. Hence, our system has succeeded in capturing service behavior and providing best possible choices.

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V. CONCLUSIONS

We have presented in this paper an global attributes based QoS framework for service selection and integration. We have designed a service evaluation center to help users choose the most appropriate service among equivalent services functionality-wise. This framework predicts the suitability of a given service to user's quality requirements and the conformance of the delivered quality to the initial offer. We have evaluated our selection criteria through simulations. The results showed that the system succeeded in capturing service behaviors and in providing users with best available choices.

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