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A Survey on QOS Based Web Service Selection

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Abstract— The Web service has become an essential concern for developers. Users have to select a service from a number of available services that best fit for their use. It is hard to discover the most appropriate web service from a large collection of web services. Quality of service depends upon the numbers of parameters. Every attribute of the QoS has its own effect on overall quality of service, which will change every time based on the service and user requirement. However, most of the researches in this field have concentrated on the study of each independent attribute of web service or based on their pre-defined priority of attribute. The article presents an overview of challenges that comes in order to select appropriate Web service also it give a road map for future research.

Keywords— Selection of web services, quality of web services, web service discovery, web service, QoS analysis

I. INTRODUCTION

The service on the Internet grows every day and users need to select service that is best for them. Web service selection process is an important component in service-oriented computing. However, without Web service quality standards, quality-based service cannot be guaranteed. To determine right web service for customer search engine or Universal Description, Discovery and Integration (UDDI) service provider has to match not only the functionalities of web services, but also their Quality of Service (QoS). QoS of web service depend upon non- functional attributes (e.g. response time, availability etc.). These attribute may have impact on the quality of service provided by Web services. [1][2][3]. Quality of service depends upon numbers of attributes. Every attribute of the QoS has its own effect on overall quality of service, which will change every time based on the service and user requirement. However, the overall quality determines in these research by considering each attribute independently. Web service quality cannot be measured by only one quality attribute. The priority weight of each quality attribute can be changed based on the purpose of the quality evaluation or the bias of the user search. [4]. When there is multiple web services provider who provides the same functionality, User need to compare these service based on their own requirement. Therefore we just not only have to focus the QoS but also how these attribute varies as per user need. That's why here researchers switch to a new area called users preference based QoS which gave them ability to determine user what attribute that need more.

II. QOS OF WEB SERVICE

Web service selection process is depending upon many factors. These are section of parameters that need to evaluate, how to collect the information or value of these parameters , how to process those data to generate rank in case of pre- define condition and how to process that data if rank generate based on user preference. Many researchers' works on these factors, here we review these work. To analysis these work this paper divides all research work into three categories. Quality is defined by International Quality Standard which is a part of ISO 9000 standard, is as follows "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". Fig 1 shows the current web service model in which web service provider publish their information using Web Services Description Language (WSDL) to UDDI registrar and Web consumer accessing their information from UDDI using WSDL.

A. Parameter Selection And Data Collection

QoS parameter selection is varied based on users need and services that provide to them. Consider an example, let there be two services, one which provide online tutorial and another mobile recharge service. Both service need different QoS parameter like mobile recharge, privacy and security is high priority but for online tutorial service there is no privacy issue and security problem. Therefore based on service requirement QoS parameter varies. Currently there is no international standard for QoS selection, therefore researcher selecting QoS based on either their choice or based on their case study requirements. However, there are some research works that mainly focus on selection of parameters and how to measure these parameters. Ran [1] describes a set of attribute with four different categories which is based on runtime analysis, transaction requirement, configuration management and security.

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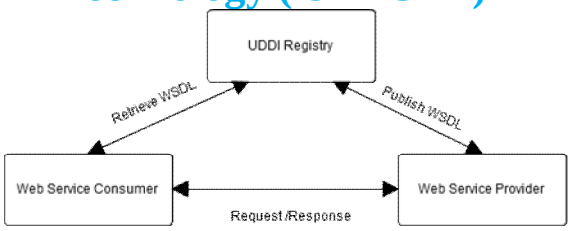


Fig 1 Web Service Model

Mostly researchers currently follow that recommendation, but without a web service quality standard, the quality based service guarantee is not possible. Data collection related to these parameters based on tModel data structure which is used to store information of web service in UDDI registry. This is uploaded by web service provider. Therefore it may possible that web service provider provide wrong QoS parameter value to UDDI registrar or web service provider does not update these QoS value regularly which means that value is out of date. UDDI register does not have any functionality to verify information that is a big drawback of this system. To resolve this problem Ran [1] proposed a web service model, which uses an extra component in web service model, called web service QoS certifier which validates the information of web service provider before they publish it. But they did not specify how the certifier validates this information and also it is not practically implemented. Later Al-Masri and Qusay H. Mahmoud [5] proposed a web service broker system, in that they introduced one new component called web service broker which automatically collect information from web service provider within a period of time. They prove their theory using commercial tool but in this work they did not explain how web broker collect data and validate their data.Therefore currently there is no method present which collect the QoS information from the web service provider and validate the information. All work on this area still using tModel data that is provided by web service provider where there is no guarantee that provider value is correct or not.

B. Rank Generation Without User Preference

Patil and Gopal [6] proposed a model for web service section based on the QoS in 2010 that have an algorithm for matching and ranking the web service. Algorithm is used for matching the QoS requirements of web service and the rating requirement of web service. Based on the match of the users requirement web service broker generate the rank. Here rating requirement and QoS requirement both are optional for user. Later Yager, Gumrah and Marek [7] proposed a technique in 2011. They use lexicographical preferences method to collect user's criterion and satisfaction levels. Satisfaction levels defined with a threshold value that represents a limit value between acceptable and unacceptable values of attributes of alternatives. This method considers the users preferences, but meanwhile the user has to choose the weights of attributes and the threshold limits, the problem of inconsistency can arise as an outcome of the user's decision. Furthermore, they did not recommend a method to decide the weight and the threshold accurately. Another working technique is Fuzzy logic which has been widely used in real world mainly in automation and process control. Using fuzzy logic many approaches have been proposed for identifying fuzzy QoS constraints and for ranking Web services. But these calculations put more work load user to determine attribute ration value. In these types of methods basically they are using multi-criteria decision technique which need compression with each attribute to each other. Therefore in such case, users have to insert more compassion value n (n-1) possible input.

C. Rank Generation With Users Preference

Choi, Cheol Rim, and Hwa Young Jeong [4] developed a broker based evaluation system for service selection according to the QoS preferences of users. Here they applied Analytic Hierarchy Process (AHP) as a method to calculate priority weight. To calculate the weights, they apply a pairwise comparison matrix and an eigenvector of the matrix. The algorithm generates weight of each attribute based on users' preference and then according to users' functional requirement. It display set of service with their QoS Value, then rank these service based on its overall value. However, AHP method needs n (n-1)/2 input to perform operation. These values must be consistent in order to generate weight which used to calculate QoS rank of web service. The probability for getting consistent value is very low. Currently this is the one method available which provide facility to user preference based web service discovery.

III. DISCUSSION

Most researchers' work is basically focused on individual analysis of attributes. There work is based on predefined weight of each

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attribute. Practically when users need to choose web service their selection of service depend upon their requirement, which varies for all organizations. There are many decision methods that focus to determine which attribute have highest priority to determine the QoS. But in case of comparing two or more services results varies only if order of the priority of attribute will varies, otherwise it always remain same. An example we can see that if we have to select top two students of any class we generally see which one have heights marks. These results are based on pre- determine priority of every subject on course. But when we need to select top two students from the class, where selection based on subject A and B preference. Here rank of student will change only if weight of subject order will get change. If the order is same, just change in weight does not affect the overall rank. Therefore in order to find rank of service we need to focus on the order of priority of attribute instant of the priority of attribute. Mostly work had done by researcher to improving the weight value of attribute but with above example we can see that weight of attribute does not change the rank. Rank of web service will get change based on order of attribute weight value.

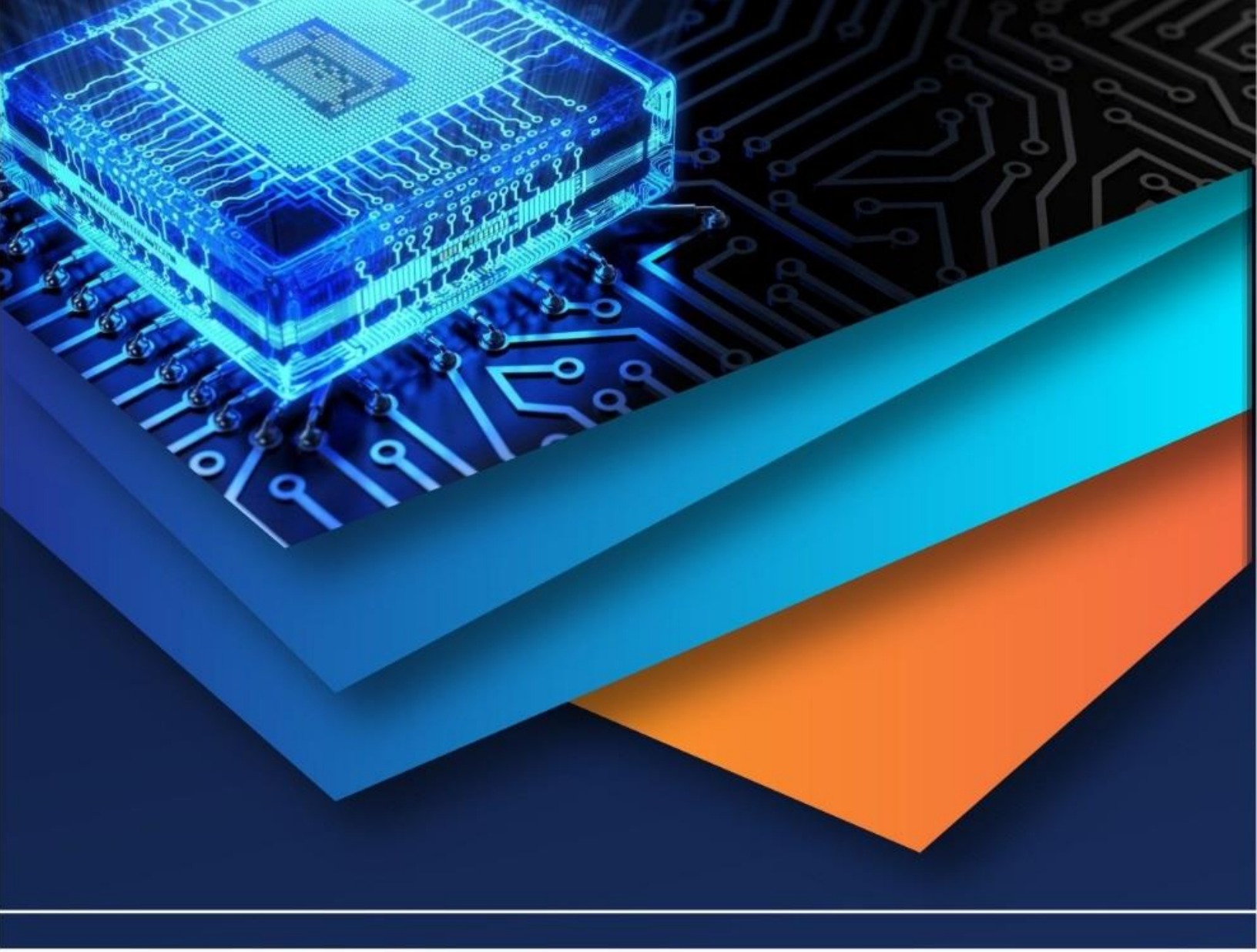
IV. CONCLUSIONS

Web services discovery has an active area of research and development. In this paper a survey of Quality based Web service discovery was performed. Quality based web service discovery need basically two step, one for parameter selection and another need a technique to generate the rank. Generating rank of web service mostly depend upon the pre-define preference provide by web service provider or broker which is not suitable to small business industry. Based on need of organization the requirement of service is changed, therefore here need to focus the research on user preference base web service discovery. User preference based system generates different rank for same set of web service rank for different user which is always same in pre-defined preference based systems.

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