Chapter 9
Conclusion and Future Research

9.1 Conclusion

Service Oriented Systems incorporate the services running on different platforms, hosted by service providers outside the enterprise boundaries. The discovery of relevant services and selection of right business partners that guarantee the best Quality of Service are the major issues. As multiple Web services are expected to deliver similar functionalities, QoS is considered as a key concept in distinguishing between competing Web services. The literature study of this research work shows that many approaches were proposed for the evaluation of QoS of the Web service. These approaches used different architectures, models, methods and techniques for this evaluation but there is no specific effort that focused on the functionality based evaluation of QoS and cost. So in the initial stage of this research work much importance is given for the functionality based weight assignment for the non-functional parameters by analyzing the domain specific and independent attributes of the Web service. Then the QoS of the Web service is asserted as per the functionality weights that are mutually agreed by both the signing parties. Such agreed guarantee are mentioned in the WSLA document for monitoring the performance of the Web services while usage. These guarantee values in the WSLA document are used as the input by the proposed architecture for the real time evaluation of QoS and cost of the Web service.

In the evaluation process apart from using the non-functional parameter values, the assigned non-functional weights are also used for the functionality based QoS
evaluation. The proposed guarantee level check service of the third party broker compares the evaluated values with the guarantee values in the WSLA document to check whether any violations from the mutually agreed levels by the signing parties.

The dynamic costing and reporting system proposed in this research work evaluate the cost of the Web service based on the offered QoS and report it to the top management of the signing parties over a period of time. Finally the management analyses the violations from the guaranteed level of performance and take necessary actions to achieve the expected quality level for the forth coming terms of billing periods.

To provide comprehensive studies of the user-independent QoS properties of real-world Web services, this research work make use of two QoS datasets released by Zeng et al and Al-Masri consists of 365 Web services each with a set of nine QoS attributes. The performance analysis of this research work indicate that there is up to 20 % of reduction in cost of usage of a Web service when the service is violating from the guaranteed level of performance. This will directly benefit the customer of the service in cost and leads to the satisfaction level that the payment is only for the service that delivered. On the other side if the Web service provides better performance than the asserted level, the provider is benefited up to 10 % more than the agreed cost at the time of selection of the Web service. Hence the provider is also satisfied with cost for the quality he provided and thereby improved the reputation of the service.

The result analysis shows that this research work contributed in the following areas

1. The proposed system allows the service consumer and provider with an optimal correlation between the quality and price.
2. This system motivates the provider to update the Web service in regular interval of time by monitoring the actual performances for the cost benefit.

3. The customer can take measures to improve the business performance by monitoring the increase or decrease in Web service requests and other quality parameters.

4. Here the costing is done purely based on the actual performance of the Web service and the reporting of violations to the signing parties gives more impact because both are mutually benefited in cost and quality.

5. The QoS of the Web service is always viewed as the extent to which how long the user requirements are satisfied. The proposed method contributes to reach the functional requirements of Web services and viewed as an important differentiating point from the competing Web services.

6. The deviation from the guaranteed performance has been studied and reported to the managements for immediate action. The main advantage of the presented system over the existing Web service costing approaches is that the proposed system allows clients to pay only for the quality offered by the provider and not relying only on the false ratings given by the provider.

The result shows that the range of violation is reduced to a remarkable extend because the customer and the provider are aware of the business performance and quality delivered by the service. The models and methods proposed by the other optimal costing methods failed to present the correlation between the cost and the QoS of the Web service and also to calculate cost dynamically based on the actual functionality of the service. This investigation results show that there is a remarkable improvement in the QoS and actual cost of the service which will benefit both the provider and consumer.
9.2 Future Research

In this work the cost of the service is calculated mainly based on the actual QoS. Here the QoS is evaluated by considering the non-functional parameters such as response time, availability, throughput, successbility, and reliability. In future, the business performance and invariant properties such as security, interoperability, and other quality aspects are also considered to evaluate the actual cost. In the proposed method the billing terms are divided into the number of invocations and the evaluation of QoS and cost is for that specific term period. In future the duration of terms may be fixed based on some time period for the specific Web service domain. The success of the proposed method is mainly based on the analysis of the actual functionality of the Web service to assign the weights to the non-functional parameters. So in the future work, different domain dependent techniques may be tried to assign the functionality weight to reach the customers requirement. Also to analyze the advantage of the proposed system over the methods which implements penalty based cost evaluation systems, the domain dependent aspects are considered in future, because the influence of violation that affect the service environment varies between different Web services.