ABSTRACT

Increase in component based systems has led to the development of Web Services, the inter-operable, platform independent and distributed components that can be used as a part of an application to perform a task. Web Services in general provide the users with a single functionality. The efficient working of any process requires a combination of many such functionalities. Hence we use the process of web service composition. This helps in aggregating the web services such that it creates a chain of the web services to accomplish a complete task. This in general is referred to as a workflow. Due to the increase in the number of web services, complexities in the process of selection have also increased. Further, each web service pertaining to a single process has different specifications and properties. Every web service concentrates on providing an efficient solution considering different quality attributes of concern. Thus selecting a web service based on a problem in hand is considered the most inefficient way of building a workflow. The quality attributes specified by the consumer must match with the quality attributes concentrated in building up the web service.

The first contribution of the thesis presents an analysis of the current techniques available for service selection and orchestration. The currently available techniques are analyzed in terms of their pros and cons along with the resource requirements. Problems encountered during service selection are discussed in detail. The major issues include process description, quality of the service, quality parameters to be considered and satisfied, etc.

The second contribution of the thesis discusses a tradeoff based service selection process, which uses a tradeoff incorporated elimination method to deliver the best possible service to the user. The availability of a huge number of web services complicates the process of selecting suitable
web services. The major objective of this work is to provide an effective mechanism that retrieves the appropriate web services faster. These services hoisted by third party may not contain all the required quality attributes. As a result a tradeoff mechanism that tends to provide appropriate tradeoffs in attributes during the selection process is introduced. Quality of Web Service (QWS) 2.0 dataset was used for the analysis and results show relevant retrieval with low retrieval times.

The third contribution of the thesis presents a method that uses a variant of the metaheuristic optimization method named the DPSOSA (Discrete PSO with Simulated Annealing) to select the most suitable services to perform orchestration of services. It is observed from the experiments that DPSOSA exhibits lesser latency with good QoS compared to the regular methods.

The fourth contribution of the thesis presents a metaheuristic based solution for service selection and service optimization. Modified PSO is used for the selection and orchestration process. PSO is discretized and incorporated with catfish particles to eliminate the problem of local optima. It is observed from the experiments that the modified PSO based service selection and orchestration performs effectively in terms of optimal selection and time.