ABSTRACT

The initial web was used as a medium for the broadcast of read-only material from heavily loaded corporate servers to the mass of Internet connected consumers. Now a day, the web is a repository of information which resides on the servers and Internet and web is the main way of communication, e-commerce, e-governance, bank transactions, research, industry etc. Further, the revolution of mobile devices also plays an important role in the growth of the Internet and web. The client’s basic requirements are performance, security, contents, maintenance, and scalability of web applications. But, with the massive use of web the design, development, maintenance, security and efficiency of web applications or systems have become more complex.

So, in the growth of web, it becomes very important that quality of services, security, performance and efficiency should be improved. The web developers are facing serious problems in successful development and deployment of web applications. So, the developers need more hardware to store more data and web technologies for security and the performance of the web applications. Further, in the last decade the number of servers is being increased to store more and more data and further, advanced web technologies are being introduced for improving the performance and security of web applications.

Query and optimization is the prime way of Information Retrieval (IR) systems. In web-centric query, URL work as a query from the client to the server and the optimization techniques are required at the server side to respond a relevant and fast response.

As a result, the development of web-centric query and optimization has become more complex and challenging. With the increasing complexity of web-based applications the dependency of users on web has also increased dramatically. Further it is a known fact that within the last decade only, the quality, the security, performance and dependability are of utmost important. Therefore, the need of web
which fulfil all above requirements is very much apparent and scientists have been putting efforts to improve the performance of web on day to day basis.

The thrust of the thesis is to make web respond faster, secure and balanced. In this research work a detailed comparison of classical and extended query optimization techniques is being presented. It is observed that a selected query optimization technique has a direct impact on the performance, security and load on servers. The various data-centric and web-centric query optimization techniques are being analyzed and a framework based on ACO one of the extended query optimization techniques is being proposed in this research work. The research has been carried out with the objective of improving the performance of web by considering the facts such as effect of network traffic, security of web applications, load on servers and impact of collective intelligence.

In order to achieve the above stated objectives, the current work primarily focused on improving the hardware at client side, deploying collective intelligence both at client and server side and providing an interface for the above two frameworks.

Phase one aims to reduce the network traffic with Portable Extended Cache Approach (PECA) [24]. With the PECA the heavy data is stored at the client side and during web-centric queries to and fro movement of heavy data is avoided from client to server and server to client. The browser at the client side retrieves this data from the local machine and this approach reduces the network traffic and automatically improves the web performance. In this research work the initial PECA and the improved PECA are proposed. In order to analyse the proposed approaches two cases each with three tests are used. A comparison of all above, with the traditional, initial and improved PECA is being discussed. The results show that in every parameter the initial PECA is better than traditional approach and the improved PECA is better than traditional as well as initial PECA. With the experimental approach, the web performance is observed to improve and the network traffic is reduced. Further, the
biometric techniques have also been employed and it has proved as a better authentication techniques. Currently, these techniques are specific for a single system or a local network. In this research work the biometric techniques are proposed with Secure Web Access Model (SWAM) [47].

The research work exploits the collective intelligence referred to as ant intelligence in WWW with the aim to improve the performance of online web servers by balancing the load. The central concept of this idea is that a collection of agents can individually perform relatively simple, self-centred actions, such as the selection or rejection of hyperlinks in a web page for navigation, computing the load of server and aggregate these individual actions into a common substrate. The common substrate can then be evaluated to find the best available server to perform the task. This work aims to address the challenge of distributing intelligence to web by contributing a unique ant-based intelligent load balancing framework which is able to integrate and synthesize knowledge on a scale far beyond the capabilities of individual humans. In short, the thesis proposes the approaches, model and framework to improve the web performance and security.