ABSTRACT

The investigation of distributed databases started in the early eighties. The major argument was that distributing data over the nodes of a network would increase performance and robustness, the latter one in the sense that a single malfunctioning node would not have such a tremendous impact on the availability of the database as a whole. The key features of distributed database are Availability and Reliability, Performance Improvement, Communication via Computer Network, Distributed Transactions and Replicated Data Consistency etc.

A major objective of distributed databases is to provide ease of access to data for users at many different locations while maintaining the integrity of data. In this research work, the objective is to design a trusted consistency controlled system for distributed database covering various application areas. Our research contributes as follows:

In a distributed database system, both a local and a global schedule of concurrent transactions must be produced in order to preserve database consistency. A concurrency control algorithm is used to meet this objective. The concurrency control in distributed database, its characteristics, challenges, its basic model and performance is analyzed. Related work based on different existing concurrency control algorithms is investigated.

In distributed database, it is important to take data locality into account so as to avoid increased number of blocked transactions. Several techniques are proposed for balancing the load in homogeneous applications but still some improvement in terms of efficiency is required. A priority based load balancing algorithm is proposed and implemented which balances the load on different nodes in a fragmented distributed database. Memory and CPU utilization based priority method is used and data locality is also taken into consideration along with process waiting time and data transmission time.

Many transaction complexities are there in handling traffic control in distributed database systems which can lead to a large number of rejected transactions resulting in reduced system performance and high communication cost. To meet these challenges, an efficient and cost effective multilayer peer to peer distributed database model for mobile E-polling has been proposed in our research work.
The amount of data used to support the operations of an organization is growing exponentially, so the storing and accessing of this huge data set is becoming a great challenge and hence web cache comes into existence. Web caching is the caching of web documents (e.g. web pages, images) in order to reduce bandwidth usage, server load and improve latency time. Our proposed approach is based on the concept of caching entire pages of dynamically generated contents by reducing the cost and end-user latency for web access. Clusters communicate with each other by message passing. Poor communication among clusters can result into transmission delay, poor bandwidth usage and reduced performance of the overall system. To survive failures, clusters take checkpoints periodically or non-periodically. To meet these challenges, a low cost checkpointing algorithm has been proposed in our research work.

Addressing security demands in distributed database is a big challenge. Moreover, securing the distributed database in compliance with several security guidelines makes the system more complex. In our research work, a framework has been proposed that embeds autonomic capabilities into distributed database by replicating different predefined security policies at different sites using multilevel secure database management system.