Abstract

This thesis presents a new novel approach for unifying processing while preserving heterogeneity among databases. To date, distributed database models attempt to achieve unification of processing and heterogeneity by using interface techniques employing gateways, data dictionaries, wrappers, or special servers. Furthermore they use special kinds of networks, servers, and DBMS, so they face some difficulties in integrating a variety of systems. They also encounter difficulties in providing the distributed database techniques such as the fragmentation, replication and allocation.

The approach presented here is different from those used by the current models. Instead of using interface techniques for providing heterogeneous data this approach uses a linking technique, which is more flexible and available. It adopts a mechanism using an algorithm which divides the problems to sub-instances and then starts solving these sub-instances individually. It then combines the solutions starting from bottom-up iteratively resulting in the solution of the whole problem.

This approach was applied and tested on a real-life distributed university information system running on a wide area network. The following problems that were experienced under the previous models have been resolved by this new approach:

(a) Distributed database techniques were implemented:

    (i) fragmentation was generated automatically. This is because, under the new method, the top systems databases carry combined data, accumulated from several sub systems.

    (ii) replication was implemented. Updating can now be handled and all the work accumulates on the top of the system.

(b) Queries are optimized because most of the work is handled on the local machine. Under the new algorithm difficulties in processing and updating, in the experimental system, were eliminated.

The proposed approach builds an expandable integrated model which unifies processing while preserving heterogeneity among distributed database.