Query Optimization Model for Distributed and Replicated Database Systems

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Abstract

There has been an increased interest in the development and implementation of distributed computer system and distributed database management systems (DDBMS). In a distributed database, we have the ability to centralize data that are most heavily used by end users at geographically dispersed locations and, at the same time, to combine data from different sources by means of queries. The decentralization of data will result in better response times and, if multiple copies are used, in a more reliable system.

The retrieval of data from different sites in a network is known as distributed query processing. The efficiency of processing strategies for queries in a distributed database is critical for system performance. One of the important problems is the efficient processing of queries in a relational DDBMS, where data needed by the query are stored at multiple sites. Two major features that distinguish query processing in a DDBMS from processing a query in a centralized DBMS are significant communication delays and costs and the capability for concurrent processing on multiple machines. These features increase the complexity of the distributed query optimization problem and amplify the importance of deriving good algorithms to solve it.

This paper identifies a special case of the distributed query optimization problem. To solve the problems of query processing, it considers replicated DDBMS in a more actual system environment. A mathematical programming model of the query optimization is developed and solution procedures proposed. The main results for computational experiment is discussed for many queries.

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