METU Interoperable Database System

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METU INteroperable DBMS (MIND) (This project is being partially supported by Motorola Inc., USA and Sevgi Foundation, Turkey) is a multidatabase system based on OMG's (OMG is a registered trademark, and CORBA, ORB, OMG IDL, Object Request Broker are trademarks of OMG) distributed object management architecture. It is implemented on top of a CORBA compliant ORB, namely, DEC's ObjectBroker (ObjectBroker is a registered trademark of DEC Corp.) [DDO96]. In MIND all local databases are encapsulated in generic Database Object. The interface of the generic Database Object is defined in CORBA IDL and multiple implementations of this interface, one for each component DBMSs, namely, Oracle7 (Oracle7 is a trademark of Oracle Corp.), Sybase (Sybase is a trademark of Sybase Corp.), Adabas D (Adabas D is a trademark of Software AG Corp.) and MOOD [Dog94] are provided. MIND provides its users a common data model and a single global query language based on SQL. The main functionalities of MIND are global query processing, global transaction management and schema integration.

The basic component classes in the system are: Global Database Agent (GDA), Schema Information Manager (SIM), Local Database Agent (LDA) and Query Processor (QP).

LDA objects are responsible for maintaining export schemas provided by the local DBMSs, translating the queries received in the global query language to the local query language, and providing an interface to the local DBMSs.

GDA objects are responsible for parsing and decomposing the queries according to the information obtained from Schema Information Manager. They are also responsible for global transaction management, which ensures serializability of nested and flat global transactions without violating the autonomy of local DBMSs [HAD95], and for scheduling and controlling intersite operations. GDA objects handle global commit or global abort using 2PC protocol over LDA objects.

Schema Information Manager holds the global schema information. The integration of export schemas is currently performed by using an Object Definition Language (ODL) which is based on OMG's Interface Definition Language. The multidatabase administrator builds the integrated schema as a view over export schemas. The functionalities of ODL allow selection and restructuring of schema elements from existing local schemas.

Currently, MIND employs a dynamic query optimizer. After a query is decomposed, the global subqueries are sent to the involved LDA objects. The optimization process starts after the first partial result from a LDA object becomes available. For optimizing the intersite operations among these partial results, a statistical inferencing mechanism is used [Ozc96]. Intersite operations are performed by QP objects. There could be as many QP objects running in parallel as necessary.

References

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[DDO96]   A. Dogac, C. Dengi and T. Ozsu, "Building Interoperable Database Management Systems on Distributed Object Management Platforms", Technical Report 96.2.1 Software R&D Center, METU, January 1996

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[Ozc96]   F. Ozcan, "Dynamic Query Optimization on a Distributed Object Management Platform", MS Thesis, Computer Engineering Dept. METU, January 1996.