Tools to Enable Interoperation of Heterogeneous Databases

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Abstract

We demonstrate a prototype toolkit called ITSE (Integrated Translation Support Environment) for interoperation and migration of heterogeneous database systems.

1. Objectives

The main objective of ITSE is to enable transparency in heterogeneous database environments. Therefore, tools have been developed to support flexible configuration of databases and the wrapping or migrating of legacy systems in intranets. The tools themselves are aimed at MDBMS administrators and MIS analysts. These users can tailor the toolkit’s operation so that end users are shielded from the underlying heterogeneity of their information system.

2. Architecture

The functionality of the ITSE system is divided into four programmable components (see figure). Interopera-
tion Workbench - a set of analyzers and translators between database languages, Configuration tools - to customise ITSE for specific multidatabase environments, Access tools - to establish communication channels with local and remote information sources (network products, drivers, etc), Meta-
tools - to extend system functionality (e.g. to add new translators for specific data languages).

3. Technology

Semantic Metamodel - Major datamodels (network, relational, object-oriented) are represented in the metamodel as sets of logic predicates along with mapping rules to establish equivalences between expressions in different models. Expressions in supported database languages are mapped into this canonical form before being processed further.

Automated Code Generation - With the aid of the meta model we are able to produce code generators which require little or no human input. This makes users of the toolkit more productive than programmers who develop standard driver software for interoperation.

Industry Standards - We do not aim to propose another interoperation standard. Therefore, the system makes use of vendor specific connectivity tools wherever possible (e.g. SQLnet, IngresStar, UniSQL/M, ODBC, JDBC), by mapping from the metamodel into vendor-specific APIs. This way, further process communication overheads are kept to a minimum.

Internet Enabled Design - The ITSE toolkit is designed to be internet-aware. Its client/server architecture can be accessed remotely and supports human interaction (command-line interpreter, Java-WWW-GUI) as well as agent based interaction through a programming language and interaction protocol.

4. Status

At the time of writing, prototype interoperation tools as described above are in place. A basic API for ITSE has been defined and implemented. A programming language for the configuration tools has been devised. We do not aim to create a full MDBMS. However, when used in ‘mediation mode’ some basic MDBMS functionality needs to be available. Therefore, we provide a thin layer of access functions which can be intercepted by a local DBMS server as well as by another participating MDBMS (e.g. UniSQL/M).

References