

The Miro DBMS

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This short paper explains the key **object-relational (OR)** DBMS technology used by the Miro DBMS.

There are two popular classes of products in the commercial DBMS marketplace today. The first are relational DBMSs from Oracle, Ingres, Informix, Sybase, etc., and we refer to them as the "R vendors". They sell SQL-based servers on a variety of hardware platforms. The other class of companies includes Objectivity, Object Design, Servio, Versant, and Ontologic. Their products are oriented toward providing persistent data, tightly coupled to a C++ programming environment, and we term them the "O vendors".

On the other hand, Miro is an object-relational (OR) DBMS, which combines the good features of both classes of DBMSs while avoiding the disadvantages of either one. Specifically, an OR DBMS provides a high-level declarative query language through which a user interacts with his data, the standard collection of multi-user data base services, a rich data model and extendability.

The virtues of a high level query language include easier coding of DBMS interactions, easier maintenance of programs, automatic query optimization, automatic integrity of secondary indexes, and a strong notion of data independence. Multi-user services include transaction management, protection and authorization services, integrity constraints and alternate views of data. The third OR capability is a rich data model which is required to support DBMS applications outside of the traditional business data processing arena. Desired data model capabilities include type extension, user defined functions, inheritance and overloading of functions. The last characteristic of an OR system is **extendability**, i.e. the ability to extend the DBMS with new access methods or new algorithms, such as the shortest path between two geographic points. An extendable DBMS allows a user to **customize** the DBMS to meet his specific performance and data modelling needs.

As shown in Table 1, the R vendors are strong on the first two points but have no capabilities in the last two areas, since the relational model is "semantically impoverished" and does not have extension mechanisms. On the other hand, the O vendors have systems with a rich data model and extendability but are weak on the first two characteristics. Specifically, their systems are tuned to providing persistence from a programming language and they have weak or non-existent versions of SQL. In addition, all O vendors run the DBMS in the same protection domain as the DBMS

for high performance in a persistent language environment. As such, it is possible for a malicious programmer to read and write any DBMS data, and such systems have fundamentally no security.

On the other hand Miro has all four characteristics of an OR system. It supports a variant of SQL-3, to become the industry standard later this decade. It offers standard multi-user services, and runs a conventional client-server computing model offering a full suite of protection services. Furthermore, it implements an object-oriented data model, and has a table-driven query optimizer that can take advantage of DBMS extensions, such as new access methods as they are added.

The Miro DBMS started with the POSTGRES DBMS and has added an SQL-based query language, an enhanced data model, much better performance, and a novel set of front-end tools. Version 1 is available now at very attractive prices.

test	OR vendor	O vendors	R vendors
high level language	yes	no	yes
multi-user services	yes	limited	yes
rich data model	yes	yes	no
extendability	yes	yes	no

Product Conformance to Object-relational Principles
Table 1

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