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Enterprising databases

New crop of systems bring more features

New products & solutions

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At first glance, enterprise database systems seem to be super-sized versions of popular desktop database applications, such as Microsoft Access. But they have distinct differences.

Database systems for the enterprise are highly scalable, meaning they can serve 10 or 20 users in a small workgroup or be upgraded to meet the needs of hundreds or thousands of networked users.

Desktop databases typically cost several hundred dollars each, but enterprise database servers can cost thousands of dollars per server, depending on the number of licenses required or the options added to the core program.

And unlike desktop databases, enterprise database programs are notoriously difficult to set up and manage. Even mid-size enterprises generally require at least one database administrator to keep the programs up and running.

But the job of an enterprise database also is considerably more daunting. And considering government agencies' needs to collect, store, transform and transmit huge amounts of information, databases are absolutely essential.

Several classifications of databases are available. Of these, relational database management systems are far and away the most popular. But gaining momentum are two types more suited to the Web: post-relational object databases and XML databases.

Unlike two-dimensional flat-file databases, in which all data is stored in a single file, relational databases store data in multiple flat files connected by shared data fields called keys. Users can query these files by using a language, usually

THE LOWDOWN

What are they? Enterprise database management systems serve up to thousands of networked users. They run on single servers or multiple servers organized in clusters. Most can run on a variety of operating systems.

What's established? Relational databases are the most widely used. They can handle immense amounts of data and easily be queried through the use of Structured Query Language, or SQL. Most support advanced data management features and are Web-friendly.

What's new? Post-relational databases are object-oriented and go well beyond the limits of traditional relational databases. They are suited for managing enterprise e-business requirements. XML is an open standard for storing, exchanging and publishing any kind of information; XML databases could be the future of database technology.

Must-know info? The ability to handle rich data, including audio, video and multimedia, will be a requirement of all database systems before long. Most relational database vendors now provide XML extensions to their core systems, and it won't be long before more native XML database programs come to market.

structured query language, understood by all related databases. With the help of SQL, a standardized query language, relational databases can provide an array of information to users who may or may not understand how a database works.

The market for relational database management systems is robust and growing steadily. Enterprises worldwide spent $8.8 billion on these systems in 2001 and will spend nearly $20 billion by 2006, according to International Data Corp., a Framingham, Mass., research firm.

Interestingly, while the market for the software is growing at a healthy pace, the number of vendors is shrinking.

Last year, only four database vendors accounted for more than 80 percent of the total amount of money spent on relational database management systems worldwide, according to Gartner Inc., a market research company in Stamford, Conn. Oracle Corp., maker of Oracle9i Database, accounted for 33.8 percent. IBM's DB2 Universal Database 7.2, had 30.1 percent. Microsoft's SQL Server 2000 SP2 came in with 14.9 percent. Sybase Inc.'s Adaptive Enterprise 12.5 came in fourth with a 3.9 percent market share but is still considered a market leader.

All four companies have zeroed in on several keys to success in the database market:

Internet use. Enterprises will succeed or fail according to their ability to share information online.

SQL. Virtually all relational databases support this standard language for querying database files. In fact, many users now use the terms "SQL database" and "relational database" interchangeably.

Transaction processing. Handling multiple transactions simultaneously is the bread and butter of relational database management systems. Online transaction processing and transaction logs are built into all the major relational databases.

Manageability. The technology isn't known for being user-friendly. Most systems require a skilled administrator who keeps the database software up and running and trains new users. The best relational database software contains advanced wizards that guide users through complex tasks, such as database and table creation or Web publishing. Graphical tools are also part of the arsenal.

Data security. A good relational database provides safety checks whenever data is changed. Most write data to a transaction log as well as to the database itself. If a mistake occurs as a result of a series of database commands, the commands can be rolled back in order until the error is corrected. Software and hardware fault tolerance, as well as various levels of administrator-defined password protection, is also built into most software programs.

Advanced data management. A growing trend is built-in support for advanced data management features such as data warehousing, data analysis and data mining. Microsoft built limited support for data warehousing and online analytical processing into earlier versions of SQL Server and has enhanced them in its latest version. Oracle and IBM have followed suit.

Open source. To meet demands for open systems software, proprietary database software makers have added support for open standards such as Java and extensible markup language.

As good as it is, the technology has limits. Relational databases only understand limited and simple types of data, such as integers, dates and character strings. More complex data types, such as those used in e-commerce and Web applications, require new database architectures.

According to the Aberdeen Group Inc., a Boston market research company, object-oriented databases are designed to support the complex logic and rapid deployment of Web applications, as well as Web tools such as XML and Web services.

"The new databases are 'low profile.' They can be embedded in the Web application, allowing low administrative costs and higher performance," an Aberdeen report said.

InterSystems Corp.'s Cache 5, for example, is a popular post-relational object database that combines object, SQL and multidimensional technologies.

Cache 5 includes relational capabilities but focuses on complex transactions. New features include a redesigned engine for greater performance and scalability, server pages for enhanced Web programming, real-time search capability for combined decision support and transaction processing, multilingual programming and enhanced XML object connections.

Relational database systems are well-suited to manage data that fits into rows and columns, but they fail when called on to manage rich data such as audio, video, nested data structures or complex documents. All are characteristic of Web content.

The XML standard is an open standard for storing, publishing and exchanging any kind of information. It lets business information be made independent from proprietary data formats and to remain readable forever.

Some industry insiders are calling XML the most significant change in computing since the invention of relational databases and SQL.

As a result, many vendors are jumping onto the XML bandwagon by building special XML extensions into their core products. This move is a step in the right direction, but will result in products that will never be as cost-effective and robust as native XML databases, according to Software AG and other XML developers. ■

Enterprise database management systems can link many users

Company	Product	Classification	Description
Computer Associates International Inc. Islandia, N.Y. | 631-342-6000 **www.ca.com**	Advantage Ingres Enterprise Relational Database 2.6	Relational	Highly scalable RDBMS, deploys to most platforms, including Linux; advanced visual administration tools, enhanced integration flexibility, XML support, intuitive database administration tools, Unicode support
	Jasmine ii 2.0	Object-oriented	Ensures seamless integration of e-business systems between organizations and their partners or suppliers; provides database support, e-mail management and middleware services through a single interface; $2,000 up per server CPU
FileMaker Inc. Santa Clara, Calif. | 408-987-7000 **www.filemaker.com**	FileMaker Server 6.0	Relational	Designed for enterprise workgroups, supports up to 250 concurrent guests and 125 hosted files, includes centralized backups, remote administration, LDAP directory support and automatic updates of plug-ins; box set site license $169 per seat
FirstSQL Inc. El Cerrito, Calif. | 425-828-4552 **www.firstsql.com**	FirstSQL/J Enterprise Server 2.0	Object-relational	A 100 percent Java object-relational database that combines objects integrated with a relational database and SQL; can be used in any type of embedded system, device or server-based application; $1,195 up per server CPU
IBM Corp. Armonk, N.Y. | 800-426-4968 **www.ibm.com**	DB2 Universal Database Enterprise Edition 7.2	Relational	A multimedia, Web-ready RDBMS for e-business applications such as electronic commerce, enterprise resource planning (ERP), customer relationship management (CRM) supply-chain management, Web self-service and business intelligence; $25,100 per server CPU
	IMS Database Management System 8.0	Online Transaction Processing (OLTP)	Mainframe-based, used for critical online operational applications and data where support for high availability, performance, capacity, data integrity and low cost are key factors; $25,000 up per month
InterSystems Corp. Cambridge, Mass. | 617-621-0600 **www.intersystems.com**	Cache 5	Post-relational	Optimized for the rapid development and deployment of high-performance, massively scalable Web and client-server applications; comes with strong object-oriented features and links easily with legacy relational databases; $1,000 up
Ipedo Inc. Redwood City, Calif. | 650-306-4000 **www.ipedo.com**	Ipedo XML Database 3.0	XML	New features include updated graphical and command line administration tools, transaction support and document revision control; supports both XPath and XQuery querying systems; $29,000 per server CPU
Microsoft Corp. Bellevue, Wash. | 425-882-8080 **www.microsoft.com**	SQL Server 2000 SR2	Relational	Complete database and data analysis; fully Web-enabled, supports XML, queries across the Internet beyond enterprise firewalls; $19,999 per server CPU
MySQL Inc. Seattle | 425-743-5635 **www.mysql.com**	MySQL 4.0	Open-source relational	Open-source RDBMS; reuse of code within the software and a minimalistic approach to added features gives it speed, compactness and ease of deployment; free download; minimum fees for commercial licenses
NCR Teradata Division Dayton, Ohio | 937-445-5000 **www.teradata.com**	Teradata Database 2.5	Data warehousing	The database component of NCR's Teradata Warehouse 7.0, an industry-leading suite of data warehousing software; lets data be stored, analyzed and interpreted from one centralized database engine; bundled with Teradata Warehouse 7.0
Neocore Inc. Colorado Springs, Colo. | 719-226-7000 **www.neocore.com**	Neocore XMS 2.0	XML	A basic XML database with XPath but not XQuery querying capability; Java-based administration tool, Access Control Manager, provides a basic set of management tools; employs Neocore's Digital Pattern Processing (DPP) for fast data processing; $5,000 to $75,000 per server CPU
OpenLink Software Inc. Burlington, Mass. | 781-273-0900 **www.openlinksw.com**	OpenLink Virtuoso Enterprise Edition 2.7	Post-relational/XML	A cross-platform, multiprotocol and multipurpose server that implements Web, database and application server functions, native XML storage and universal data access; $7,999 per server CPU
Oracle Corp. Redwood Shores, Calif. | 650-506-7000 **www.oracle.com**	Oracle 9i Enterprise Edition 2.0	Relational	Highly scalable and reliable; comprehensive features for OLTP and business intelligence; comprehensive access to Web services through SQL, Java, XML and standard Web interfaces; $40,000 per server CPU
PointBase Inc. Mountain View, Calif. | 650-230-7200 **www.pointbase.com**	PointBase Embedded 1.0	Java relational	A platform-independent RDBMS written entirely in Java; can be embedded directly within an application, so it is completely transparent to users; $353 per seat (downloadable version)
PostgreSQL Global Development Group (contact via Web site) **www.postgre.com**	PostgreSQL 7.3	Open-systems/ object-relational	An open-systems, object-relational database sponsored by a global community of RDBMS developers and users; free download
Progress Software Corp. Bedford, Mass. | 781-280-4000 **www.progress.com**	Progress RDBMS 9.1d	Embedded relational	Embedded, highly scalable, low cost of ownership, high availability and reliability, support for transaction processing, broad platform support, open interfaces; $730 per seat
Sybase Inc. Dublin, Calif. | 925-236-5000 **www.sybase.com**	Adaptive Server Enterprise (ASE) 12.5	Relational	Developed for mission-critical, transaction-intensive enterprise applications; features strong cross-platform capabilities, Java support, high-availability modules, extensive online documentation; $3,995 per server CPU
Software AG Inc. Reston, Va. | 703-860-5050 www.softwareag.com	Tamino XML Server 4.1	XML	Open-source, designed for high-performance, mission-critical e-business applications, stores XML documents natively in their original formats, manages information residing in external XML or non-XML formats sources; free 30-day download; $45,000 per server CPU

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