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Embedded Databases Reveal Gems

Built-in databases are easy to use, cost-effective, and require little or no administration

By Rick Whiting, InformationWeek
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Boating supplies retailer West Marine Inc. deployed a new point-of-sale system throughout its 250 stores in July. Buried in the software running on each store's server, and invisible to employees, is an embedded database handling a variety of pricing and inventory-management chores. Why an embedded database? "Total cost of ownership. And we don't have a database administrator in every store," says Wayne Freeman, retail systems applications manager.

The term "embedded database" covers a broad range of implementations. Some are built into devices ranging from industrial controllers and cable-television set-top boxes to medical-imaging systems and the flight controls of the Boeing 777. Others are used in the rapidly growing number of mobile phones, PDAs, and other portable consumer devices that rely on built-in databases as small as 50 Kbytes. Still others are used by corporate developers and independent software vendors, who build them into applications, making the databases invisible to users.

Embedded databases are particularly prevalent in accounting software, retail applications such as West Marine's, and applications for the health-care industry.

PixelPoint Technologies Inc., for example, develops point-of-sale applications for restaurants that have Sybase Inc.'s SQL Anywhere database built into them.

The database has to be reliable and easy to use, because PixelPoint's resellers sell cash registers, not complex applications, CEO Lino D'Angicco says. "If we had to tell our resellers that they have to have a database administrator on-site, well, that's cost-prohibitive," he says. PixelPoint's software is designed to be self-configuring.


West Marine chose an embedded system to meet performance, Freeman says.

The automated, self-configuring capabilities in Pervasive Software Inc.'s database software is a key reason West Marine used it to replace the database that came with the Win/DSS point-of-sale system from JDA Software Group Inc. that runs the retailer's 1,400 cash registers and workstations. Also key was scalability: The system tracks the stores' 160,000 inventory items and 500,000 price records. "We desperately needed performance," Freeman says.

Despite their obvious benefit and almost ubiquitous nature, sales of database software for embedded applications have slumped badly during the recession--

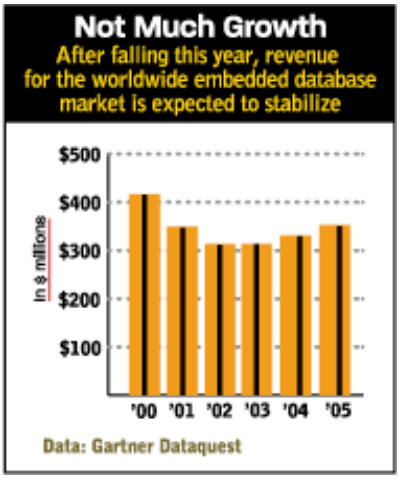
people aren't buying as many refrigerators, vending machines, industrial controllers, networking devices, airplanes, and medical-imaging systems, and so they're not buying as many embedded databases.

Sales of the software dropped from $416.9 million in 2000 to $349.7 million last year and are expected to sink further to $314.1 million this year, according to market researcher Gartner Dataquest. Sales are expected to stay flat next year before starting to grow again in 2004.

What's more, large packaged applications with embedded databases seem to be losing some of their popularity, while vertical-market and workgroup applications with embedded databases are becoming more prevalent, Aberdeen Group analyst Wayne Kernochan says.

Unlike the market for mainstream databases, which is dominated by IBM, Microsoft, and Oracle, the fragmented embedded database sector has a large number of players led by InterSystems, Progress Software, Sybase, and Pervasive Software, although no vendor has more than a quarter of the total market. Not that IBM, Microsoft, and Oracle are absent from the scene: All three offer slimmed-down versions of their databases for embedded and mobile applications.

And vendors have been busy, despite the sales slowdown. During the summer, Gupta Technologies LLC launched SQLBase 8.0 with support for Microsoft's Transaction Server. Last month, InterSystems began shipping Cache 5, a new release of its database software with real-time analytics capabilities and built-in support for Web services.



At the same time, Microsoft debuted SQL Server 2000 CE 2.0, a new release of its minidatabase for mobile applications. And last week, Pervasive Software unveiled version 8.0 of its namesake database with improved deployment and administration capabilities and a range of performance enhancements.

Looking to the near future, Borland Software Corp. later this month will debut InterBase 7.0 with symmetric multiprocessing capabilities. This fall, IBM will unveil release 8.0 of its DB2 Everyplace with new encryption features for improved security.

Most vendors focus on specific segments of the embedded database market. FairCom Corp.'s C-Tree Plus, for example, is particularly strong in the market for databases with a small footprint (generally 100 to 300 Kbytes) that is deeply embedded in things such as industrial controllers and automobile braking systems. Sybase's SQL Anywhere database is especially popular for building mobile applications.

InterSystems' Cache is widely recognized as the leading embedded database for health-care applications. This month, Molecular Pathology Laboratory Network, which conducts advanced molecular testing for cancer and infectious diseases, will go live with a laboratory information system built around Cache 5.

The software will essentially run the lab, CIO Kenneth Billings says, tracking orders for laboratory tests and producing reports on the results. The lab chose Cache because of its capacity to handle the large volumes of data the lab's genomic tests generate, he says.

A key difference between embedded databases and mainstream databases such as Oracle9i and IBM DB2 is that the latter are designed for maximum performance and require a lot of care and feeding by database administrators. But embedded databases are designed to be self-sufficient and require little or no administration. Low cost and ease of use are the two things users of embedded database software demand, Aberdeen Group's Kernochan says.

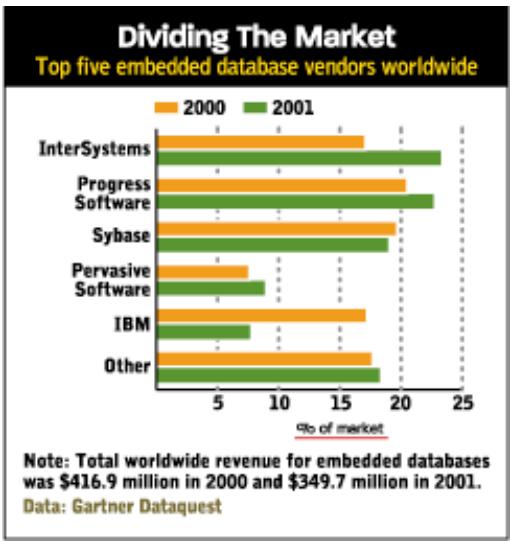
Self-administration was the main reason health maintenance organization Kaiser Permanente installed software

from Royal 4 Systems Inc. last year to track the purchase, storage, and installation of office furniture and medical equipment in its new medical facilities in Southern California. The software has a Progress database at its core.

The self-contained application and database were necessary because Kaiser Permanente's IS operation has no experience with distribution systems and can't provide any support, says Jonathan Rothschild, manager of startup services. "There are no IS people here at all," he says from the HMO's warehouse in Chino, Calif.

Compatibility and connectivity with other enterprise systems, support for multiple data types, and scalability are the chief weaknesses of the current crop of embedded database tools, according to a survey of more than 400 embedded systems developers conducted earlier this year by Evans Data Corp. But those developers say they were relatively pleased with the products' integration capabilities, portability, and support for real-time operating systems.

Embeddable databases are often closely tied to a set of development tools for building applications around the database. And those tools are frequently what lead a company to buy one embedded database over another, Gartner Dataquest analyst Colleen Graham says. Progress, for example, sells its database as part of its OpenEdge application development and deployment platform, which also includes development tools and an application server. InterSystems provides its Cache Studio application development environment.



HAB Inc. markets a set of management applications for public-housing authorities based on Gupta's SQLBase and developed using that vendor's tools. "Getting both from under one roof was a big deal for us," says Tom Fahey, HAB's development manager. "If you get the database from one place and the development tools from another, there could be technology issues."

Some vendors that sell development tools and database software have used proprietary programming interfaces. Developers today are demanding that embeddable databases provide more standard interfaces such as Open Database Connectivity, Java Database Connectivity, OLE DB, and Active Data Objects.

In Pervasive 8.0, those standard interfaces are supported along with the vendor's proprietary Btrieve application programming interface. In its RDM Server 4.0 database released in July, Birdstep Technology ASA supports ODBC, JDBC, and Dynamic Database Definition Language for modifying a database's structure.

By the end of the year, Gupta plans to offer a native .Net data provider that will let SQLBase exchange data with .Net applications. And InterSystems' Cache database offers an ODBC interface that Molecular Pathology Laboratory Network plans to use to link its laboratory software with IT systems at other medical laboratories, CIO Billings says.

Customers are also starting to ask for data-replication capabilities to let databases built into mobile devices or products such as vending machines sync up with a database back at headquarters. Borland already provides such capabilities in its InterBase embeddable database, while other vendors, such as Progress, plan to add such features soon. A train manufacturer uses the replication capabilities in FairCom's database to download collected diagnostics data from locomotive engines to a central system for analysis, for example.

Suppliers of native XML databases such as Excelon, Ipedo, and Software AG say they're seeing increasing demand for their products for embedded applications. XML databases are designed to store and manage XML documents and other content.

One Ipedo customer embeds the vendor's XML database in an application used to manage digital assets such as training videos. Ipedo says embedded applications account for about one-third of its sales.

Last month, Birdstep debuted RDM XML, an embeddable XML database for mobile applications. Adding XML support to databases is on the research and development to-do lists of other vendors as well.

Vendors of open-source databases such as MySQL, NuSphere, and Sleepycat Software also have been making a run at the embedded database market. Open-source database vendors sell products and services based on the free MySQL and PostgreSQL database technologies.

But competitors say that open-source databases don't have the scalability and reliability of established, proprietary products. "Transactional integrity is the bread-and-butter of embedded databases," says Jacob Christfort, product development VP and chief technology officer of Oracle's mobile products and services division, which develops the Oracle9i Lite software.

Industry analysts say open-source databases may be a threat to established vendors such as Progress and InterSystems, but not in the immediate future. Says Aberdeen Group's Kernochan, "I don't see them having a presence in the market for the next two years."