User demands for interoperability among heterogeneous environments have affected all computing platforms and they way they are sold. Vendors of proprietary midrange operating systems say they are now more open, but the question is whether they go far enough.

The Changing Face of Midrange Platforms

By Richard Cole

As with various aspects of contemporary life, some traditional distinctions regarding computing aren't as clear as they used to be. For instance, take the dichotomy "open" versus "proprietary." In the past, "open" was code for "Unix-based," and proprietary vendors prided themselves on a "Not Invented Here" snobbishness to justify their ambitions to provide vertically integrated, turnkey solutions for customers.

Today, the distinctions between open and proprietary are blurring, honestly or not. Systems that used to be known as closed are becoming more open—or trying to appear as such. At the same time, the definition of *openness* itself is evolving. It still revolves around basic criteria like portability, interoperability and modularity. But changes in the technology and the marketplace have forced a broader definition, as vendors of non-Unix and distinctly proprietary environments try to find ways to position their products under this banner.

These changes appear most clearly in midrange hardware and operating systems. Feeling pressures from above and below, midrange platforms have always been one of the most rapidly evolving areas of information technology, as their designers are forced to reinvent them and justify their places in the market. Minicomputers were offered as the first mainframe alternatives. Now, midrange systems have established themselves as cost-effective solutions for small businesses, departments or networks. They can work as stand-alone systems, nodes connected to a larger host or servers in client/server environments.

However, it's precisely these areas,

especially the server market, where the issues of open versus proprietary are contested most hotly. Technical and marketing strategies reveal how both open and proprietary midrange vendors are dealing with customers who, more and more, simply want the best business solution rather than a particular kind of system.

A Proprietary Archetype

Since its introduction in 1988, IBM's Application System/400 (AS/400), with its Operating System/400 (OS/400), has been considered an archetype of the proprietary solution. IBM has always tried to position its products as universal standards, and this generically named midrange platform is no different. Sales originally were strong, but by 1992, the AS/400 had almost died a natural death. It was viewed as underpowered, overpriced and hopelessly closed. Customers complained about being "locked in" to IBM hardware and software. Positioned as a "VAX killer," the AS/400 instead lost key markets to those systems from Digital Equipment Corp.

In 1994, new models and a new version of OS/400 breathed life into the system, and more enhancements were added in 1995. Performance has been improved with the introduction of a 64-bit, PowerPC reduced instruction set computing (RISC) chip. AS/400 performance as a server has also been boosted with a variety of file server input/output processors. These Intel or Intel-compatible 486 PC processors inside the AS/400 cabinet are dedicated to server processing.

These are the type of enhancements that might be made to any architecture. In addition, IBM has tried to make the AS/400 more open by adopting a number of protocols and standards. OS/400 version 3.1 now provides about 2,000 application programming interfaces (APIs) for Unix, DOS, Windows and Macintosh applications. Network performance, long a major complaint, has been increased with improved TCP/IP support integrated into the OS/400 kernel, which gives the system better performance than when the software ran as an application. NetWare's IPX/SPX communications protocols are supported, and support is available for some APIs of the Single UNIX Specification certified by the X/Open consortium.

Also increasing AS/400 openness is an integrated file system, which allows files to be viewed in AS/400, PC or Unix file formats. Other refinements increase access to query standards such as Structured Query Language (SQL), Microsoft's Open Database Connectivity (ODBC) and Apple's Data Access Language and to database access and distributed display for HP, IBM and Sun Unix platforms.

A Hung Jury

Despite these additions, opinion is divided as to their actual effect in terms of openness. Analyst Chris Christensen of International Data Corp. in Framingham, MA, says, "The AS/400 has been open for quite some time." He cites basic criteria such as common communications protocols, common development products and common applications.

In contrast, Don Brown, president and research director of D. H. Brown in Port Chester, NY, is underwhelmed by these efforts. Speaking of IBM's degree of compliance with the Single UNIX Specification, he says, "Being 80 percent compliant is like being halfway pregnant. Either you're compliant or you're not." As for the idea of open, he says, "They're open only one way. Unix applications can be ported to the AS/400, not vice versa." Brown also points out features such as a kernel interface that makes tinkering with or even examining source code almost impossible.

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Most analysts also give middling grades to IBM for connectivity from the AS/400 to the RS/6000, IBM's other midrange platform, which is based on a RISC microprocessor and runs AIX, IBM's Unix variant. Analysts downgrade what is only "arms-length," protocol-level connections, such as TCP/IP, between the two platforms. They also question the overlap and confusion of applications between AS/400 and RS/6000 systems.

"What IBM doesn't realize is that protocols aren't enough," says Terry Bennett, partner at the Bennett Co. in Portland, OR. "You've got to be able to build an effective computing environment with heterogeneous equipment. IBM hasn't gone far enough beyond the pure standards to actually support different system management levels or backup and restore capabilities. They've got to do this to be attractive to people considering Unix systems."

The Proprietary Paradox

IBM's clearest reply to criticisms about AS/400 openness is seen in the way the company sells the machine: as an easy-to-manage solution that doesn't require a lot of technical expertise (or expensive salaries) to operate. Indeed, if the system were "opened up" completely, it would lose its integrated database and simple management tools, the qualities that make it attractive to system administrators trying to connect a variety of workstations, servers, databases and more.

This is the paradox of proprietary systems. Their best features are intimately linked to their limiting, proprietary nature. The AS/400's high level of integration makes it easy to use but at the cost of application and configuration flexibility.

This paradox doesn't concern all AS/400 customers. John Stahler is information system manager for Southland Industries, an automobile products manufacturer in Chesapeake Bay, MD. Southland runs an AS/400 server connected to 60 PC clients and 32 IBM 3477 terminals. An RS/6000 is used for computer-aided design applications. The two systems are not connected at this time, although Stahler has looked at third-party packages that allow terminal emulation between them. The systems can share data, though updates have to be done on each platform separately.

Like many AS/400 customers, Stahler isn't concerned with openness per se. "Our decisions have to be business-driven," he says. "I'm not trying to be the

first on my block to have an open machine. As far as I'm concerned, [the AS/400] is as open as I need."

Although Bennett and other analysts report that AS/400 revenue streams are trailing off, the platform has over 25,000 applications and 300,000 systems installed worldwide. About 50,000 new machines are being sold annually, and according to the Garter Group of Stamford, CT, IBM still contributes $500 million a year to AS/400 research and development. IBM seems determined to promote the system as long as possible.

A Graceful Exit

In many ways, the situation of the MPE/ix operating system, which supports the HP 3000 line of servers from Hewlett-Packard, is similar to that of OS/400. The 20-year-old operating system has a reputation as a dependable platform for commercial transaction processing. Like IBM, HP continues to back its platform. In 1995, MPE/ix received a number of enhancements that have improved performance and increased openness. To date, the operating system supports AppleTalk and NetWare networks, the Network File System and databases accessed through Microsoft's ODBC interface. Support is provided for Posix standards, Ethernet and Token Ring network protocols, TCP/IP, IPX/SPX, the X.400 e-mail standard, the Distributed Computing Environment (DCE), the Motif graphical user interface, and the Internet File Transfer Protocol and Simple Network Management Protocol.

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However, HP's position is more delicate than IBM's, because the HP 3000 is more clearly on its way out. Sales are dropping, and few independent software vendors are writing new applications for it. This is the opposite of the success of HP's other platform, the HP 9000, which runs the HP-UX version of Unix. The two hardware platforms are almost identical, and obviously HP wants to migrate its 3000 customers to the 9000 line. Hewlett-Packard is therefore faced with a knotty problem: how to phase out the older platform, stressing its proprietary advantages all the way, while conveying the message that Unix is the future.

This problem has required some careful phrasing. For example, the company stresses that HP 3000 and MPE/ix are "open" without being Unix-based. Says Kriss Rant, product manager for the commercial systems division in Cupertino, CA, "We are trying to strengthen the links with other platforms, so HP 3000 is becoming, in so far as it can, a more open platform." Besides the standards and protocols mentioned above, there are interfaces that allow HP 3000 servers to share files, access data and use printers on other platforms. Third-party products enable Unix-based applications to read and update HP 3000 files and vice versa.

Like other proprietary systems vendors, Hewlett-Packard also claims advantages for the HP 3000 over Unix systems, including easier operation, better system and database administration due to the higher level of integration, and better data availability with fewer system aborts and faster recovery.

But HP 3000 people are careful not to knock Unix too loudly, since they provide technical support and financial incentives for HP 3000 customers to move to the 9000 line. Rant tries to present a balanced view of the future. "We'll continue to enhance and support this operating system for as long as customers want us to," he says. "However, we recognize that the 3000 is surrounded by other platforms, and customers are supplementing their environment with other applications and platforms as well."

Covering the Bases

Digital Equipment Corp. shows another way to deal with the issue of proprietary versus open: join the competition which, in this case, is both Unix and Windows NT.

Digital's OpenVMS operating system is based on the Virtual Memory System (VMS) operating system that runs on the VAX systems. OpenVMS runs on both VAX and Digital's Alpha RISC servers and workstations, and it complies with both Posix and the X/Open Portability Guide version 3 (XPG3), a set of standards for X/Open's Common Application Environment. In 1995, Digital unveiled version 7.0 of OpenVMS, which offers a 64-bit operating system, a more efficient log-structured file system that allows continuous backup and kernel threads for distributed application processing.

Even so, like MPE/ix, OpenVMS is increasingly seen as an outmoded OS. Brian Richardson, program director at the Meta Group in Westport, CT, says, "OpenVMS is as open as a non-Unix system can get." He adds, however, that although the operating system core is Posix-compliant, the extensions—where the middleware and systems management tools are located—remain proprietary. In addition, OpenVMS runs only on Digital hardware. "That limits it in terms of portability," says Richardson.

Like Hewlett-Packard, Digital is preparing for an open future. The Digital Unix operating system is a native, 64-bit operating system based on reference code from Open Software Foundation (OSF) of Cambridge, MA. Digital has incorporated OSF standards such as Applications Environment Specifications, the Motif user interface, DCE and others. DEC provides compatibility for the BSD source of Unix; complies with Unix System V through APIs; and claims compliance with 98 percent of the Single UNIX Specification APIs.

Digital still has ideas about lengthening the life of OpenVMS. Efforts have recently centered on an affinity program with Windows NT. In 1996, Digital plans to introduce a common code base that will allow many applications written for either Windows NT or OpenVMS to run on the other platform. The affinity program also includes improved processing among clustered servers, LAN management software to monitor OpenVMS servers from a Windows NT workstation, the addition of Microsoft's Object Linking and Embedding (OLE) protocol to OpenVMS platforms and messaging software to support future Microsoft Exchange clients.

Windows NT affinity also extends to Digital Unix. Mark Silverberg, product marketing manager for Digital Unix in Maynard, MA, points to third-party products from Bristol Technology of Richfield,

CT, and Mainsoft of Sunnyvale, CA, which allow Windows NT applications to run on top of Digital Unix (as they do for other Unix implementations). Silverberg also mentions development efforts by Digital for centralized management of Digital Unix and Windows NT in the same environment, plus common middleware tools for application and data integration. "We're highly supportive of Windows NT, and we'll continue that direction in the future," he says.

Digital plans to introduce a common code base that will allow applications to run on both Windows NT and OpenVMS.

Going Head-to-Head

The "if you can't beat 'em, join 'em" attitude is not evident in the Orem, UT, headquarters of Novell, whose NetWare network operating system is perhaps the mostly directly threatened by Windows NT. NetWare has been criticized as expensive, inflexible and difficult to install, and analysts say that release 4.0 didn't change this perception substantially. Today, 70 percent of LAN servers run NetWare, but the general feeling is that NT will take over this market in the next few years.

Faced with this challenge, Novell has tried to position NetWare as a "from anywhere to anywhere" network solution. To that end, it emphasizes support for other operating systems such as IBM OS/2, Macintosh and Unix, which have been folded into NetWare as clients. NetWare also supports TCP/IP, the SCSI interface for the connection of peripherals and X.500, a protocol for maintaining online directories and resources.

In addition to its own IPX/SPX protocol stack, NetWare supports IBM's Systems Network Architecture, the NetBIOS protocol for PC LANs, AppleTalk and Digital's PathWorks. NetWare also supports native file formats and native file header specs, so customers can use NetWare file services to store and share files across heterogeneous platforms. In addition, NetWare supports a number of network topologies including Ethernet, Token Ring and Fiber Distributed Data Interface (FDDI). NetWare Loadable Modules allow other applications services to be offered with NetWare, and Novell is developing what it calls a universal API, code-named Net2000, which will allow other applications to access NetWare services.

Novell has a longer focus on Unix platforms. Presently, NetWare customers can register Unix applications in NetWare's directory and authenticate the Unix namespace, so Unix applications can be accessed anywhere on a NetWare network. In September 1995, Novell sold UnixWare and the Unix source code (which it had purchased from AT&T) to the Santa Cruz Operation of Santa Cruz, CA. As part of the agreement, SCO and Hewlett-Packard plan to incorporate the NetWare Directory Services (NDS) into the merged operating system they are developing. Meanwhile, Novell can return to its core business—networking—and concentrate on services and product development.

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Novell realizes that Windows NT is its most dangerous competitor. William Donahoo, senior director of product marketing for NetWare, claims that Novell has a "36-month advantage" over rival Microsoft in the areas of network services, distributed services and support for heterogeneous systems. NDS has received the most attention. As a distributed goal name service, it provides the ability for any resource on the network (file, printer, e-mail and others) to be registered with the NetWare directory as an object and then be displayed independently of its location. New user accounts can be added and connected to multiple resources listed in a single, integrated directory. In contrast, Windows NT won't have single-directory capability until a future release.

NetWare is also, ironically, making progress with connections to Windows NT, including porting NDS to NT. However, Novell realizes that it and Microsoft are locked in what is essentially a zero-sum game: As one side gains, the other side loses. Microsoft, of course, has a number of product lines and businesses. For NetWare, this game will be do or die.

An Open-Minded Future

Seasoned observers know that the technology road takes surprising twists and turns. Who would have expected a new proprietary midrange operating system before Microsoft announced NT?

Probably, however, older midrange systems will continue to concede market share to more open systems, even though openness itself is becoming more of a "checklist item," according Shaku Atre, analyst and president of Atre Associates in Port Chester, NY. She observes that corporations sometimes migrate across platforms, but the decision is an expensive one and therefore rare. What's more, if migration occurs, new applications are often purchased or started from scratch. She argues, "As a CIO, my main interest is in how I'm going to look in two years. In most installations, openness is used only in the process of evaluation. It's a security blanket."

On the other hand, if openness is a security blanket, it is one that remains important to many customers. Rod Barnett works out of Bristol, VA, as director of information systems at Flav-o-Rich, a dairy products company. He runs both OpenVMS and Digital Unix systems, and is committed to future development on the Unix platform. He lists three advantages over proprietary systems: hardware independence, a strong development community for Unix applications and competitive prices. Assessing his experience with both the proprietary OpenVMS and the open Digital Unix, Barnett says, "I like the open systems environment. It hasn't been totally easy. Unix can be an unforgiving OS. But we're happy with open platforms, and we're moving ahead with them." IT

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