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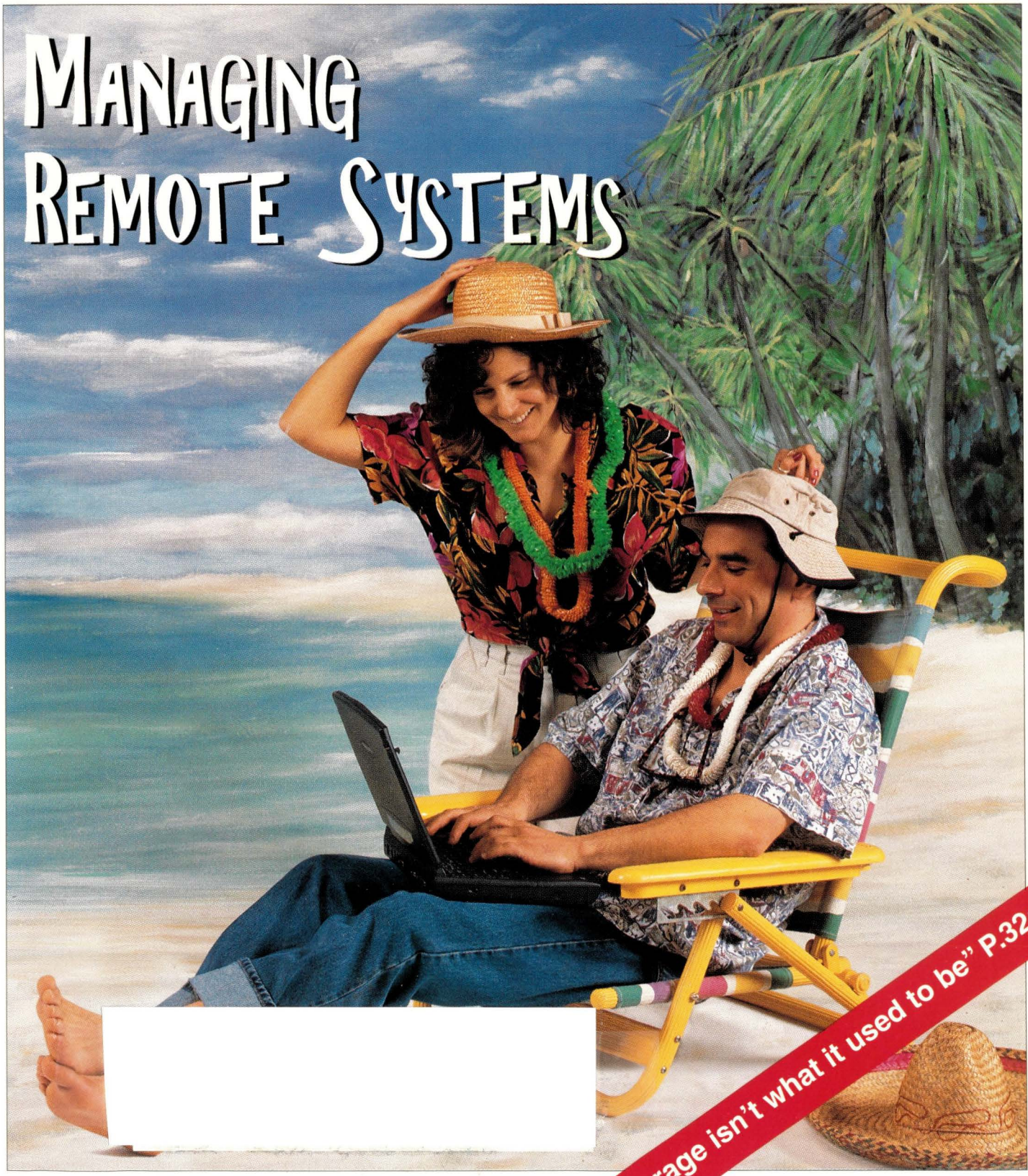
The Server/Workstation Magazine



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Review: Tadpole-RDI VoyagerIli

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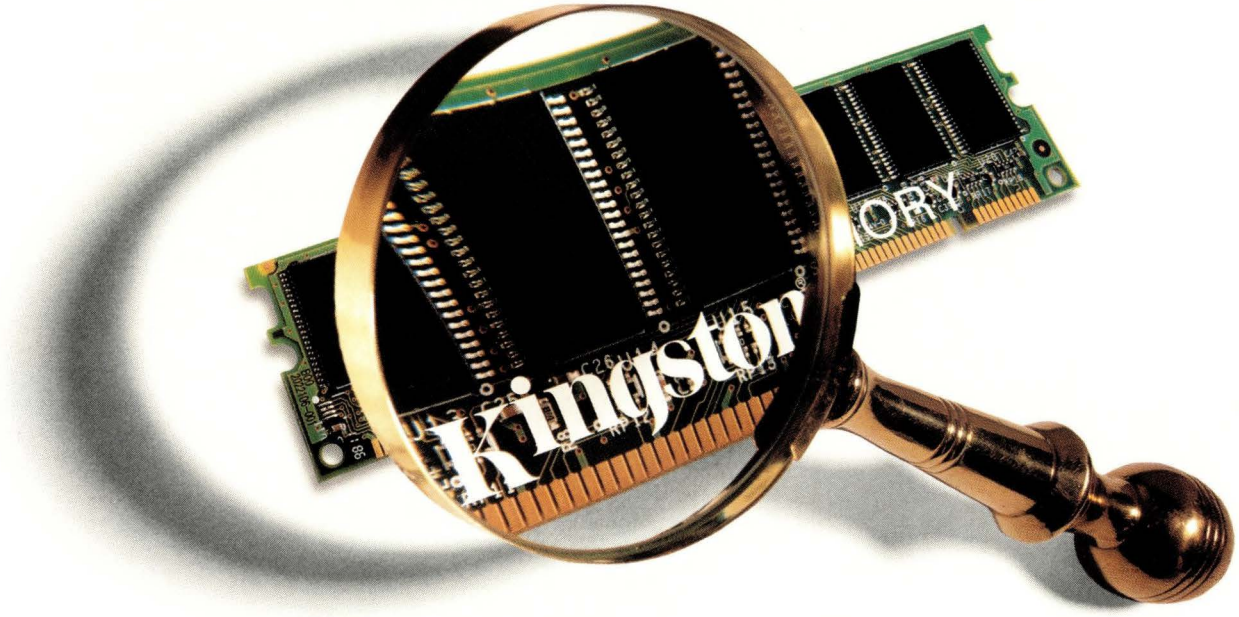

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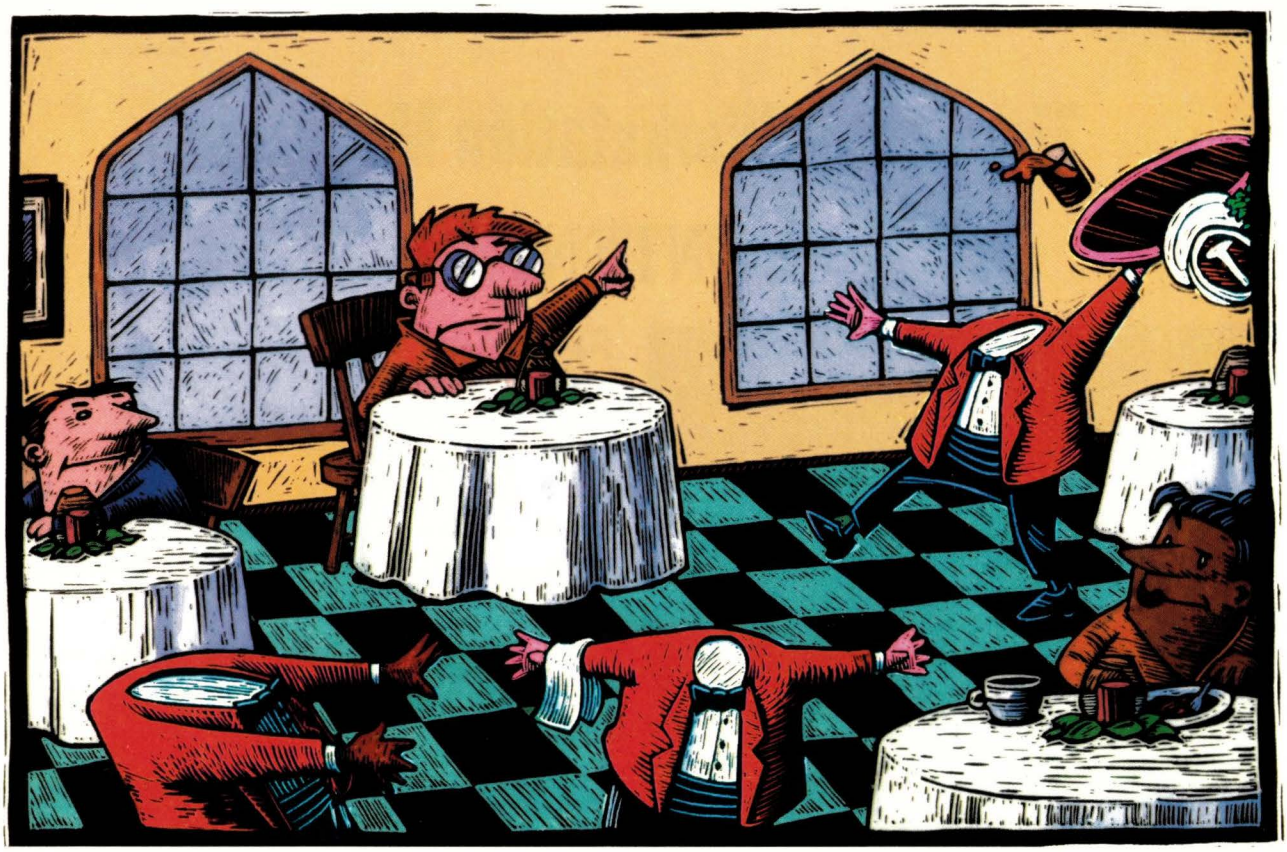

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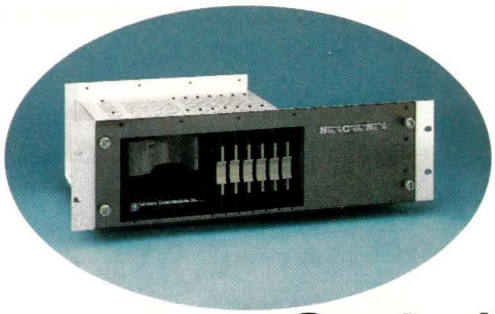

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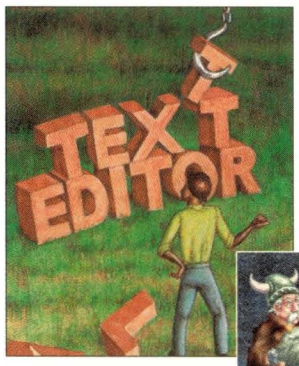

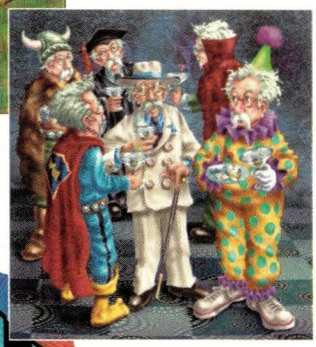

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EDITORIAL

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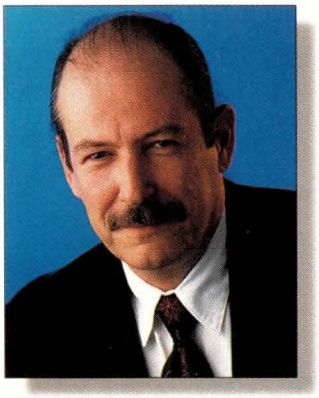

Distance, Bandwidth and Mergers

Most network managers shudder at the thought of scores of remote users. Why? How many users do you know who have built-in SNMP? That would certainly make life a little easier, wouldn't it? In most cases, remote systems require the basic systems management expertise we use to keep our local area networks (LANs) and wide area networks (WANs) running smoothly. As Alexandra Barrett discovers in this month's cover story, "Managing Remote Systems," Page 44, "Remote systems need to be kept free of viruses, they need to be equipped with the latest operating systems and applications, they need to be backed up and their performance needs to be monitored." It just makes sense that these concerns be addressed by the same network performance and monitoring tools we use locally.

In the course of gathering information for her article, Alex found that most traditional management automation tools assume that the systems under their control reside on local, high-speed networks with persistent connections. However, some tool vendors are beginning to place remote systems under a management wing. Tom Bishop, chief technical officer at Tivoli Systems Inc., points out that agent technology new to Tivoli 3.6 allows a managed client–local or remote–to dynamically download the management components it needs to perform particular functions. According to Allan Andersen, product manager for desktop and server management solutions at Computer Associates International Inc., Unicenter TNG has a set of remote management tools that do chores such as inventory control, software distribution, remote control, virus control, backup and security.

Please check out this month's News section, Page 6. The first three stories deal with the implications of the Netscape Communications Corp./America Online Inc. (AOL) merger. They examine the implications of the technology agreements between the new entity and Sun Microsystems Inc., which became part of the fabric of the announcement. Most Sun users will have to be alert to how product redundancy and any joint development work evolves when trying to plan migration paths. For example, Sun has publicly stated that its Internet Mail Server software will continue to be sold and supported even though it competes with the popular Netscape Mail Server. It could be an interesting year. Watch this space for developments and let us know what you think.

Doug Pryor

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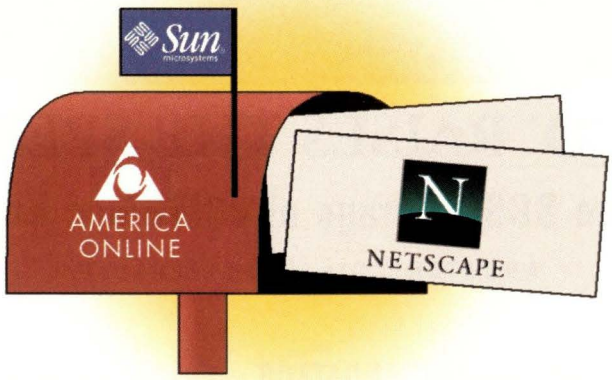
The Net Dynamics of Mergers

When America Online Inc. (AOL) announced its plans in November to spend $4.2 billion to purchase Netscape Communications Corp., one of the more interesting aspects of the deal revolved around Sun Microsystems Inc. Contingent on the merger being finalized, Sun and AOL have formed an alliance that calls for the two companies to develop products based on Java and relating to Netscape's current offerings. In addition, AOL will become one of Sun's largest hardware customers and Sun will license and OEM AOL's Netscape-enhanced product line.

Once the merger becomes official, sometime between April and June, Sun and AOL will have to make some decisions concerning product redundancy. "There are a few areas of overlap where customers on either product set need to be assured that they will have a forward moving path and that in any joint development work that happens, there will be a clear migration path," says Stephen Zocchi, director of marketing for Sun's NetDynamics unit.



BRAD DILLMAN

Two areas of overlap in particular are messaging software and the application server market. Sun has already stated publicly that its Internet Mail Server software will continue to be sold and supported even though it competes with the popular Netscape Mail Server. But what will become of the Netscape product? Similarly, one of the more intriguing questions surrounding the deal relates to the fate of the application server business for both companies.

Last July, Sun purchased application server vendor NetDynamics Inc., Menlo Park, CA, and Netscape entered the application server market in December 1997, with its acquisition of Kiva Software Corp., Mountain View, CA. Both products compete directly with one another. As with its Internet Mail Server, Sun has stated that it will continue to push the NetDynamics product line. In fact by early next month, Sun plans to release its first version of the NetDynamics application server since taking control of the technology. Code-named Owens, the product will feature full support of Enterprise JavaBeans (EJB) and Java APIs.

When customer inquiries were made to a telephone sales representative regarding the future of their application server product lines, Sun's message was clear: "NetDynamics is the Sun Microsystems application server and it will remain the Sun Microsystems application server from here on out."

Netscape's answer was less emphatic. "For at least the next [four] months, all of our products will stay the same. What's going to happen after that? We just don't know. As far as we have heard, there are not going to be any products discontinued as of yet, but once the merger gets completed, then at that time there might be some type of alignment of products."

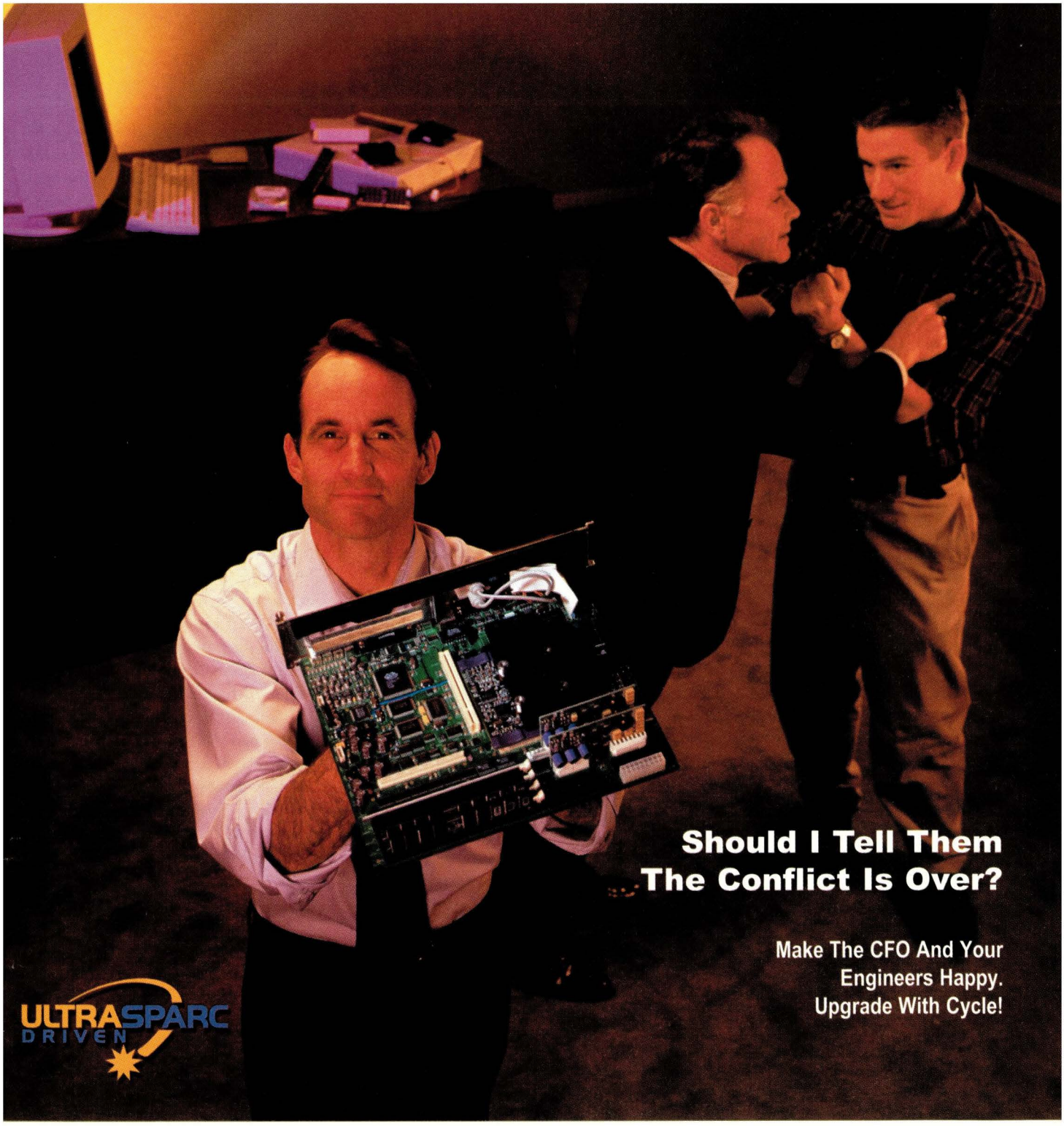
As for Sun's current NetDynamics customers, they believe the company is behind the application server product line. "Sun has committed to NetDynamics and we believe in that commitment," says Uday Walia, chief technology officer at Getsmart.com, a Burlingame, CA-based company that offers financial loan services via its Web site. Walia already went through the Sun-NetDynamics merger and believes the deal with AOL will not alter Sun's application server product support. "We don't have immediate concerns in any change of direction, and I think potentially [the deal] could be very positive."

Industry watchers are uncertain how the product alignment will pan out. Some believe products such as application servers will converge down the road, but say it won't happen overnight. "There is some work to do," says Ed Acly, director of middleware research at International Data Corp., Framingham, MA. "There is an opportunity to mesh the different products together. I'm not saying that's easy, but I think those products serve a fairly similar type of application."

Other analysts speculate that AOL will simply sell off the server software division to Sun or another company. "I don't see any synergy [between AOL and Netscape server software] whatsoever," says David Card analyst at Jupiter Communications, New York, NY. "If they keep it, it will die."

While questions regarding product similarities will linger for the time being, it is Netscape's e-commerce product line that could provide Sun with a unique business opportunity. Netscape's enterprise software and services unit is a $400 million-per-year business with 1998 fourth-quarter revenues totalling $114 million.

Thanks to the agreement with AOL,



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Sun will be able to sell, market and develop this business. The company may even compete with IBM Corp. in the enterprise software space.

"I think at the high level, the very attractive components of the alliance have to do with the e-commerce applications and Web server infrastructure that AOL in a merged entity will have," says Sun's Zocchi. "These are areas where Sun doesn't really have products today. We don't really have those e-commerce types of applications so there is a very natural synergy. I expect to see a lot emphasis around the alliance focused on that."–*ptc*

No Longer Platform Neutral?

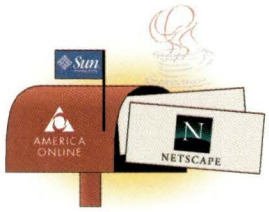
Before it was acquired by America Online Inc. (AOL), one of Netscape Communications Corp.'s biggest assets was that it could deliver products on a wide variety of platforms. Indeed, Netscape's main attraction has always been that its products are platform neutral, especially when compared with the single-platform, single-vendor Internet Information Server (IIS) and Internet Explorer offerings from Microsoft Corp., says Dan Kusnetzky, director of operating environments and serverware for research firm International Data Corp., Framingham, MA.

For example, Netscape currently supports Communicator 4.5, its client-side suite of products, on eight platforms: Windows 3.1/95/98/NT, Solaris, HP-UX, AIX, IRIX, Digital UNIX, Caldera OpenLinux and Macintosh PowerPC. In addition, Communicator runs (but is not officially supported) on a host of other UNIX platforms, including BSDI, SCO UnixWare and SINIX, to name a few. Similarly, Netscape's Enterprise server products run on six UNIX platforms, as well as Windows NT. This level of platform support may be painful, says Kusnetzky, but "it's a requirement if you're going to position yourself as an enterprise-class vendor."

But now that Netscape has been acquired by consumer-oriented AOL, and with Sun Microsystems Inc. collaborating on product development, it will be interesting to see if Netscape can live up to its track record of multiplatform support. In particular, will Sun develop top-notch products on competing UNIX platforms, much less on Windows NT?

To date, Netscape has been reticent about divulging details on the subject, as the deal has not been officially closed. Netscape spokeswoman Maggie Young did confirm that the company would indeed continue its multiplatform server strategy, particularly when it comes to NT and AIX, but would not specify whether the company will continue to support its current range of platforms. Similarly, Netscape will continue to support a wide range of platforms for its client software, but no mention was made of whether that included all its current platforms–or even if multiplatform support might eventually come by way of a Java browser.

Whatever the outcome, "it would be extremely foolish for Netscape/AOL to drop support for other operating environments," says Kusnetzky. Solaris, he points out, represents a small percentage of the total UNIX server environment, with both Solaris SPARC and x86 adding up to no more than 16% of total unit shipments last year.–*ab*



Left to Its Own Devices

Where does Sun Microsystems Inc. want Java to be this year? On your desktop, your palm-top, your ATM, your cell phone and your living room lamp.

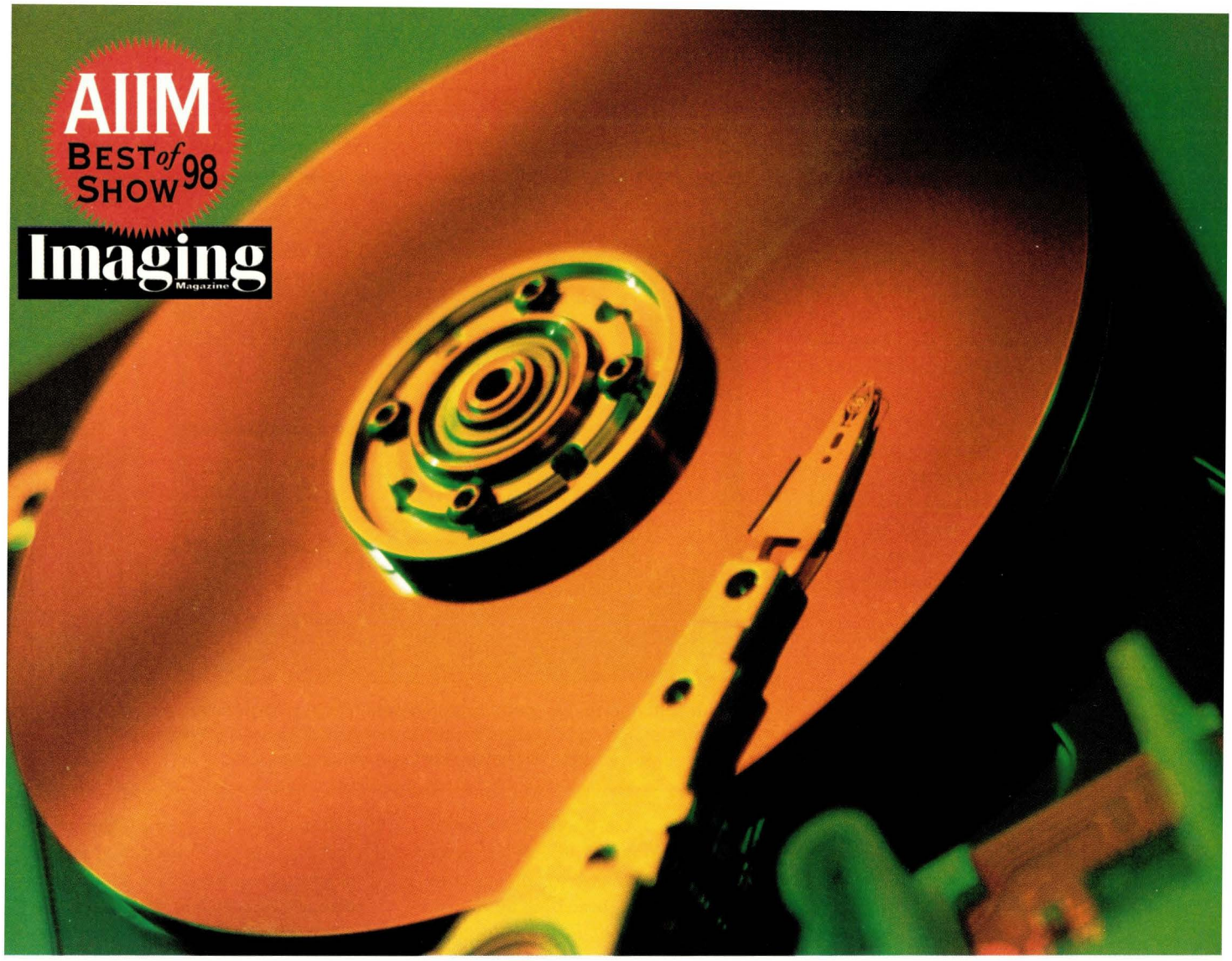
Sun has made it pretty clear that it aims to make Java the Internet device platform, and its recent deal with America Online Inc. (AOL) should give it a considerable head start toward achieving that goal. Under the agreement, Sun and AOL will work together to develop Java-based handheld Internet devices that will allow AOL customers to access the service no matter where they are. AOL has dubbed this technology "AOL Anywhere."

Evidence abounds of Sun's device aspirations. For example, the Sun booth at the Java Business Expo held in New York City in December was crammed with demos of set-top boxes, ATMs, cash registers, smart cards and retail kiosks all running Java. Sun Chief Executive Officer Scott McNealy, in his keynote address at the Expo, used a Web browser to turn on and off a household lamp and fan, both equipped with Java Virtual Machines (JVMs). In another presentation, Ed Zander, Sun Chief Operating Officer, opined that "any device with a microprocessor in it is a potential Internet access device and, therefore, a potential Java application platform going forward."

According to industry observers, AOL is just the partner to help make that happen. While AOL doesn't have any Internet devices on the market yet, such devices are part of the company's long-term plan to make email and other AOL services available to its 15 million subscribers from various outlets. As part of this plan, AOL has pledged to work with Sun to develop Sun's PersonalJava subset of the Java Application Environment for network-connected devices.

David Card, analyst for Jupiter Communications, a market research firm based in New York, NY, believes AOL could easily be a major player in the Internet device market, if it sets out to do so. "It could be a market maker," says Card. "AOL hasn't really made a strong play into alternative devices yet. But if it were to make a move in that direction, it has tremendous experience in marketing to consumers and a huge installed base that it could sell into."

That, in turn, could put Java into the hands of millions of consumers. Which is why Sun's increased focus on devices is a good move, says Ron Rappaport, Java analyst for Zona Research Inc., Redwood City, CA. "This is the ripest area that Sun has ever had for Java. Sun originally created Java for exactly this



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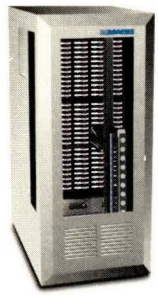

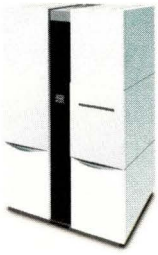

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market niche, but then got distracted with the [idea of putting Java on the] desktop. In the past year and a half or so, Sun has realized that the new opportunity is the original opportunity."

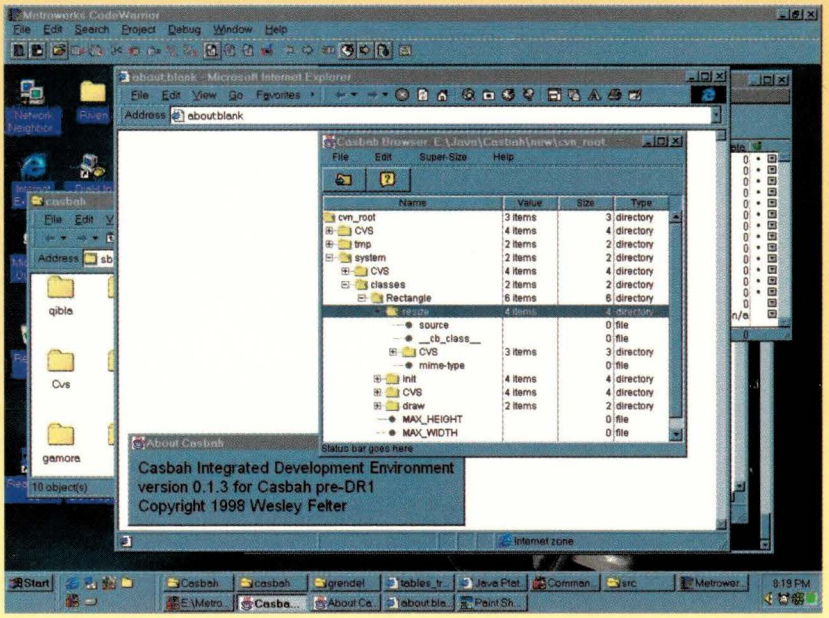
Of course, Rappaport says, it is not just the devices themselves that Sun wants to dominate, but the potentially huge market for the hardware and software needed to serve up data and applications to those devices. "All those handhelds have to connect to something," he says. Indeed, Sun's most tangible return on investment from the AOL deal, thus far, has been the commitment it has received from AOL to buy $500 million worth of Sun servers and services.

International Data Corp., Framingham, MA, is predicting a global market of information appliances that will reach 55.7 million in 2002, up from less than 6 million in 1998. Will all those devices turn out to be Java devices, though? Not necessarily. There are other contenders, including Microsoft Corp.'s Windows CE, Hewlett-Packard Co.'s Chai–a clean-room version of Java for embedded systems–and Palm OS from 3Com Corp.'s Palm Computing. But the device market is still up for grabs, and is therefore a market with a lot of potential for Sun. It might even give Sun the opportunity to oust Microsoft Windows from its position as the dominant client platform.

"Right now, Microsoft has a pretty good lock on Windows-based PCs," says Joe Damassa, director of marketing for IBM Corp.'s San Francisco technology, a framework for building Java-based business components. "But we see, as Sun does, the explosion of clients being everything from your car to your TV to your telephone to your tape recorder–and that is virgin territory for client wars."–*sjh*

Welcome to the Casbah

Java technology makes it possible to write one application that will run on multiple platforms. Now, wouldn't it be nice if you could also use multiple languages–not just Java–to write cross-platform software?



The advantage of the open-source Casbah Project, say developers, is that it provides a high layer of abstraction so that less advanced programmers need not worry about all the behind-the-scenes details.

Such an effort is currently underway in the open-source development community. Slated to bear fruit by the end of first-quarter 1999, the Casbah Project (`http://www.ntlug.org/casbah`) is an attempt to create a multilingual, cross-platform framework for building Web applications, according to Casbah Project Leader Kendall Clark, president of the North Texas Linux Users Group, which is sponsoring the project.

When the developer's version, Casbah 1.0, is released this month, programmers will be able to begin creating Web applications using any of a number of scripting languages, including Perl, Python and JavaScript. Initially, says Clark, Casbah will support Python and Scheme (a high-level, functional programming language), but more will be added in the months ahead. "We plan to support, eventually, every language that can be transformed into Java byte code," Clark says.

The advantage of Casbah, says Clark, is that it provides a high layer of abstraction so that less advanced programmers don't have to worry about all the behind-the-scenes details. For instance, when a programmer wants to instruct the application to send/retrieve data to an SQL database or a Lightweight Directory Access Protocol (LDAP) directory, he or she writes to a single "backend" API, called Natroun. The NatrounAPI then looks for the appropriate driver to determine where to get/put the data.

"We want Casbah to be usable by the novice scripter, while still providing a lot of power to the systems scripter and applications developer," says Ken MacLeod, lead architect on the Casbah Project and a UNIX systems consultant for Terrapin Technologies Inc., Omaha, NE. MacLeod is working on some initial Casbah applications, including a mail/news reader and a demo tutorial for developers.

The key components of Casbah are: the Cairo application server, the Oriel-API and drivers, which provide the language abstraction layer; a Cardamon "black box" that actually converts source code into Java byte code; the Natroun-API and drivers, which provide the backend interface to storage systems and services; the Coptic object database; and the CasbahIDE, a Java-based GUI for browsing the Coptic database and editing and running scripts. All Casbah components run on any platform that supports a Java Virtual Machine (JVM),

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making the framework as cross-platform as it is cross-language.

The Casbah Project, while ambitious in scope, is but one of thousands of open-source development projects currently underway around the world, says Eric Raymond, president of Open-Source.Org, a group that promotes free access and redistribution of source code. But, he adds, most of them involve free versions of UNIX, such as Linux and FreeBSD, rather than Java.

That may change, however, as Java becomes more omnipresent, especially in Inter/intranet applications. Also, Sun's recent efforts to open up its licensing policies may help to increase the acceptance of Java in the open-source community (see "Lightening Up on Licenses," Page 13).

Because of the multilingual nature of the project, Casbah programmers come from a fairly wide range of backgrounds. There are currently about a dozen programmers who contribute code, and their expertise spans the gamut of languages and platforms, from Macintosh to UNIX, Perl to XML and Java to Windows.

Clark and his fellow developers actually started Casbah using Scheme in 1998. The idea then was to develop a number of Scheme parsers for the various scripting languages and create a Scheme-based framework for running the finished applications. Then, in mid-1998, they realized they didn't have sufficient expertise to get the project done quickly, so they switched to Java. "The JVM had become the lingua franca of the Internet," Clark says.–*sjh*

Linux File System

IBM Corp. subsidiary Transarc Corp. has jumped on the Linux bandwagon by announcing that its AFS file system will support Linux.

Until now, AFS ran on popular versions of UNIX, including Solaris, AIX and HP-UX. But, owing to the overwhelming growth of the operating system, and citing customer demand, Transarc has added Red Hat Software Inc. Linux to its list of supported operating environments. "Many of our customers have been asking for an AFS product on Linux," says Chris Maher, vice president of the enterprise file systems division at Transarc.

AFS, which derives its name from the Andrew File System developed at Carnegie Mellon University, manages, shares and finds files across a network. Industry analysts see Transarc's support of Linux as another indicator of the growth and importance of the operating system in the corporate enterprise. "It demonstrates the fact that Transarc wants to be on whatever hot platforms are coming out," says Dan Kusnetzky, analyst at research firm International Data Corp., Framingham, MA. "There was more Linux server software shipped in 1998, by our estimates, than all of [commercial] UNIX combined."

AFS is not the only distributed file system software available for Linux. Linux also supports the Network File System (NFS), and clients that are NFS-compatible can work with most Linux systems. Also, with NetWare for Linux from Caldera Systems Inc., Orem, UT, a Linux system can be made to "look" like a Novell Inc. NetWare server.

AFS Server for Linux and AFS Client for Linux will be available later this month, Transarc says. The server version for Linux will be priced at $1,995–considerably less than the $4,995 price tag Transarc charges for versions supporting commercial UNIX operating systems. AFS clients cost $99

The Java Zone

Respectfully submitted for your perusal is a World Wide Web not of mundane corporate Web sites, but of interactive customer interfaces. Picture if you will a Web accessed by devices such as automated tellers, vending machines and gas pumps; but not Windows-based desktops. It's a dimension locked behind the door of imagination, and the key, perhaps, is Java.

People will interface with devices not through Web browsers such as Netscape Communications Corp. Navigator or Microsoft Corp. Internet Explorer, but through a 100% Pure Java browser. It's a World Wide Web not envisioned by Rod Serling of "The Twilight Zone" fame, but rather Sun Microsystems Inc. Welcome to the Java Browser Zone.

Sun intends to release a new version of the HotJava browser by April, which will be the first major upgrade to the product since it was first introduced three years ago. The browser will be available in two forms: one for OEM partners and another stand-alone, end-user version. But the primary emphasis will be placed on pushing the browser through Sun's partnership channels. "It will be marketed in conjunction with OEM providers and providers of network stations," says Jonathan Schwartz, director of enterprise products at Sun. "Everything that will be network-enabled is going to need a browser. Given that the desktop browser is somewhat monopolized right now, we're going to move to other non-Windows desktop platforms."

The Java browser will be customized by the OEM. The look and feel will be determined by its use, and Sun believes that could be something as simple as a vending machine or an ATM. The current version, HotJava Browser 1.1.5, supports HTML tables, frames and the World Wide Web Consortium's specifications for HTML 3.2. The new release, currently being called Sun's Browser, will bear a new name and will offer the features according to what's available with Netscape Navigator 3.0.

"What we are looking to do is tweak up the performance and add in support for modern browser features," says Scott Ryder, product manager for Sun's HotJava browser. "While we're probably not going to call it HotJava, you can easily think of it as HotJava 2.0."

In addition to the OEM version, a new stand-alone version will also be available. Pricing information for either version was not available at press time.–*ptc*

per user. A Web version of the software is also available at $6,495 and comes with unlimited client access. A Windows NT version is scheduled for release later this month.–*ptc*

Lightening Up on Licenses

Sun Microsystems Inc. moved one step closer to making Java an open-source platform when it announced in December that it would stop charging for access to its source code. Sun will now make the source code to its Java class libraries, virtual machine and products such as the Java Workshop Software available to anyone who wants to download it from Sun's Java software Web site (`http://java.sun.com`).

In the past, Sun charged a licensing fee for access to Java source code (rumored to run upwards of $200,000). Sun will still charge royalty fees to any organization that deploys or sells a product containing source code, but will no longer charge a fee prior to final delivery of a product. "We won't make a dime unless you do," said Ed Zander, Sun Chief Operating Officer, during the December announcement at the Java Business Expo in New York City.

Sun allows licensees to make modifications and to sublicense those modifications, but only to other Sun Java licensees. To get a 100% Pure Java seal of approval, the licensee must also purchase a support contract and run the final code through Sun's Java Compatibility Kit (JCK), which comprises 16,000 tests.

For those developers who don't need source code to ship a product, but do want to play around with the source code for research purposes, the new licensing scheme is a windfall. "We're very interested in having the source code here so we can identify bugs and determine if they're ours or theirs," says David Dewan, vice president of product strategy for Silverstream Software Inc., Burlington, MA. "When we have access to the source code, we can go through [our applications] and determine if a problem is caused by the Java Virtual Machine, for instance, or by something in our code...In the past, we couldn't do that without spending a lot of money." Sun wouldn't reveal how much it charged for access to the source code, but Dewan estimates it was several hundred thousand dollars.

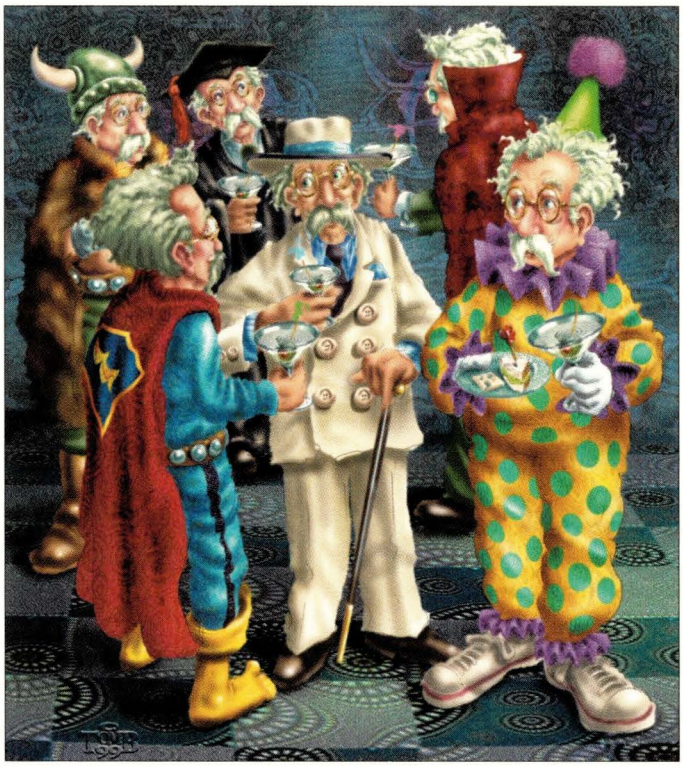
While the announcement did satisfy many developers, it didn't go far enough for some open-source advocates. "It's still not there yet. It is still not conformant with the open-source definition," says Eric Raymond, president of OpenSource.Org, a group that promotes free access and redistribution of source code.

The definition of open-source software, according to OpenSource.Org, does not allow for restrictions on the sale or distribution of the code as part of another program, for royalties for such distribution nor for restrictions on any modifications to the code that a developer might want to make.–*sjh*

Circle No. 7

Ask Mr. Protocol

by Michael O'Brien



TOM BARRETT

"Look there! In that stratum! Is that Archaeopteryx, or a relocating loader?"
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– Prof. Anthrax and friend

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Shirts vs. Skins vs. Mr. Protocol

Q: *OK, I'm lost. I went to pick up an MPEG player on some Web site, but I had trouble finding the player because most of the site was given over to offering all kinds of "skins." Just what the heck is going on?*

A: Well, take a look at Mr. Protocol right now. There's his screen. As you know, he doesn't use a keyboard. He doesn't type. He just emits characters into a keyboard cable directly from his…well, never mind. I don't like to think about it. But what's even more disturbing is that it doesn't look like his monitor is plugged into a computer. It seems to be plugged into an ottoman instead. And I don't mean a footstool, I mean he's got an Ottoman Turk sitting there with a monitor cable going right into his…well, again, never mind. What's even more boggling, he's got a picture on his monitor. That ottoman is actually a computer, it just *looks* like an Ottoman Turk.

I asked Mr. P. about it and got the usual stream-of-unconsciousness back. Something about Maelzel and chess engines and *au Grand Turc*. Finally I got it figured out. He's talking about one of the very early computers, so early that it was actually a fake. In 1770, one Wolfgang von Kempelen claimed to have created a mechanical device capable of playing chess well enough to defeat all but the most excellent of players. Von Kempelen sold his machine to a man called Maelzel, who for decades exhibited the machine all over Europe and America. The machine finally ended up in a museum in Philadelphia, where it was destroyed in a fire in 1854.

The machine had the appearance of a Turk seated cross-legged before a wooden chest upon which sat a chessboard. The mechanical Turk would apparently move his head back and forth as if viewing the board, then move the chess pieces with his hand. Doors on the wooden chest could be opened to display a mechanism. It was apparent that there was insufficient room inside the chest and the figure of the Turk to hold a man, and there was no external apparatus. Therefore, apparently, it was proven that the device must be purely mechanical, and it demonstrably played excellent chess.

The actual truth was discerned by none other than Edgar Allen Poe, who, although he never actually saw the device, saw pictures and heard sufficient descriptions to deduce how the trick was done. The result was an article exposing the Turk as a fraud. John Dickson Carr later wrote an article describing the Turk and Poe's analysis of it.

While there was no room inside the Turk and his chest for a normal man, von Kempelen and, later, Maelzel made use of a man who had lost his legs. This man was an excellent chess player, and could fit inside the mechanism and control it. It was fiendishly airless and cramped inside the "Turk," but the money was good and in those days a man with no legs could be expected to jump at such a chance.

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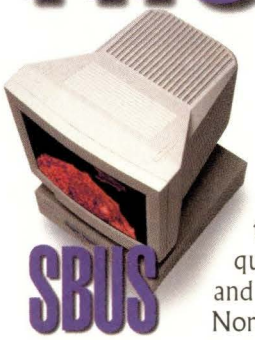

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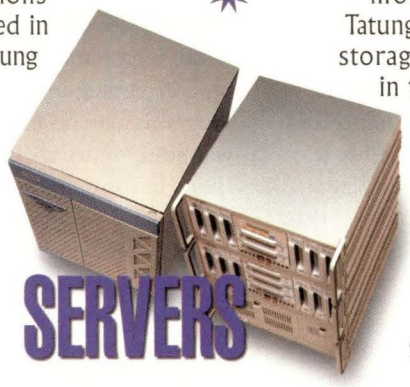

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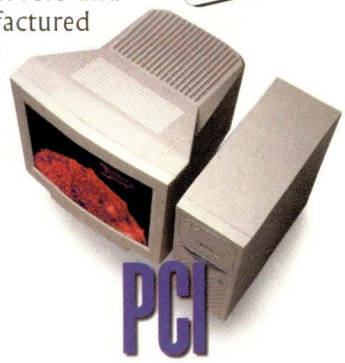

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Circle No. 8

Turk, apparently stuffed with a mechanism, instead stuffed with a man. It's an interesting notion in man-machine interface. By all accounts, the interface available to the man in the machine was a poor and uncomfortable one, but the interface to the challenger was ideal: He merely moved real chess pieces upon a real board and the "machine" understood the result. In the years since computational chess became a reality, only one or two systems have ever been able to use such an interface, and then only by using either special boards with special pieces or by doing some extremely serious image recognition using input from a video camera–computation which is itself, in its own way, as difficult as chess computation.

This is an interesting notion. A fraud is perpetuated and people believe it in part because it emulates so precisely what they expect of a human being. Had it been ghost writing upon frosted glass, giving moves in chess notation, no such feeling of belief would have been created. Unless, of course, some hefty paraphernalia from the world of spiritualism had been imported. Yet when the trick was finally pulled off for real a couple of centuries later, it amounted to exactly this: a ghost typewriter, or letters written on a frosted screen.

Mr. Protocol was put in mind of this tale by something he came across the other day: the notion of "skins."

The Internet is vastly increasing the potential size of the music market, or sending it to hell in a lightspeed handbasket, depending on whom you ask. Players for the various audio MPEG compression formats are nearly universal and are available as shareware classic, shareware lite, greenware, nagware, crippleware or WAR3Zware. One of the most popular is called Winamp (`http://www.winamp.com`), but with a twist. Several dozen of them, in fact.

Users don't interact with the Winamp engine directly. Instead, they interact with a Windows-based GUI, a sort of mouse-based version of a car stereo control head. The interesting part is there are dozens of these to choose from. In fact, there are so many possible GUIs to choose from, they have to be organized into categories for browsing purposes. They come in everything from a straightforward Windows-like GUI to a "Buffy" version that has a picture of Buffy the Vampire Slayer on it. (Be it noted here that BtVS is a far, far better product than Windows will ever be.) These different GUIs are called "skins."

What's so great about skins?

Mr. Protocol is glad you asked.

Mr. P. has goaded me in the past to mention Eric Raymond's model of the cathedral and the bazaar. In this model of software development, good software can be written without the use of legions of coders by giving the source for an initial version of the software away for free. The myriad of users will outcode the legions of programmers on the grounds that "with enough eyes, all bugs are shallow."

But there are more than two models of software development, some lying in between the two extremes of the cathedral and the bazaar, and some having nothing to do with either one. Somewhere there is probably an application that is coded by someone who is channeling for the legions of unborn geeks, eager to show their chops even before going through the messy business of physical incarnation.

Here's another. You've got an application that has two ends. On one end, you get to do the sort of mathematical programming computers were born to do: decompress a compressed data stream, and feed it to a digital-to-analog converter in real time. Fine. Choose your algorithm. Code it up. Test it, test it, test it, tweak it, test it, optimize it, fix it, test it. Ready to go.

But there's another side to this business, a much more slippery one. You need to build a GUI to control this engine. And not only that, but this is a music engine. People get particular about their music. They get stroppy and difficult to please. They want everything just right. Your engine will play anybody's music, and play it well, but no GUI you design is going to please everyone, and for every one you displease, you lose a customer–even though your engine would serve that customer well.

What's a body to do?

Well, if you decide you're a little too overtly capitalistic to follow the open source model, don't give away the store. Give away half of it. Publish one GUI. And publish the GUI's programmatic interface to your engine, so that anybody who wants to can write one too. Make it feature-rich–it's much easier to add a group of doodads and frobs to an engine that is cognizant of the entire process than it is to write a second set of graphic doodads and frobs to manipulate the first set. Let other people do the work for you...over and over and over again. If your engine's good enough to garner a base set of users, others will come along and write GUIs for everybody's taste, including those who'd rather listen to music while staring at a picture of Sarah Michelle Gellar, or maybe Delirium of the Endless (and who wouldn't?). (Now there's a thought. Gellar cast as Delirium. Ow! Stop that.)

Now your engine is much more marketable. Like John Brunner's *Traveller in Black*, it has many names and but one nature.

Skins vs. Plug-Ins

It's important to note the difference between a skin and a plug-in. A plug-in is a consumer name for a loadable module. Programs have been using these since the first relocating loader was born, sometime back in the Pleistocene. They've come into vogue in consumer software with the development of loadable modules for Web browsers to interpret data streams that the browsers proper are not prepared to handle.

Plug-ins extend the range of what browsers can handle and often have user interfaces of their own. It is not the job of plug-ins, however, to give the user a choice of interfaces to a given set of data, but rather to extend the range of data types to which the user may gain access. A skin is just the opposite: It provides the user with a fresh way of dealing with data to which he already has access.

There is virtue here for more than just MPEG players. On a grander scale, it may be seen in operation in the open source UNIX world. Just as Sun Microsystems Inc.'s Solaris has both OpenWindows and Common Desktop Environment (CDE) desktops available, there are at least four desktops available for open source UNIX systems: "regular" MIT X Window, the Caldera Desktop, the Project GNU GNOME environment and the K Desktop Environment (KDE). The analogy is a loose one because many of these desktops also provide feature-rich appli-

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cations to go with them, such as KOffice for KDE. The point is there, though: All of these represent an attempt to provide a user desktop environment similar to that provided by Windows or Mac OS. The difference is that if you run, say, Linux, you get a choice of desktops, whereas if you run Mac OS or Windows, you get Mac OS or Windows, amen. Although Windows NT can present more than one user interface, in practice, the only one generally available is the one that looks just like Windows.

There are distinct advantages to the one-size-fits-all approach, of course. For one thing, everyone knows what you're talking about. There are no "language barriers" because everyone is intimately familiar with the same interface. This leads to a certain confusion of layers, because no one is ever quite sure whether they're dealing with an application problem or a Windows (or Mac) problem, but this is made up for by the fact that everyone involved at least knows how to drive the dang thing.

Can we extend this metaphor? Do skins, so to speak, have legs?

Could be.

The Interface Is the Computer

Remember Steve Deering's hourglass model of the Internet? He postulates lots and lots of top-layer applications, lots and lots of bottom-layer transport mechanisms, IP, and only IP, in the middle. The top is fat, the bottom is fat and they all meet in the middle, which is skinny. In this way, any application can transparently use any transport mechanism to move data around, without even being aware of it.

UNIX sort of works the same way. Linux looks the same whether it's running on a PC or a SPARC box. Sun knew this when it created the Sun i386, but at that time, no one was buying an off-brand operating system when the only applications available for Intel Corp.-based machines followed the Microsoft Corp. model, and the i386 never successfully bridged that gap. Nowadays, we've got loads of Linux applications and Linux running on different sorts of boxes, with only Linux in the middle. Or, wait, hmmm, FreeBSD runs just about everything Linux will, and can support high-end servers to boot. So is Linux useless?

Heavens no. Linux is a standard, just like IP is a standard. Code your application to the Linux API, and it'll run on just about any Linux-compatible operating system on just about any hardware.

Are we starting to see the picture? Sun's got it wrong. The network isn't the computer. The interface is. Meet the interface on its terms and you can go anywhere it does.

Even this idea isn't new. For years, companies have been making a nice living from various analytical engineering tools, which do not consist of a program, but of a library of analytical routines and a framework for stringing them together. You don't worry about how the routines do their work, except parametrically (to make sure you don't violate any of their constraints). But you do have to string them together yourself to meet the needs of your particular problem. In essence, you have to write your own skin, your own user interface, according to the general interface provided by the analysis library.

Operating systems are themselves beginning to take advantage of this model. Up until the present, an operating system, whether written as a suite of cooperating, privileged processes communicating via a microkernel or as one big glop of code, has been difficult to port from one hardware platform to another. Not impossible, but difficult. Much of the pain of porting an operating system has to do with the necessity of rewriting the drivers for the various hardware devices on the new platform. Operating systems, even of the "big glop" variety, are now constructed in such a way as to compartmentalize the I/O driver section as much as possible from the rest of the code, but that whole segment generally gets thrown out and rewritten with every port.

A new initiative, supported by a surprising array of vendors, is now trying to make life at least a little better. The Uniform Driver Interface (UDI) initiative proposes that device drivers, which have, since the beginning of time, been written idiosyncratically, should be written to a common interface independent of both hardware platform and operating system.

In this way, Adaptec Inc., say, could create a driver in source form, which could be compiled on any target hardware platform under any operating system, and the resulting binary be integrated into that system. One disk drive interface, one driver for everybody, amen. If Adaptec wished the source to remain proprietary, it would have only to compile it to a single binary for any hardware platform.

Sun, Intel, Compaq Computer Corp., Hewlett-Packard Co., Interphase Corp., even Lockheed Martin Corp. are behind this proposal. Microsoft is nowhere to be found.

Be it noted that this would end the "driver wars." In some cases, a Linux vendor such as Red Hat Software Inc. has successfully executed nondisclosure agreements with hardware vendors in order to write drivers for Linux, which are then distributed in binary-only form. This leaves systems such as FreeBSD out in the cold because, while some of the largest servers on the Internet run these operating systems, their overall market share is not large enough to provide them with the clout necessary to get hardware manufacturers to pay attention. Under UDI, Red Hat writes a driver and everybody gets to use it because, while the driver isn't public, the interface to it is.

Certain stuffed shirts who believe that profitability lies wholly in proprietary products don't like this model. But in this "shirts and skins" game, Mr. Protocol thinks the skins will win nearly every time. ⊸

Mike O'Brien *has been noodling around the UNIX world for far too long a time. He knows he started out with UNIX Research Version 5 (not System V, he hastens to point out), but forgets the year. He thinks it was around 1975 or so.*

He founded and ran the first nationwide UNIX Users Group Software Distribution Center. He worked at Rand during the glory days of the Rand editor and the MH mail system, helped build CSNET (first at Rand and later at BBN Labs Inc.) and is now working at an aerospace research corporation.

Mr. Protocol *refuses to divulge his qualifications and may, in fact, have none whatsoever. His email address is* amp@cpg.com.

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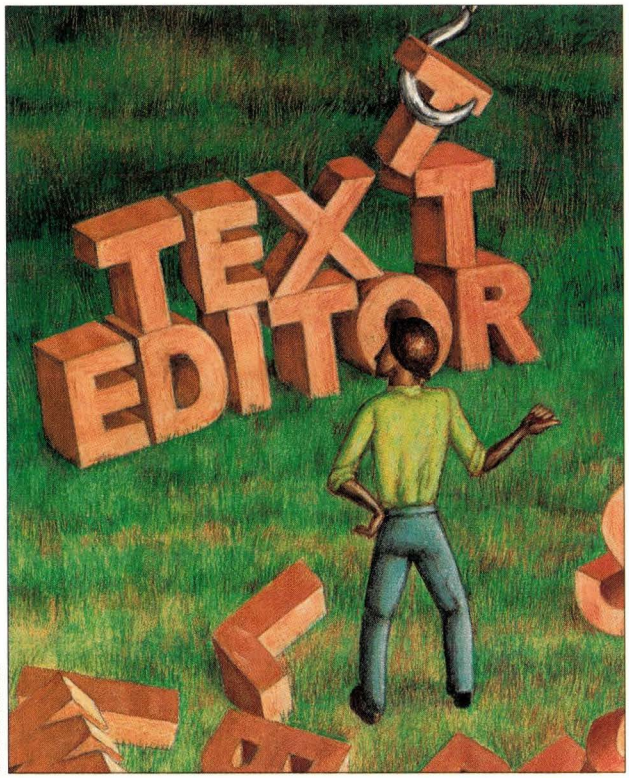
by Peter Collinson, Hillside Systems



JANE MARINSKY

Editing

In these days of ubiquitous word processors people expect to have an easy-to-use text editor on their system. Text editors should be visual with WYSIWYG facilities showing you the state of the file you are creating or changing. Commonly, as new text is typed in from the keyboard it replaces existing text or is inserted where the text cursor points. Navigation around the file should not involve any hidden keys. For example, to move upward, you should be able to use the "up" arrow key on your keyboard. Better still, the mouse should be able to move you up and down the file, moving the text cursor in one click.

If you work exclusively in the visual environment on your Sun Microsystems Inc. machine, then you'll find that many applications provide you with an easy-to-use editing environment by default. For example, when dealing with email, you are presented with a window where you can type a caustic reply to the person who just flamed you. If you want to edit a text file, then Sun has long provided the `textedit` program, which loads the text to be edited into a window and allows you to poke at it with the keyboard and mouse.

However, these window-based editors are generally very simplistic. They are good for originating text files or making simple edits on short files, but they are not very good at allowing complex changes to a file. If a complex alteration is needed, then many users will sit there hacking away, making one change at a time. It's inertia, people use what they know. I regard this type of activity as "the computer controlling the user." There *are* faster, less labor-intensive, and more accurate ways.

Types of Editors

There are a great many flavors of "standard" text editor for UNIX. If asked, many people will know there is a UNIX visual text editor, called `vi`, and will then go on to say "I used it once. It was impossible." I am quite sympathetic to this view.

Most text editors work in exactly the same way. You tell it that you wish to edit a file, the program reads the file into a temporary buffer and waits for keyboard commands from you to change its copy of the file. When you are done editing, it will write the new file out.

The major UNIX text editors predated the introduction of visual environments, using pointing devices like a mouse and bitmapped screens. They actually predated the widespread introduction of enhanced keyboards containing positioning keys. These editors had to use basic keyboard input for the text to be stored and for the commands that instruct the editor in the necessary navigation around the file, or for taking the many other actions that we expect editors to undertake. The programmer designing the editor was presented with a problem: When the user types a character, should it be inserted into the file or should it be interpreted as an editor command?

Designers adopted two ways around

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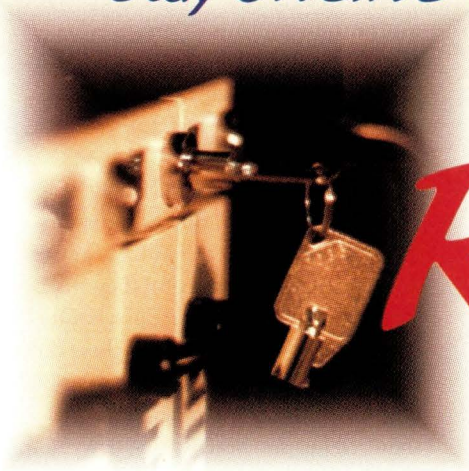

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the problem. The first idea is to have *modes*, where input to the program is interpreted in the context of the state that the program is currently "in." So `vi` will start up in command mode, interpreting keystrokes as commands to the editor. Some of these commands will switch the mode into character input mode, where input to the program is added into the internal buffer, changing the file. A particular keystroke, Escape for `vi`, takes the user out of input mode and back into command mode.

Other editors, notably `emacs` and its clones, are *modeless*. These editors have a single mode, where text that is input will be sent to the buffer for insertion into the file. These editors require some way of providing for navigation around the file and for command input. They cannot use the normal character set because it's assumed that typing a visible character will make it appear in the file. They make use of the control key values, a set of keystrokes that are part of the character set but are not used in normal text input.

Key Input

Keyboards have always been able to deliver different codes by using key-chords, so, for example, holding down the Shift key and pressing another key at the same time transmits an uppercase letter. When UNIX was driven from terminals, the computer was sent a code value for each key that was pressed. A different value was sent when the user held down Shift and pressed a key. Actually, the numbers that are sent for the "shifted" and "unshifted" keys are related, pressing the Shift key and typing another key forces a zero in a bit position in the character code that is sent for that key.

Computer keyboards typically provide further modifier keys, allowing other bits in the character code coming from a specific key to be altered. The Control key forces another bit in the character code to be zero and generates a code that is in the lowest 32 positions in the character code set, a section that's used to send positioning information to an output device. For instance, Control-H will send the code that is used to mean "backspace," and Control-M sends the code for "carriage return."

You may ask why we have a key on our keyboard that is used to generate output formatting codes. The reason goes back to punched tape. Teletypes were able to read and generate punched tape, and systems used the tape for program input and output. One way of editing programs was to edit the tape "off-line," by reading an old version in the tape reader and creating a copy in the tape punch until you reached the point that needed changing. At this point, it was perhaps necessary to insert formatting code such as a carriage return. The operator was supplied with a Control key on the keyboard to generate the control characters, not for sending to the computer but for placing on the tape.

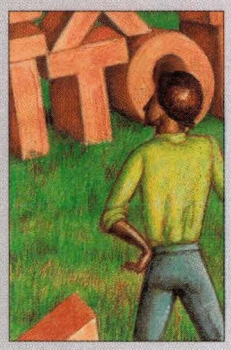
So courtesy of some old technology, we have the ability to create 32 control-character codes from our keyboard. The editor can interpret these keys as commands to move around the file. The designers of text editors have often tried to make the action of the key mnemonically related to the legend printed on the keyboard. So in `emacs`, for example, Control-E means move the cursor to the *E*nd of the line and Control-P means move the cursor up to the *P*revious line. Of course there are rare occasions where the user wants to insert a control character into the text, and so the editors provide a quoting character, which indicates that the next character that is input should be inserted directly into the text.

However, modeless editors soon run out of control keys and need to find some way to provide more actions. Some early terminals had a Meta key that was used in a chord to set the eighth bit in the character that was being sent. ASCII is a seven-bit code, designed to be sent down a serial line one bit at a time. The transmitter waggles the line up and down using a predetermined frequency (the baud rate) and the receiver scans the line at the same frequency to reconstruct the value for the appropriate bit in the character that is being sent.

The top bit was originally intended to provide a check that the data is OK. The idea is that the bits that are "on" in the character are counted, and the result must either be odd or even. You could often choose whether you used odd or

even parity. The top bit in the eight-bit code is used by the transmitter to create a "parity" bit. The transmitter counts the bits in the seven-bit character that it is sending and forces the top bit on (or off) to create an even or odd number of bits. When the character is received at the othe other end of the wire, the hardware that reads the character will reject it unless the total number of "on" bits sums to an odd or even value, depending on whether odd or even parity is selected. Because line errors mostly mean that the serial line is forced fully on or fully off, this technique picks up "bad" characters and filters them from the data stream.

If the communication between the terminal and the computer is a reasonable connection, parity checking is not needed and the top bit can be used to extend the character set from seven to eight bits–a ready-made source of additional control characters.



The emacs editor further complicates matters by allowing the user to bind any key to any action they wish. There is a default set of actions bound to a default set of keys, but if these don't suit you, you can rebind them.

However, only a few terminals were supplied the modifier key that forced the top bit of the character to be on, so a short key sequence was used to emulate the coding. The Meta key (usually the Escape key) is pressed, followed by a standard key from the keyboard. The editor picks up the character pairing and treats it as a single action. Meta key actions are usually used for navigation and the settings are often related to the control key sequences. So, for example, Control-B usually means "back one character" and Meta followed by "B" means "back one word."

The default `emacs` editor key sequences also use the Control-X character to introduce a set of sequences that extend the available command character set further, providing for "control commands." For example, it's useful to know that to get out of `emacs` or one of its clones, you need to type Control-X followed by Control-C.

The `emacs` editor (and many of its clones) further complicates matters by allowing the user to bind any key (or key sequence) to any action they wish. There is a default set of actions bound to a default set of keys, but if these don't suit you, you can rebind them. It's a bad idea to arbitrarily rebind keys for the standard key set, because one day you'll be in a place without your default setup file and will be lost because your body will not know how to drive the editor. This keeps happening to me, so I know.

These days, keyboards are generally integral to the computer and no longer send ASCII codes directly. Instead, they generate key press events and transmit a value that identifies the physical key on the keyboard when a key is pressed and another when it's released. Software tracks keyboard state and maps the key number onto a character code that's sent to the program.

The X Window System allows you to remap the key code translations. If, like me, you hate the Caps-Lock key, you can simply remove it from your keyboard by telling X to stop using it. Also, on my standard Sun keyboard (designed to support PCs), I find that the Escape key is in the wrong place and is difficult to reach. I want my Escape key next to the key that generates the digit 1, so I've remapped it and swapped the key covers.

Incidentally, you'll find that the arrow keys on your keyboard are probably mapped by the X server into a sequence starting with Escape and an opening square bracket. A letter that's different for each key will follow this sequence. X is emulating an ANSI standard terminal and generating a standard sequence for the key.

Finally, the eighth bit in the character set is no longer available, at least to me, because the ASCII code has been extended into an eight-bit code, with the extra values being used to display characters with accents needed by major European languages. I like to be able to type those characters to give me easy access to my currency symbol and the ability to generate correct spellings of the names of my friends. It means that I cannot use the Alt key on my keyboard to generate eight-bit Meta instructions for editors. I have never done so because I am wary of keyboard portability and don't want to train my body to use keystrokes that will sometimes not be present on a new system.

UNIX Editors

Both `vi` and `emacs` are visual editors, designed originally to work with terminals with addressable screens. The user sees a screenful of information that is a window into the file. With `emacs`, you can split the screen vertically to see parts of the same file or display parts of different files on the same screen. Of course, nowadays, `emacs` is "X-ified," so parts of each file you are editing appear in a separate X window.

Editing on UNIX started with `ed`, which was designed before even glass terminals were invented. It's a line editor, presenting the user with a set of commands that may be applied to any of the lines in the edited file. Essentially, there are two modes: command mode, where you type in commands to make the editor change the data; and text mode, where you type lines of text after a command, and these lines are added to the file.

I still find myself using `ed` to create tiny files or make quick changes. Why? Because it's easy and fast. I can start `ed` quickly and it doesn't involve me searching for the mouse or removing my hands from the keyboard. The `ed` editor is available on every UNIX system and, because it was designed to be used on teletypes, it needs only the simplest of environments, taking input from the user and displaying its results as a data stream. Consequently, `ed` is always usable. If you can log in, you can edit text files with `ed`.

The `vi` editor was developed from the `ex` editor, which was Bill Joy's version of `ed`. He'd coped with some of the perceived problems with `ed`, such as the lack

of any error message other than ? (and TMP when temporary file space was low), and some people thought that "real" error messages would be a bonus. His ex editor also provided prompts. When you start ed it gives you no prompts at all to show that you are expected to type things. Again, some people think this is a bug. I am used to it.

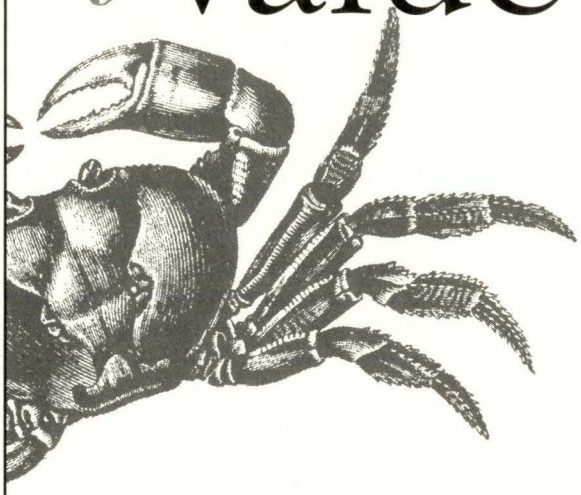
The visual part of vi was glued onto the editing engine supported by ex–and you can move in and out of both editing styles simply–so ex's powerful substitution and global editing features that were inherited from ed are added to a visual front end. I said that vi has two modes: command mode where regular keystrokes are used to move about the file being displayed on the screen; and input mode, where keystrokes are entered into the file being edited. These modes really only apply to visual working, a further line editing mode is supported when you type a colon and enter ex commands to change the file.

On balance, moving about a file in vi takes fewer keystrokes than the regular emacs command set. Quite a lot of thought was put into the design of vi, choosing keys that were in easy reach. For example, H, J, K and L in the center of the keyboard moves you left, down, up and right, respectively. I taught myself to use these keys by playing the "hack" game endlessly for a couple of weeks before the need to do real work crept up on me.

Terminal Types

The vi program had a further problem to conquer: output portability. The fundamental prerequisite for using vi is that your terminal supports "cursor addressing," which makes it possible to send a command terminal to place the cursor at some random position on the grid of characters on the screen, where subsequent characters will be written. Early glass terminals behaved like teletypes, taking characters from the serial line and adding them to the bottom of the screen, then scrolling the whole screen up as each line was added. Even with these simple electronics there was a choice, if the screen is 80 characters wide, what happens when you send 81 characters? Some terminals scrolled auto-

A DIFFERENT KIND *of* Value



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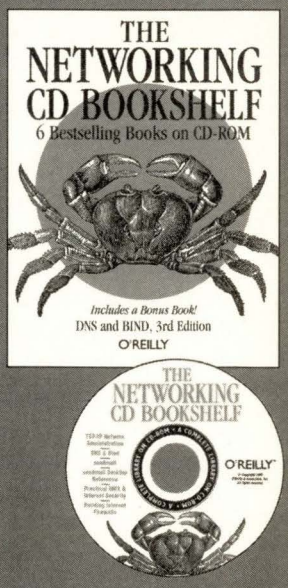

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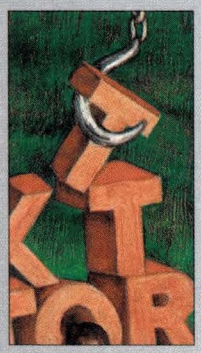
matically. Some just lost the data that was "off" the screen.

As time moved on, the electronics in terminals became more intelligent and soon the computer could send character sequences that positioned the cursor, and the terminal could then place text that arrived in amongst other text on the screen. Terminal line speeds were slow, and so program designers wanted to make use of the stored state on the screen, sending the minimum number of characters to change the screen to match the state of the stored file being edited. The choices offered by the terminal manufacturers multiplied. For example, when you moved the cursor to a point on the screen and typed something, the terminal could overwrite what was there, or it could insert the characters into the screen memory, moving any existing characters to the right.

The `vi` program, then, had a varying range of terminal capabilities to deal with; some terminals could do one thing, some another. Worse, they tended to use different control sequences to achieve the same action. Eventually, the Digital Equipment Corp. VT-100 terminal established a set of control sequences that became an ANSI standard, but by then it was too late to do anything about the vast installed base of terminals.



Originally, programs were converted to use termcap or terminfo to make them portable across a range of terminals. Now, we are creating terminal emulators in software and want them to be compatible with the installed software base.

To cope with this problem, `vi` used a terminal capability database, `termcap`, that defined what each terminal could do and what character sequences were needed to achieve certain effects on the terminal. I suspect that the creation of this database was one of the first worldwide cooperative, free software efforts. People were encouraged to send in terminal definitions that allowed `vi` to work on their brand of terminal. The original text-based system was used by AT&T to generate a binary system, `terminfo`, which defined new capabilities. The terminal capability system was eventually broken out of the `vi` editor, becoming the `curses` library so that any visual program could be made to be portable on any terminal. On the whole, we are left with the legacy of both these mechanisms on systems today.

Nowadays, we tend to use terminal emulators that mimic the behavior of the ANSI standard terminal, and take this for granted. It's a kind of a reversal. Originally, programs were converted to use `termcap` or `terminfo` to make them portable across a range of terminals. Now, we are creating terminal emulators in software and want them to be compatible with the installed software base.

Which Editor Should I Use?

Your choice of editor has long been a religious decision, and you risk being branded as a heretic if you endorse one and not another. My career has moved along with UNIX, so I started using `ed`, then switched to `em`, which was a version of `ed` with simple interactive editing on one line supported by control keys. It was `em` that gave Bill Joy the idea to create `vi`. I then used `vi` for many years.

When `emacs` first appeared, I looked at it. To begin with, it was big, slow to start and lumbered along in comparison to `vi`. Basically, it needed a stand-alone VAX-11 to support it, and at the time we were putting more than 50 people on one VAX, so we couldn't afford that. My arguments about the slowness of `emacs` are always countered by `emacs` lovers who do everything in the editor, using it as their shell, editor, mail program and almost everything else. "I fire up `emacs` at the start of the day, and stay inside it all the time," is a common statement from aficionados. Many of the arguments about slowness and program size have undoubtedly gone away because machines are fast with large memories now.

However, as time went on, I became slowly disenchanted with `vi` and switched to `jove`, largely because `jove` was about the same size and speed as `vi` but supported multiple buffers and multiple windows on the same screen. It also didn't have the idea of the "line" burnt into it quite so firmly. The `jove` editor also supports regular expression matching, which the early `emacs` editors didn't. I have dabbled in other editors, but have tended to stick with `jove`, which runs on every machine I own except my Psion palmtop.

If you are interested in starting with an editor, then dabbling a little with `ed` or `ex` is good training for general UNIX use, lots of what you learn will spill over into other programs and systems. You will find that you can do repetitive edits and other command tasks very quickly after some little march up the learning curve. If nothing else, it will show you the problems that `vi` or `emacs` are trying to solve in their separate ways.

If you need to be portable across UNIX systems, then `vi` is a good choice, it exists on all machines and is consistent across them all, so what you learn on one system will be usable elsewhere. If you've dabbled in `ed` or `ex`, you can dip back into their command set while learning `vi`. The work that you are trying to get done can happen while you are struggling to train your reflexes to know what to type when you think "up three lines and along a bit."

It's also a good idea to have a passing acquaintance with the standard `emacs` command sequences; many systems have these embedded as a line-editing standard. So, for example, you can use the `emacs` line editing set in the Netscape browser URL selection window, because X implements the controls for its standard method for line editing. ⊸

***Peter Collinson** runs his own UNIX consultancy, dedicated to earning enough money to allow him to pursue his own interests: doing whatever, whenever, wherever... He writes, teaches, consults and programs using Solaris running on a SPARCstation 2. Email:* `pc@cpg.com`.

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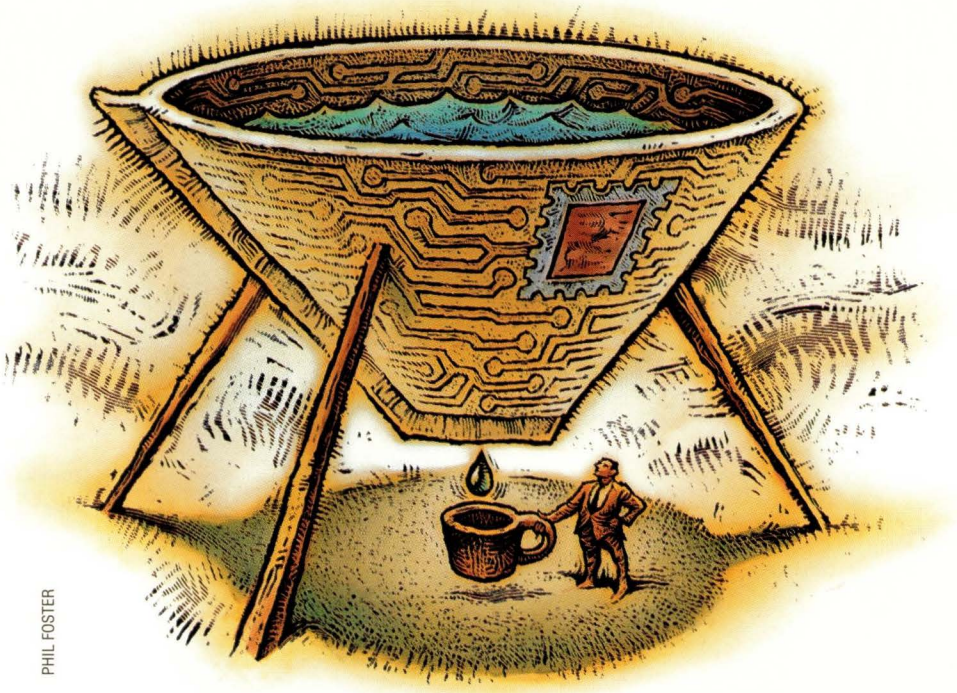
by S. Lee Henry



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Mail Handling in Perl

There are two important reasons for implementing mail filters today: The growing problem of spam and the frequent need for automatic handling of email related to subscriptions, online commerce or the volumes of messages that many sysadmins receive from automated processes and `cron` jobs, which report their status via email.

Many client email programs, such as Qualcomm Inc. Eudora and Microsoft Corp. Outlook Express, give users the option of adding filters to their email. But if you have to manage numerous email clients, or support numerous platforms, you may have a lot to do to make this work properly for all your users. Wouldn't it be better to have a one-size-fits-all solution? Wouldn't it be easier to manage an email solution that works on your mail server?

For sites that receive mail on one of their Solaris servers and dole it out to clients via Post Office Protocol (POP) or Interactive Mail Access Protocol (IMAP), here's a Perl approach that might help. The disadvantage is that particular filters need to be inserted into each user's copy of this script.

Before we talk about how to implement this script for a particular user, let's take a look at it. The first two lines identify Perl as the program to execute the script, and a comment:

```
#!/usr/bin/perl
# mh - script to handle incoming
# mail
```

The next line of code may look odd to some readers. The final semicolon on the line is the line terminator. The rest of the line reassigns to `$0` (the name of the script itself), its name stripped of pathname. If you were to invoke this script with the command `"/home/USER/bin/mh"`, `$0` would have the value `mh`.

```
$0 =~ s;^.*/;;;
```

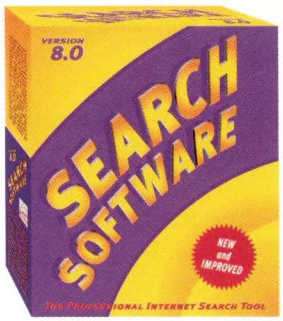
Next, we need to assign values to a number of variables that we will use in the script:

```
$errlog = "/var/tmp/mh.errlog";
$mhroot = "/home/USER/mail";
$defaultmbox = "/var/mail/USER";
$tmp = "/var/tmp/mh-$$";
```

Notice that we have set up an error log (the directory name in which the user's email folders will be stored after filtering), the inbox (the standard email inbox for Solaris systems) and a temporary file (`TMP`), which will be used to store the content of a message before adding it to a particular email folder.

The following two lines of code do very different things. The first sets up a variable that we'll use as a Boolean in our script. It will keep track of whether or not we are processing the message header. The second assigns a `umask` value for the duration of this script. You probably recall that `umask` is, after all, a mask. The value assigned to files created while a `umask` of `027` is in

YOU WANTED



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effect will be 640 (750 minus the executable bits).

```
$header = 1;
umask(027);
```

In the next section of code, we're trying to open our temporary file for writing so that we can write the contents of an email message to it. If there are problems opening the temporary file for writing, we will report an error and close it.

```
if (!open(TMP,"+>$tmp")) {
 if (open(ERR,">>$errlog")) {
    print ERR "$0: unable to open $tmp";
    print "for writing: $!\n";
    close(ERR);
 }
}
```

In the following section, we are processing our email. You may notice that there is no file open before the `while` command. Email will be directed to this Perl script via standard in.

```
while (<>) {
   if ($header) {
      if (/^[\s]*$/) {
         $header = 0;
      }
```

It's time to put on our regular expression wizard hats. The third line in the section above is testing each line of input (assigned by default to the standard Perl variable `$_`) for any data whatsoever. This may seem a little lenient at first. However, if you look at a number of email messages in any one of your `/var/mail` files, you'll notice there is a blank line separating the header of a message from the data, or content, of the message.

Now let's put in a comment that will grab any reader's attention:

```
      ############
      # FILTERS #
      ############
```

Anyone reading this script will get the idea that this is where the action starts. It's a good idea to keep your scripts as readable as possible. This way, there will be little holding you back when that big promotion comes your way. Your assistants will be able to take responsibility for your scripts with little consternation.

Inside the filters section of our script, we are matching on various fields in the message head. Two of the lines below are looking for matches on the subject line of the email. Each of these is looking to match literally the word `Subject:` at the start of the message. (The `/` marks the beginning of the match pattern, while the `^` specifies that the match is to begin at the start of the line.) The `[\s]` and `{1,}` strings allow for text preceding the string that we are matching. The first `elsif` clause, therefore, is matching on a portion of the subject line. The second, which lacks these special-purpose strings, is performing an exact match. Nothing but an email message with the subject line `Subject: EXACT-MATCH` will match this regular expression.

```
      elsif (/^Subject:[\s] {1,}MATCH-ENDING/i) {
         $mbox = "$mhroot/mbox1";
      }
      elsif (/^Subject: EXACT-MATCH/) {
         $mbox = "$mhroot/mbox2";
      }
      elsif (/^To:[\s]{1,}MYALIAS/i) {
         $mbox = "$mhroot/mbox3";
      }
      elsif (/^From:[\s]{1,}SENDER/i) {
         $mbox = "$mhroot/mbox4";
      }
```

The third `elsif` doesn't match on the subject line, but on the `To:` field. This may seem odd at first. After all, we are assuming that this email filter is managing email for a single user. Still, many of our users may have multiple email addresses. For example, maybe a user receives spam at the address "nhenry" but email from her mother and friends at the address "nici."

The last field in this particular mail-handling script matches on the sender. Notice how following each of the matches we've specified, we select one of four email folders. These are the mail files that we will add the new email to if the email matches one of our criteria; otherwise, it will be added to the default mailbox that we specified early in the script.

The following line is simply a marker for the end of the filters section highlighted earlier:

```
      ###########
```

Below we've added a second helpful comment to mark the end of the filters section.

```
   } # if header
   else {
      $_ =~ s/^From/>From/;
   }
```

The third line above, though it may look like we're processing the header again, is actually a line to help avoid problems processing email. Because UNIX email is kept in files where each message is appended to the bottom and separated from the rest by virtue of the lines starting with "From sender," we can't allow stray lines beginning with `From` to be included. They would be mistaken for the beginnings of new messages. Therefore, this line adds a fairly unobtrusive > character to the beginning of any such lines that are encountered, rendering them as lines of message text and nothing more. Remember, we are no longer in the header section, so there's no danger of clobbering the real beginning of the message.

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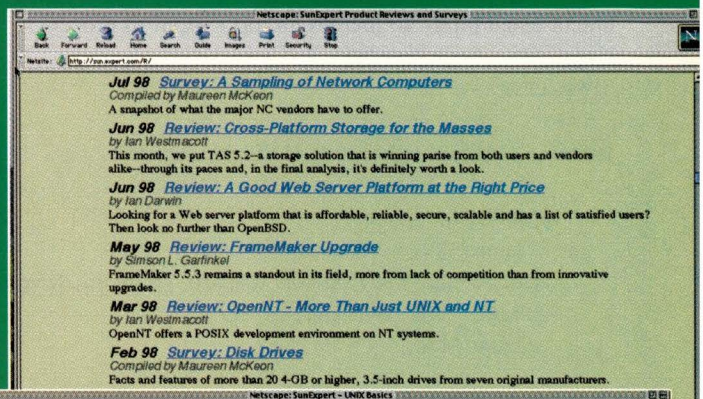
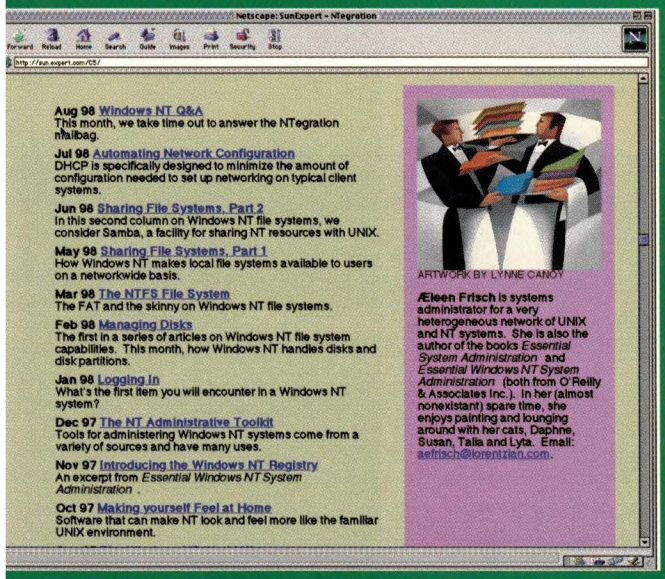
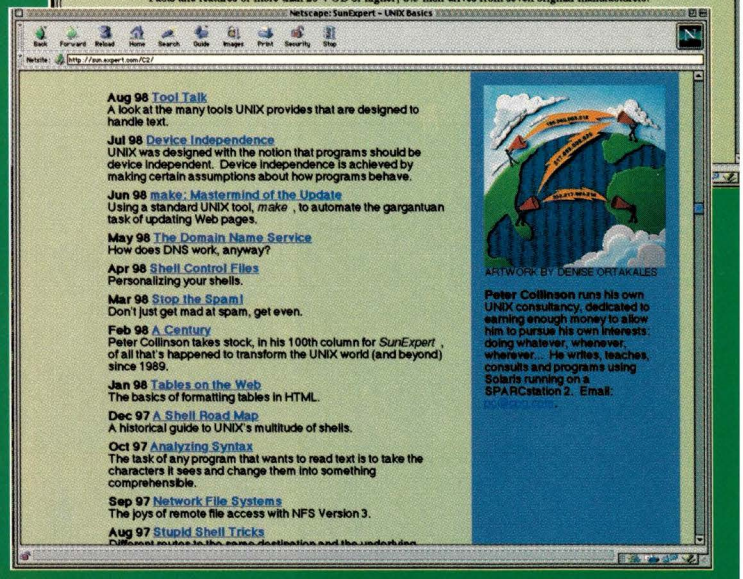
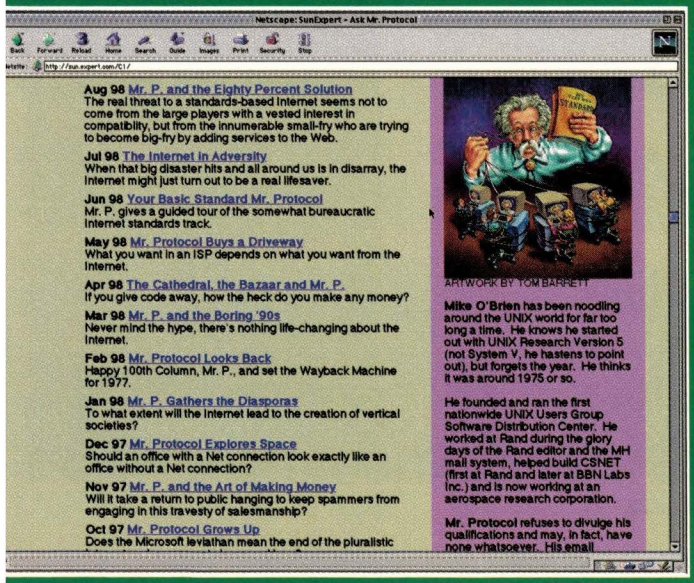
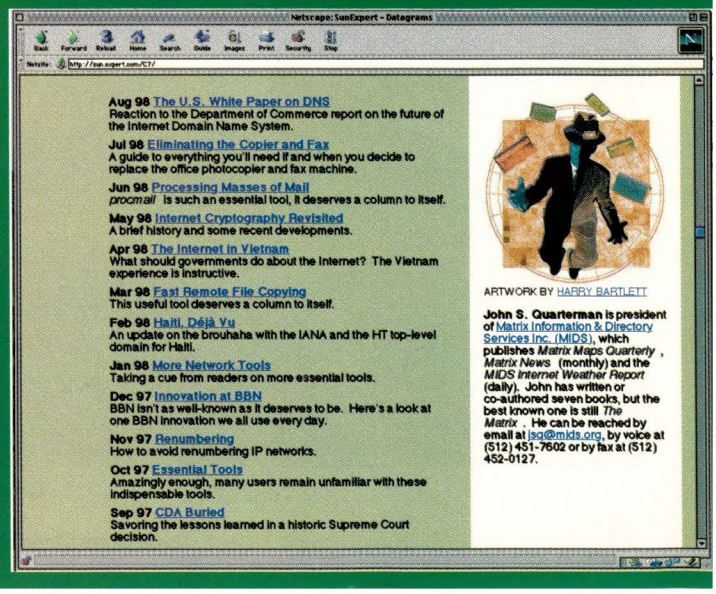
- Have you seen the Jeffrey's column on Practical RCS?
- Looking for Peter Collinson's wisdom on Network file systems?
- Did you read Æleen Frisch's tips on the NT registry?
- Searching for information on OS coexistence?
- Considering new backup software? Or a new RAID system?
- Don't make a move without reading our survey and product reviews first!
- Clusters demystified!











In the next two lines of code, we print the message line to the temporary file and mark the end of our `while` clause. Notice that the `print` command, which adds the line of the email message to the temporary file, is outside of the logic that separately processes the header and content of the message.

```
   print TMP "$_";
} # while
```

The next thing we do is close the temporary file. At this point, we're outside of the `while` loop that processes each line of email input, so there is no more input to process.

```
close(TMP);

$mbox = $defaultmbox if !defined($mbox);

if (!open(TMP,"<$tmp")) {
   if (open(ERR,">>$errlog")) {
      print ERR "$0: ERROR unable to open $tmp";
      print "for reading: $!\n";
      close(ERR);
   }
}
if (!open(MBOX,">>$mbox")) {
   if (open(ERR,">>$errlog")) {
      print ERR "$0: ERROR unable to open $mbox";
      print "for appending: $!\n";
      close(ERR);
   }
}
```

After closing the temporary file (see above), we reopen the temporary file–this time for reading. We also open the intended email folder for appending. If either of these files cannot be opened, we print an error. Notice the < and >> characters, which signify the file mode operation we are performing.

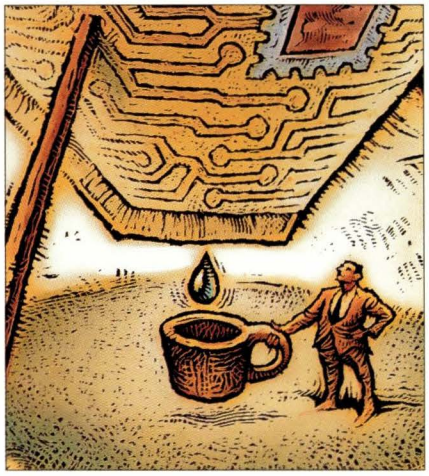
Finally, we read each line from the temporary file and add it to the target email folder (`MBOX`). After adding each line, we write one additional blank line to separate this message from the one that follows, close the files, unlink the temporary file, which removes it from the file system, and exit:

```
while (<TMP>) {
   print MBOX "$_";
}
print MBOX "\n";

close(MBOX);
```

Circle No. 28

```
close(TMP);
unlink($tmp);

exit 0;
```

This script (with reasonable subjects and addresses instead of the placeholders, of course) might do a nice job of filtering email for users whose filtering needs are fairly stable. An alternate script–for users who want an easy way to change their filters without grappling with the syntax of Perl–would be to replace the regular expression (`FILTERS`) section with code that compares incoming subject lines with a series of subjects read in from a file.



To implement this script for a particular user, put a personalized copy of the script in the user's `bin` directory and add a `.forward` file to their home directory of the form `| /home/USER/bin/mh`. This will pipe each message through the filter and, subsequently, store it in the appropriate mail folders in the user's home directory.

Warn your users that filtering, though it can save them time and annoyance, is difficult to do "right." There are always the dangers of overfiltering (removing messages you might have wanted to see) and underfiltering (failing to remove messages you don't want to see). They should be cautious in their choices.

S. Lee Henry *receives about 400 pieces of email per day. She works as Webmaster and sysadmin for Web Publishing Inc. in San Francisco, CA, and lives with her stepfamily on a sailboat in San Rafael.*

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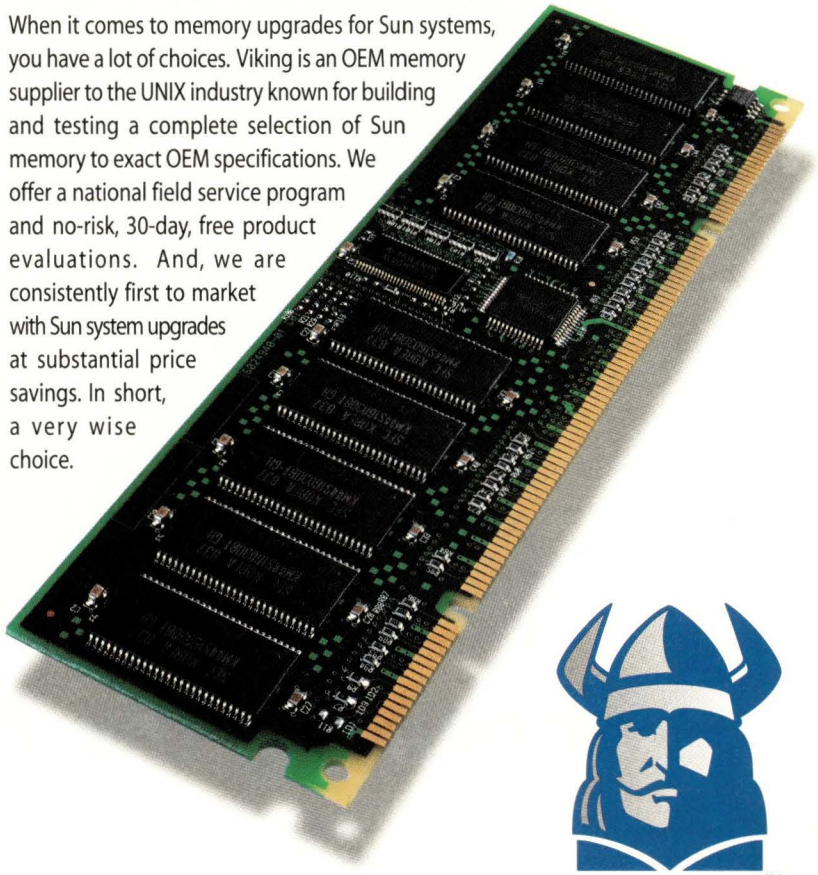

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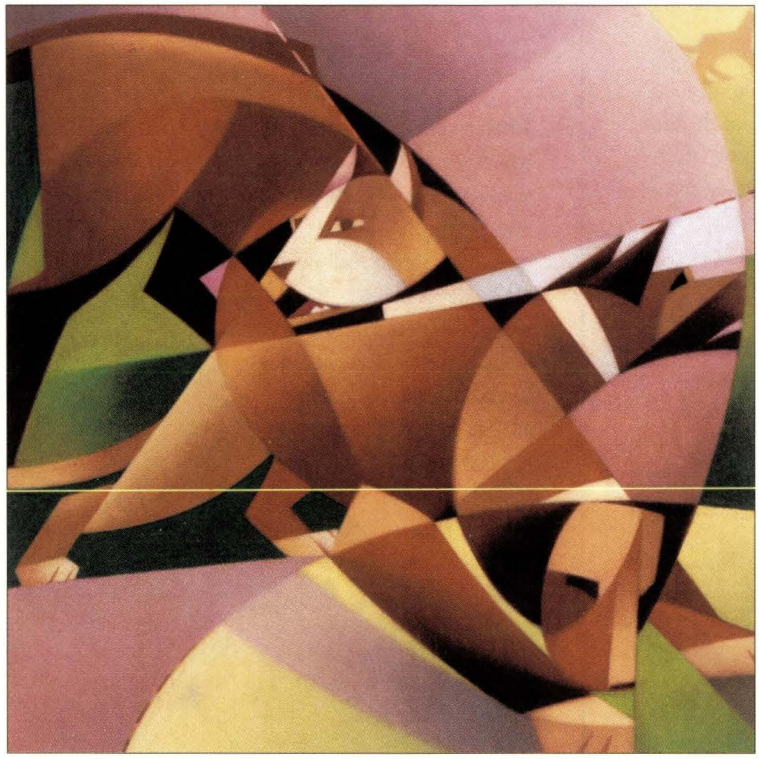
by Æleen Frisch



LYNNE CANNOY

Unchaining the Watchdog

Most Windows NT users have some familiarity with Event Viewer, an administrative tool that lets you examine system status and error messages. However, many people don't realize that this same utility can be used to examine two other classes of logged system information as well: status and error messages generated by application programs and messages related to security auditing. The type of data to be examined is selected via the corresponding items on the Log menu. (You can start Event Viewer with the `eventvwr` command or via the **Start=>Administrative Tools [Common]=>Event Viewer** menu path.)

If you've never used Event Viewer to examine security-related system information, you'll be in for a surprise the first time you select **Log=>Security**. The panel displaying the events will in all likelihood be empty. This is not because Windows NT is so secure that no security-related events ever happen. Rather, it's a result of the fact that security auditing is disabled by default on Windows NT systems. (Once enabled, security auditing is actually conducted by the EventLog service, which runs by default.)

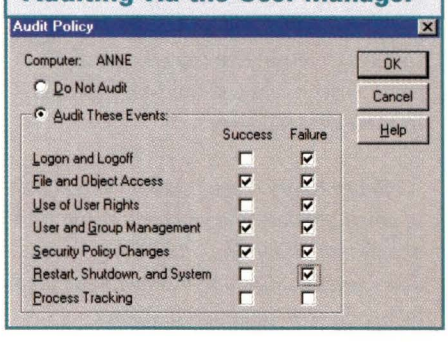
Enabling security auditing is done via the User Manager administrative tools (**Policies=>Audit** menu path), which results in the dialog box shown in Figure 1.

Security auditing in general is enabled via the Audit These Events radio button. Once selected, you can then choose exactly which classes of events you want to track, and whether you want to audit successful actions, failing actions or both. The configuration depicted in Figure 1 represents a reasonable minimum subset of events that would be useful for security monitoring. We'll look at each of the seven choices individually.

The Logon and Logoff audit class records primary and secondary logins and logouts. Secondary logins occur via network system access, for example, when a user accesses a local file or printer. Because there are so many events of this type, I generally only audit failures for this class. You might want to audit successes as well to generate the maximum amount of data to examine in the case of after-the-fact security investigations.

The File and Object Access audit class tracks access to objects controlled via access control lists (ACLs) and similar permissions, such as files, printers, shares and so on. I audit either failures, or all events for a limited set of files and direc-

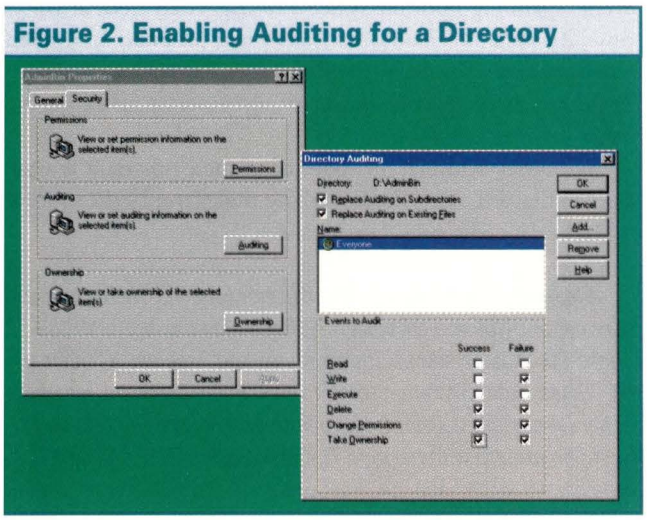
Figure 1. Enabling Security Auditing via the User Manager



ories that are especially important for system security.

Unlike the other audit classes, activating File and Object Access does not generate any data until you also enable auditing on those files, directories and other entities in which you are interested. Figure 2 illustrates the dialog box that is used to enable security auditing for a directory. Here we are specifying the events we want to track for the AdminBin directory: write failures and delete all, change permissions and take ownership events for Everyone. By checking the two boxes at the top of the dialog box, we apply this setting to the directory itself, all of the files in the directory and the entire subtree below it.

Figure 2. Enabling Auditing for a Directory



Note that security auditing can only be performed for files and directories residing on NTFS file systems.

The Use of User Rights audit class records any action that requires the possession of a user right other than the Backup and Restore rights (the latter are not audited by default owing to the fact that they generate huge amounts of data each time a backup is performed). I audit only failures for this audit class because most normal activities involve invoking user rights, and so auditing successes generates a large amount of "false positive" data.

The User and Group Management audit class keeps track of instances of adding, modifying or deleting user accounts or groups. You will need to audit successes and failures if unauthorized changes to user account data are a concern for your site.

The Security Policy Changes audit class records changes in the auditing policy itself and the granting or revoking of any user rights. I audit both successes and failures for this class. Because these kinds of events very rarely happen in my environment, tracking successes as well as failures is important. I don't expect to see events of this type except when I have changed the policy myself, so an unexpected success event indicates an unauthorized change and, therefore, a potential problem.

The Restart, Shutdown, and System audit class tracks system boots, system shutdowns and other system events. I audit only failures for this class, but successes may also be important in some contexts.

The Process Tracking audit class records detailed system-level information about individual processes. This class can generate a large amount of data. Such information may be useful in after-the-fact incident investigations, so I would track both successes and failures if conserving disk space is not an issue.

What to Do with all that Data

Once you've started accumulating security-related event data, you'll be faced with two additional issues: how to manage data collection and storage, and how to process all of the data.

The Event Viewer's log files themselves are stored in binary form in the `%SystemRoot%\System32\Config` subdirectory. You can control the size of the log file using the Event Log Settings dialog box, via the **Log=>Log Settings** menu path. You can specify the maximum size of each log file–system, security and application–as well as the conditions under which older events are overwritten if the log fills up (by default, the log file is treated as a circular buffer). The **Log=>Clear All Events** menu path may be used to purge the current contents of the log file; you will have an opportunity to save them to a different file beforehand. The **Log=>Save As** menu path may be used to save the current log file contents to a different file without clearing out the current events. Obviously, saved files can be written to a convenient disk location and archived to backup media.

Event Viewer provides only the simplest event filtering features and nothing in the way of analysis capabilities. You have several options in this respect. The easiest is to transfer the data to another application and analyze it yourself.

Processing the data is a little more complicated, and Event Viewer provides only the simplest event filtering features and nothing in the way of analysis capabilities. You have several options in this respect. The easiest is to transfer the data to another application and analyze it yourself. One way to do this is to use a utility like the Windows NT Resource Kit's `dumpel` command or the more flexible DumpEvt package from Somarsoft Inc. Both tools can write events to a text file in comma-separated value (CSV) format, and you can import the resulting file into a spreadsheet or database program for analysis. With this method, you will need to decide which events you are interested in and create sorting schemes, filters and/or queries that locate and summarize them for you. We don't have the space to consider this topic here, but we'll have some suggestions in this regard in next month's column.

The EventAdmin package from Midwestern Commerce Inc. will automatically retrieve event log entries periodically to a Microsoft Access database or other Object Database Connectivity (ODBC)-compliant database, such as Microsoft's SQL server. It includes a number of prewritten Access queries to identify important events. The product also includes the AuditSet utility, which allows you to set the

Resources

DumpEvt
http://www.somarsoft.com

EventAdmin
http://www.ntsecurity.com

EvntSLog and NTSLog
http://www.adiscon.com

Pagemaster/ev
http://www.techarts.com/windowsnttools/pagemaster_ev

SL4NT
http://www.netal.com

SysLogD
http://www.wgws.com

WinSpy
http://www.normand-info.fr/uk/winspy.htm

audit policies on multiple remote Windows NT systems via a single operation on the local system.

Some administrators of heterogeneous sites, including both Windows NT and UNIX computers, would like to merge Event Viewer data into their existing UNIX `syslog` setup. There are several options for doing so. There is a shareware `syslog` server for NT written by Franz Krainer called SL4NT, and a commercial one from West Georgia Web Service called SysLogD. Both may be installed as a Windows NT service.

Alternately, you can choose to forward Event Viewer events to another (presumably UNIX) `syslog` daemon using the shareware EvntSLog program from Adiscon GmbH. If you want to go the other way, the company's NTSLog package will forward `syslog` events to the Windows NT Event Viewer facility.

Finally, if you require alert generation facilities based on Event Viewer events, the WinSpy package from Normand Informatique allows you to generate alerts in a very flexible way. You can designate single events, groups of events and events spanning multiple systems to trigger an alert, at which time, the system can automatically run a program or send an email message. Similarly, the Pagemaster/ev package from TechArts can be used to automatically generate calls to a pager for specified events.

Additional information about all of these programs is available on the Web; see "Resources" for the relevant URLs for the tools mentioned above.

Æleen Frisch *is systems administrator for a very heterogeneous network of UNIX and NT systems. She is also the author of the books* Essential System Administration *and* Essential Windows NT System Administration *(both from O'Reilly & Associates Inc.). In her (almost nonexistent) spare time, she enjoys painting and lounging around with her cats, Daphne, Susan, Talia and Lyta. Email:* `aefrisch@lorentzian.com`.

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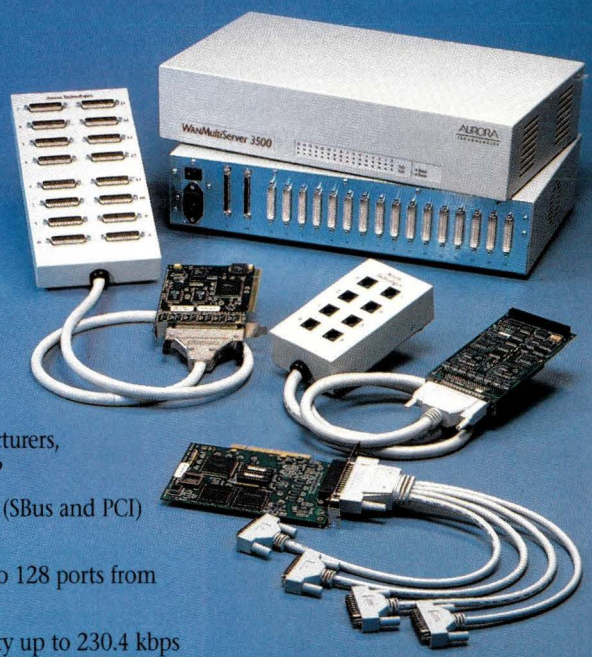

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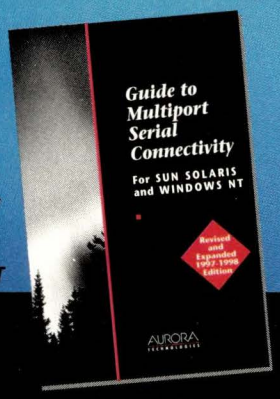

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Circle No. 16

by John S. Quarterman

JUDE MACEREN

Communication

This month, let's discuss something other than politics and statistics. Let's discuss communication. In previous columns, I have discussed some of the technical mechanisms for communication–the most recent of these was "Request Systems," October 1998, Page 44. This time, however, let's discuss some of the more general aspects.

Reporting

Many people are used to working in their own area without much coordination with other people. There's nothing wrong with this, but it doesn't work for every job or every workplace. In a typical Internet company, where employees are trying to produce quickly and rely heavily on email to do so, miminal coordination doesn't work very well. In such an environment, people need to report on what they're doing.

Part of reporting is knowing how to do so. People who don't frequently use email may not be in the habit of doing certain things that others take for granted, such as:

- Placing a real subject in the `Subject:` header.
- Changing the text in the header when the subject of the message has changed.
- Placing different subjects in different messages; bits are cheap, people's reading and mail-filing time is not.
- Quoting enough text from the previous message for context.
- Not quoting the entire previous message and just saying, "I agree!"

The old hands among you are either nodding your heads or nodding off. These things may seem obvious, but they still need to be taught–just as people must be taught how to use office telephones. I've had people apply for jobs who have asserted with confidence that they use email all the time. In more than one case, this turned out to mean they used a single provider, such as America Online, and only conversed once a day with family members. Using email as a business tool is more rigorous.

Really old hands know that I discussed many specific points about email a long time ago in my book, *The Matrix* (published by Digital Press, 1990, ISBN 155558-033-5, or see `http://www.mids.org/matrix/et.html`).

Beyond the basic mechanical aspects of what to put in headers and the like, there are content and emotional issues, such as this contrasting pair:

- Don't respond in anger.
- Give the benefit of the doubt.

Now tell me, is there an Internaut so calm that they have never violated the first? Why does this conflict with the second? There are quite a few people who haven't used email long enough to know that violations of the anger rule are going to happen sooner or later. People who hold grudges, sulk or quit because someone says something they don't like, are unlikely to enjoy working extensively with email.

Many online conflicts are actually misunderstandings. It's very easy to

communicate in person because you can rely on body language or common cultural assumptions to help shape your meaning. This doesn't work well when the recipient a) can't see your body language or hear your tone of voice; b) may be answering from a different time zone; or c) may come from a different culture. It's also hard to detect when someone is assuming context in an email message and, thus, producing confusion. If people are willing to work at it, however, this kind of accidental contention can usually be overcome. The price: more verbosity, a few frivolous online venues and the occasional chat on the telephone or in-person meeting. I won't mention singing (my staff won't let me).

Common Threads

One of the best ways *not* to get a job at MIDS is to say "interviewing for a job is like getting married." There is a difference between the workplace and the bedroom, not to mention a difference between businesslike interaction and emotional support. Sure, every business should be attentive to the needs of its employees, but the primary goal of a business isn't to pretend it's a family. (You may or may not agree with what I just wrote, but that's not the point. The point is that my opinion on this makes my next source seem ironic.)

Putting Your Heart Online by Nancy Capulet (published by Variable Symbols Inc., 1998, ISBN 0966377400) is one of the best books about online communication I've read. First of all, in that fertile field of love we call the Internet, Nancy's methods do work, and I say that not only because I've known her for many years, but because I've seen them work for many people. The book includes useful information about types of online dating services, how to use email to meet people and the like. The book contains plenty of anecdotes to illustrate Nancy's points.

However, there are common threads of communication that she discusses that do apply not only to romance, but to most online communication, including business.

The very first line of the opening chapter, for example: "Myth: If it's meant to be, it will happen." Communication and production don't just happen, they both require work.

Here's another one: "People develop fantasies about their online correspondents–fantasies that shatter when they actually meet." She's mostly referring to romantic fantasies, but in a business environment fantasies about how someone has slighted someone else are even more likely to develop. Good will and hard work are the main answers to this.

Many of Nancy's basic rules apply to any form of online communication. "Be honest." "Describe what you want." Trying to guess what the boss wants, not speaking up when you require something in order to do your job or agreeing just to go along with everyone else doesn't work well in an email environment. Remember, there are no body language clues that people often count on to indicate, for example, when someone's telling a polite fib.

You might as well say what you mean because people will likely either take your words at face value (not seeing the polite fib) or make up their own fantasies anyway. And if you say what you want, you have a better chance of getting it. Be specific. Don't say, "I want a better computer," say, "I'd like a model X with N megabytes of RAM and N gigabytes of disk space."

Other people fall into the trap of thinking email is like the telephone: a way to chat without exchanging anything very detailed. This approach to email can make you seem illusive or difficult to work with because your answers may often seem incomplete. It's better to include enough detail to be sure the reader fully understands.

Another example: "Write back promptly, even if just to say, 'I'll write more later.'" Too obvious? Nope. Many

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people treat an email message like a paper letter. You don't normally dash off a reply to every paper letter as soon as you receive it. Some people don't reply at all, because so many of us have fallen out of the habit of writing letters. Some people pick up the telephone to respond. Others wait for a meeting. It's much easier and more effective to respond by email, and to do so the same day, whenever possible.

Some of Nancy's rules are inappropriate for a business environment, for example, "Judge a person by his heart." People in a work environment do need to be compatible. But if they stay at their job primarily for interpersonal, emotional reasons, there's going to be trouble sooner or later.

For What Purpose?

Beyond mechanics and content there are questions regarding the purpose of using email in the first place. Here we get into management more than just communication.

On a basic level, it's worth noting that email alone isn't enough for sufficient business communication. Most organizations also use meetings, the telephone and even the fax machine. It is useful to organize email in mailing lists and request queues online. And once a subject has been discussed in a list or queue, it's a good idea to distill a summary and put it where everyone can refer to it easily, which these days often means putting the material on a Web page.

On more complex levels, there are questions such as on what basis do you decide to communicate and how. Principles, if you will. Some of the more popular books on this subject include *The 7 Habits of Highly Effective People* (published by Fireside, 1990, ISBN 0671708635) and *Principle-Centered Leadership*, (published by Summit Books, 1991, ISBN 0671749102) both written by Stephen R. Covey. If you want people to concentrate on getting the job done rather than reacting to the latest fire drill, these books have a lot of useful tips.

Covey isn't everyone's cup of tea. The main point is to pick something as the basis for your actions beyond mere greed or spur-of-the-moment interaction, whether you choose religion, philosophy or the pride involved in performing a job well done. People and employess will communicate better if they see a solid center to draw their communications.

OK, enough philosophical musing. Next month, back to either politics or technology, or both at once! ⊸

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Circle No. 18

by Jeffreys Copeland and Haemer

PAUL STODDARD

Plus ça change, plus c'est la même chose.
– The French

Vive la différence.
– Also the French

Differences Among Women

They say nothing ever changes. Well, we've had a first. A couple of months ago, we wrote a column entitled "A Short History of Reading" (November 1998, Page 58). It had some novel features.

- It was the only article we've written that didn't include any code. Copeland remarked that he got a few paragraphs into the first draft and discovered he was channeling James Burke.
- It generated quicker reader responses than any of our past articles–one even before either of us had received our copy of the November issue.
- It prompted a response from Corina Mullen at Atmel Corp., San Jose, CA.

The 75 columns we've written for *RS/Magazine* and *SunExpert* have generated a lot of email. Some folks express appreciation, some pick at our errors, some do both. We've had responses from all over the world and from all sorts of folk. But from a woman? Never.

(In fact, the first *two* responses to the column were from women.)

Think about this. OK, we've never gotten a reader response from Antarctica either but, even without consulting a world almanac, we're willing to chalk this up to the fact that there are very few people in Antarctica to respond in the first place. (Hey, Antarctica. Anyone out there read *SunExpert*?)

This is food for thought for us–the fathers of four daughters. More about this in a moment. First, we want to talk a little about a math problem that Zoe Haemer brought home from third grade.

Differences, Differences, Differences

Here 'tis. Start with any four integers. We'll use (0,1,4,11) to create a simple example. Next, take the absolute value of the differences of adjacent numbers (consider it a circular list): (1,3,7,11), in our example.

Repeat this process until all the numbers are the same:
(0,1,4,11) -> (1,3,7,11) -> (2,4,4,10) -> (2,0,6,8) -> (2,6,2,6) -> (4,4,4,4)

That took five steps. Zoe's challenge was to find one that took six. The book her teacher took the problem from said that no one had ever found an example that required more than six.

We think this is a great problem for a third-grader for several reasons, the most important of which is that it requires a lot of subtracting.

It is also a great problem for parents who program because it takes very little programming to find four-tuples that generate more than six steps. Our personal favorite is (0,1,4,9); not only are they the first four square numbers, they're all single digits:
(0,1,4,9) -> (1,3,5,9) -> (2,2,4,8) -> (0,2,4,6) -> (2,2,2,6) -> (0,0,4,4) -> (0,4,0,4) -> (4,4,4,4)

Seven steps.

It really impresses your third-grader when you show her you can do something that her math book says no one's ever been able to do before.

But discovering that something is unusual when it should be common-

place piques the curiosity. You understand, it's like getting your first reader response from a woman. Haemer talked to his daughter's math teacher to investigate further.

The teacher's first response? "Several fathers got interested in that problem and sent in solutions with seven steps." We note that's not "several parents."

We'll return to this math problem in a moment. Patience.

Where Are the Missing Women?

So where are the women? We're not sure, but let's knock down some commonly advanced straw men. (Oh, stop it. You know good-and-well what we mean.)

• Women don't program. Two of *SunExpert*'s columnists, S. Lee Henry and Æleen Frisch, are women, and both Copeland's wife and Haemer's ex-wife are professional programmers. One wonders how Rear Admiral Grace Murray Hopper would have used the colorful vocabulary of the Navy to describe people who make such a claim.

At the same time, we will note that there is something odd about women and programming. A few years back, when Haemer taught a series of undergraduate computer science courses at the University of Colorado, he noticed something puzzling. Each course had a similar distribution of grades across the sexes, but each successive course in the curriculum had a noticeably smaller percentage of women. The sex ratio didn't change because of a difference in ability, but by the time it went from the first course to the last, classes went from being nearly half women to being nearly all men.

Women didn't drop out of computing because they couldn't do the work, but they did drop out of it.

• Women don't do math. When Riley Haemer was nine years old, she explained to her father that she was going to be good in math because "girls are good in math." This wasn't some parroted piece of political correctness, just keen observation: Riley's mother got her Ph.D. finding new methods to solve systems of partial differential equations on big, fast computers; Riley's Aunt Barb has a Ph.D. in mathematics from MIT; Riley's Grandma Martile got her B.S. in mathematics and chemistry in 1936, and was in the first group of women to go to U.S. Army Engineering school at Fort Belvoir, VA, during World War II.

In contrast, both the Jeffs' fathers were artists. Haemer's father became a painter when the Syracuse Forestry school refused to admit him because of his D in high-school geometry. Copeland's father became a silversmith when he realized how uninteresting he found his father's work in chemistry.

This generalization from her family was reinforced by Riley's grade-school experience. Early on, girls develop noticeably more quickly. Her gifted-and-talented math class had only one boy. (Oh, and who taught the class? Nearly all grade-school teachers are women.)

If math and computing were female-dominated, we'd hear sociological Just-So stories attributing this to early educational experiences.

• Women don't write us or send solutions in to school because they don't want to call attention to themselves. Maybe women don't send email because they fear cyberstalkers. Perhaps visions of Jeffs chasing them down long electronic corridors deter them from writing us. After all, there are two of us, making it that much easier to corner them. (And just to allay any nervousness, we asked for Corina's permission to use her name above. She made us promise to spell it correctly.)

And they don't send novel solutions to school with their kids because they're afraid that doing so will get undesired attention from Mrs. Cerny, the math teacher.

• Women just aren't as verbal as men. Oops. We got carried away there for a minute.

Get the picture? We have our own pet theories, probably no better, but at least they're different. Here are a couple:

• Women have something better to do.

Q: What's the difference between a dead skunk in the middle of the road and a dead programmer in the middle of the road?

A: The skunk had a life.

Zoe's mother was the first woman to earn a Ph.D. in chemical engineering from the University of Colorado. At one point, undergraduate representatives from the Society of Women Engineers invited her to speak to them. The question they most wanted to ask her? "Isn't it hard to get dates?"

This question may put the cart before the horse. For many people, the years from high school through the early 20s are full of important social activity. We spent a large fraction of this time in the basements of computing centers and engineering buildings. Would we have if we could have gotten dates instead? Be honest.

Q: What's the difference between a dead skunk in the middle of the road and a dead programmer in the middle of the road?

A: The skunk had a life.

Female engineers, in contrast, don't seem to have major difficulties getting a date when they want one. If all else fails, they can date male engineers. Maybe all those extra hours guys spend debugging instead of dating contribute to the odd sex ratio.

• Women are more attuned to social pressures than men. Everyone knows that scientists and engineers aren't cool. Quickly, now, name a cartoon character besides Dilbert that makes fun of the social skills of an entire field. Rex Morgan, M.D.? Zippy the Pinhead? Prince Valiant? If that's not convincing, ask the next five women you meet whether they'd rather sleep with Bill Gates or Michael Jordan.

One friend, when she was in graduate school, quickly tired of the reactions she got from young men she met at taverns and on the dance floor.

"A Ph.D. student in math? Oh. That must be interesting. Well. Will you look at the time? I really have to go."

Inspiration finally hit. She just lied.

"A sex therapist? Really? Um. Well. See, I have this friend who has a problem and I was wondering what you...."

Why wouldn't this drive the same number of men as women out of computing? Perhaps men are just more willing to be socially unacceptable. We know more men who are loners than women. Just ask Ted Kaczynski–but hope he doesn't answer by mail.

We have complete confidence that you have your own pet theories that are just as silly as ours and that you will mail them to us. If you're male.

Subtracting Performance

Enough editorializing and idle speculation, let's talk code. We wrote a program to do an exhaustive search for solutions to Zoe's problem, and find beginning numbers that generated a cycle of six or more steps. We actually ended up writing several versions of programs to generate solutions.

The first one was in Perl. Even though it's an arithmetic problem, the arithmetic isn't difficult. Add to this the fact that it uses lots of lists and we like to program in Perl. Our Perl solution turned out to be ugly, slow as the dickens and made our hard disk sound like our computer was home to a click beetle convention.

OK, maybe C is still good for something. Besides, we didn't have a FORTRAN compiler. (And anyway, as Copeland's wife has been heard to observe, "A good FORTRAN programmer can write FORTRAN in any language.")

Listing 1 shows our second cut.

We weren't content to leave well enough alone (is any programmer?), so we decided to look for ways to speed it up.

Our first optimization came from realizing that the problem can be solved recursively, like factorials. We can figure out the number of steps for (1,1,1,3) by figuring out that it takes one more step than (0,0,2,2).

Not only can we write a recursive version, but we can use the trick used in factorial functions of caching away each answer to prevent having to calculate it again.

A second optimization cuts our work even further. All circular permutations of a list take the same number of steps. So does the reverse of each of these. As soon as we calculate and store the number of steps for (1,2,3,4), we can store the number of steps for seven others: (2,3,4,1), (3,4,1,2), (4,1,2,3), (4,3,2,1), (3,2,1,4), (2,1,4,3) and (1,4,3,2).

Clever, eh? (Reader quiz: There is a second set of eight that can also be stored. What is it?)

Listing 2 shows our clever, optimized version.

But how clever is it? Not very, as it turns out. When the integers in the lists are small, either program is fast enough. But by the time we permit large numbers in the four-tuples–say, up to 100–the original, brute-force method is actually faster! Why? The chattering of our disk reminds us that with integers this big, the array we're allocating to cache the steps for each four-tuple is 4 x 100 x 100 x 100 x 100 bytes. We're pretty cavalier about space on today's machines–an old programmer is

Listing 1

```
/* $ID: steps.c,v 1.1 1998/12/01 04:54:06 jsh Exp jsh $ */

#include <stdio.h>
#include <stdlib.h>

int nmax = 10;
int lim = 6;

int
steps(int a, int b, int c, int d)  {
 int n = 0;
 int a0;

 while(1)   {
  if ((a == b) && (a == c) && (a == d))
   return n;
  a0 = a;
     a = abs(b-a); b = abs(c-b); c = abs(d-c); d = abs(a0-d);
  n++;
 }
}

int
main(int argc, char *argv[]) {

 int i, j, k, l, n;

 int lim = 6;  /* don't print anything with under lim steps */
 int nmax = 9; /* maximum integer in a 4-tuple */

 if (argc > 3)   {
  fprintf(stderr, "usage: %s [cutoff] [maxint]\n", argv[0]);
  exit(1);
  }
  if (argc == 3)
   nmax = atoi(argv[2]);
  if (argc > 1)
   lim = atoi(argv[1]);

  for (i = 0; i<=nmax; i++)
   for (j = 0; j<=nmax; j++)
    for (k = 0; k<=nmax; k++)
     for (l = 0; l<=nmax; l++) {
      if ((n = steps(i, j, k, l)) >= lim)
       printf("%d %d %d %d : %d \n",
        i, j, k, l, n);
     }
  exit(0);
}
```

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Listing 2

```
/* $ID: optimized_steps.c,v 1.1 1998/12/01 04:54:34 jsh Exp jsh $ */

#include <stdio.h>
#include <stdlib.h>

#define UNDEF -1
int ****S;

/* create a 4d cube of width "len" */
int ****
make_4d_cube(int len)
{
 int i, j, k, l;
 int *s;
 int **r;
 int ***q;
 int ****p;

 p = malloc(len * sizeof(int ***));
 for (i=0; i<len; i++)   {
  q = malloc(len * sizeof(int **));
  p[i] = q;
  for (j=0; j<len; j++)   {
   r = malloc(len * sizeof(int *));
   q[j] = r;
   for (k=0; k<len; k++)    {
    s = malloc(len * sizeof(int));
    r[k] = s;
    for (l=0; l<len; l++)    {
     s[l] = UNDEF; /* initialize all entries to UNDEF */
    }
   }
  }
 }
 return p;
}

int
steps(int a, int b, int c, int d)
{
 int x = S[a][b][c][d];
 if (x != UNDEF) return x;

 /* all circular permutations of this 4-tuple and their reverses
  have the same number of steps */
 x = S[a][b][c][d] = S[b][c][d][a] = S[c][d][a][b] = S[d][a][b][c] =
     S[d][c][b][a] = S[c][b][a][d] = S[b][a][d][c] = S[a][d][c][b] =
         steps(abs(b-a), abs(c-b), abs(d-c), abs(a-d)) + 1;
 return x
}

int
main(int argc, char *argv[])
{
 int i, j, k, l, n;
 int lim = 6;  /* don't print anything with under lim steps */
 int nmax = 9; /* maximum integer in a 4-tuple */
```

someone who remembers when a Kilobyte wasn't just an archaic name for a millimeg (and why Kilobytes were used to measure something called "core")–but a 400-MB array is still big enough to cause paging.

Minus the Answers

We can use either version of this program to find four-tuples that give us large numbers of steps. (0,1,4,9) is the first four-tuple with seven steps. To get the first four-tuple with eight steps, you need to allow integers up to 11: (0,2,5,11). You want nine steps? The first four-tuple with nine steps is (0,2,6,13).

Here's a table of the lowest integers that you need to permit in four-tuples to get specific numbers of steps:

Steps	Integers
1	1
2	1
3	1
4	3
5	3
6	4
7	9
8	11
9	13
10	31
11	37
12	44
13	105
14	125
15	149

Doesn't it seem odd that it's easy to find seven-, eight- and nine-step examples with low integers, yet you have to go all the way up to four-tuples containing 31 to find a 10-step example? And look at the jump it takes to go from 12 to 13. And why do these seem to cluster in groups of three? We don't know.

Can we just keep going? Are there four-tuples with arbitrarily large numbers of steps? If we go high enough, can we find four-tuples that don't stabilize at all and have an infinite number of steps? We don't know.

Computers, with their brute-force solutions, often raise as many questions as they answer. This started out as a math problem. Can we answer our questions by deriving a mathe-

```
if (argc > 3)   {
 fprintf(stderr, "usage: %s [cutoff] [maxint]\n", argv[0]);
 exit(1);
}
if (argc == 3)
 nmax = atoi(argv[2]);
if (argc > 1)
 lim = atoi(argv[1]);

S = make_4d_cube(nmax+1);

/* entries like (3,3,3,3) have 0 steps */
for (i = 0; i<=nmax; i++)
 S[i][i][i][i] = 0;

/* now figure out the number of steps for each 4-tuple */
for (i = 0; i<=nmax; i++)
 for (j = 0; j<=nmax; j++)
  for (k = 0; k<=nmax; k++)
   for (l = 0; l<=nmax; l++) {
    if ((n = steps(i, j, k, l)) >= lim)
     printf("%d %d %d %d : %d \n",
      i, j, k, l, n);
   }
 exit(0);
}
```

matical foundation for all this–say, from the calculus of finite differences? We don't know.

In fact, why don't we say anything about four-tuples that take more than 15 steps? Because we haven't been able to generate one yet. No, wait. That is, "no one has ever found an example that takes more than 15 steps."

We'll report the sex ratio of reader responses in a future column. Until then, happy trails. ➸

Jeffrey Copeland *(copeland@alumni.caltech.edu) lives in Boulder, CO, and works at Softway Systems Inc. on UNIX internationalization. He spends his spare time rearing children, raising cats and being a thorn in the side of his local school board.*

Jeffrey S. Haemer *(jsh@usenix.org) works at QMS Inc. in Boulder, CO, building laser printer firmware. Before he worked for QMS, he operated his own consulting firm and did a lot of other things, like everyone else in the software industry.*

Note: The software from this and past Work columns is available at `http://alumni.caltech.edu/~copeland/work`.

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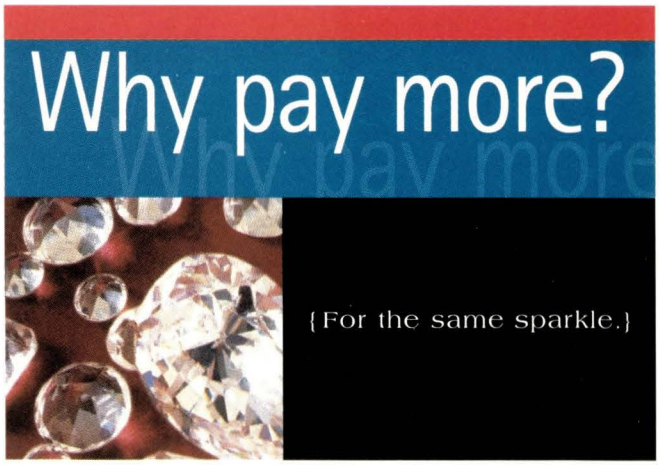

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Circle No. 21

DAVE SPENCER

Managing Remote Systems

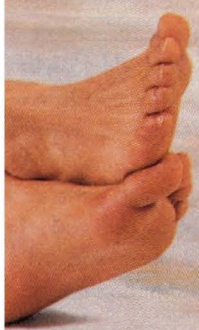
by Alexandra Barrett, Staff Editor

Blame the Internet, cheap laptops, home office tax deductions, frequent-flyer miles or simply an insatiable wanderlust, but one thing is clear, the number of people conducting business away from the traditional office setting is growing by leaps and bounds.

And another thing is clear too: They're taking their computers with them.

Indeed, remote users are an increasingly numerous bunch. According to estimates by Gartner Group Inc., an analysis firm based in Stamford, CT, the number of people working remotely will nearly quadruple in the next five years, from 35 million to

Systems administrators dream of the day when remote users will be able to 'manage' themselves, but current wisdom tells them that day is still far, far away.



137 million users. Once limited to traveling salespeople and executives, remote users now include staff located in remote offices or retail stores, field technicians, the increasingly popular telecommuter, consultants and, to a certain extent, roaming systems administrators.

These days, remote systems can represent as much as 15% of an organization's PCs, according to research firm International Data Corp. (IDC), Framingham, MA, and that number is expected to grow. At the same time, remote systems in the hands of users such as salespeople, retail store staff and field technicians often generate the lion's share of an organization's revenue stream, says IDC analyst Richard Villars.

For some, not having to punch the clock at corporate headquarters every morning may seem like a dream come true, but when it comes to computer systems, there are serious downsides to being a remote user. As a remote user, you don't have a systems administrator down the hall to help you recover from a system crash. No one is there to install the latest version of your office applications. And no one, but no one, can make sure your hard drive was backed up last night. In fact, remote users frequently act as their own systems administrators, making do, but not necessarily doing very well.

From an IT professional's point of view, remote users are a pain in the neck. They're always having dial-up problems. They call from a location six time zones away and expect to be walked through a memory upgrade, but they don't know a power cord from a SCSI cable. And, meanwhile, that management framework your company spent hundreds of thousands of dollars installing simply won't work over 28.8 Kb/s.

Not surprisingly, Gartner Group found that remote users' computers cost an estimated 58% more to manage than local systems. Often, a remote user's system is the epitome of everything IT staff is paid to avoid: The system is virus-ridden, poorly configured, runs outdated software and hasn't been backed up since Singapore.

Although this is a worst-case scenario, more and more IT departments with remote users under their jurisdiction are implementing management solutions to bring these rogue users back under centralized control. Or at least that's the idea. Management tools designed specifically for remote users are in actuality few and far between. However, customer demand, the Internet and some key initiatives from choice systems vendors promise to bring order to the chaos.

Improving System Instrumentation

A big problem with managing remote systems, and PCs in particular, has been that it's very difficult to determine from a distance what kind of hardware and software the remote system is running, much less configure it.

On the other hand, today's networking equipment is relatively easy to monitor and configure. This is due in large part to the ubiquity of the Simple Network Management Protocol (SNMP), which is embedded in most, if not all, networking equipment on the market and understood by most, if not all, network management tools. These include Solstice Domain Manager (formerly known as SunNet Manager) from Sun Microsystems Inc., Palo Alto, CA, Spectrum from Rochester, NH-based Cabletron Systems and HP OpenView from Hewlett-Packard Co., Palo Alto, CA.

But end-user systems typically don't come equipped with SNMP and, therefore, aren't easily managed by SNMP-based products. In fact, end-user systems in general have been plagued by a persistent lack of so-called "instrumentation," the facility that gathers and publishes important information about the system and the software that is running on it.

So perhaps the biggest boon to managing remote systems will be work shepherded by the Desktop Management Task Force (DMTF), an industry consortium of vendors led by Intel Corp., Santa Clara, CA, that was founded in 1992 and incorporated in 1996. Other DMTF members include Cisco Systems Inc., San Jose, CA, Compaq Computer Corp., Houston, TX, Dell Computer Corp., Round Rock, TX, HP, IBM Corp., Armonk, NY, Microsoft Corp., Redmond, WA, NEC USA Inc., Melville, NY, The Santa Cruz Operation Inc. (SCO), Santa Cruz, CA, Symantec Corp., Cupertino, CA, and Sun. Collectively, DMTF members oversee two important standards efforts: the Desktop Management Interface (DMI), now in Version 2.0, and the Common Information Model, or CIM (pronounced sim).

DMI is an API that enables software–for example, systems management tools–to gather information about a given computer environment. In this respect i's similar to SNMP, except that, "DMI was designed for flexibility," says L.D. Weller, chairman of the DMTF. "DMI doesn't need to know about a device up front, like SNMP [does]." This characteristic is especially important for managing remote systems, which, for example, in the case of a laptop, might hook into a management system from any impromptu location, and not necessarily a fixed, predetermined site.

Another feature of DMI is platform independence, which it achieves by storing information as plain text in Management Information Format (MIF). And with DMI 2.0-compliant machines, management software can not only gather information, but can also configure certain system settings over a network.

CIM, on the other hand, is an object-oriented information model for management data. CIM data, it was announced last fall, can be transmitted over the Internet by describing it in eXtensible Markup Language (XML). "Using XML as the communication mechanism enables us to transmit management data across platforms and instrumentation types, as long as you are connected to the Net," Weller says.

DMTF technologies sit squarely in the middle of two separate vendor-specific management initiatives: Intel's Wired for Management, which aims to make all future PC hardware management-ready; and Web-based Enterprise Management (WBEM, pronounced Web em), an initiative started by BMC Software Inc., Houston, TX, Cisco, Compaq, Intel and Microsoft in response to industry allegations that PCs are too expensive to manage.

As such, DMI-enabled systems, sometimes called "managed PCs" are currently available from vendors such as Dell and HP. Management software vendors that will support WBEM technologies include Computer Associates International Inc.,

Islandia, NY, with its Unicenter TNG product–which Microsoft has announced will be included as part of Windows NT 5.0–as well as BMC, Compuware Corp., Farmington Hills, MI, and Tivoli Systems Inc., Austin, TX.

Long Distance, Low Bandwidth

In the long run, remote systems have the same basic management needs as local systems. For example, like local systems, remote systems need to be kept free of viruses, they need to be equipped with the latest operating systems and applications, they need to be backed up and their performance needs to be monitored.

Over at corporate headquarters, issues such as these are typically handled by stand-alone systems management tools such as RoboMon from Heroix Corp., Newton, MA, or tools that come with management frameworks like Tivoli from Tivoli Systems, the aforementioned Unicenter TNG or HP OpenView. However, most traditional management automation tools are engineered with the assumption that the systems under their control reside on local high-speed networks. Remote systems, on the other hand, "do not usually have the luxury of persistent high-speed connections to management systems," says Deborah Cox, director of industry public relations for the managed systems division at Sterling Commerce Inc., Atlanta, GA, maker of the CONNECT: family of remote management products (CONNECT: was previously owned by XcelleNet Inc. and marketed under the name Remote Ware before Sterling Commerce acquired the company last summer).

Intermittently connected, low-speed connections inspire functionality that you don't always find in management tools designed for the local area network (LAN). Sterling's CONNECT:Remote, for example, offers end-to-end data compression to ease the pain of slow dial-up connections. In addition, a check-point restart feature enables a file transfer that was cut off during transmission to restart where it left off, rather than start over. And CONNECT:Remote can run unobtrusively in the background, performing software distribution off-line, for example, or downloading files while you read your email.

UNIX users beware, though. CONNECT:Remote, like many remote systems management products, is principally a Windows-based product. The range of client types supported by CONNECT:Remote is fairly broad: Windows 3.1/95/98/NT, point-of-sale devices such as IBM 4690s, SCO UNIX

Management the Java Way

As the definition of "system" starts to include more nontraditional Java-enabled devices such as set-top boxes, palmtops and Web-phones, Sun Microsystems Inc., Palo Alto, CA, is doubling its efforts to deliver a management story for the Java platform.

The relative ease of developing cross-platform applications in Java is also positioning the technology at the heart of enterprise-class server systems. Here too, Java is looking more and more like the logical platform on which to build management applications.

So what's lacking in the current repertoire of management tools may soon be provided by Java applets, thanks to Sun's recently renewed support for the Java Management API, or JMAPI. Previously abandoned while still in draft form, the new JMAPI 2.0 is said to provide a modular Java management framework based on JavaBeans with legacy support for a host of management protocols, including SNMP and CIM/WBEM, as well as interfaces to CORBA, HTTP and RMI.

Specific JMAPI 2.0 deliverables are slated to include a standard specification to the management extension, a reference implementation, test suites and, finally, commercial products. The first commercial product from Sun to be JMAPI-compliant will be the Java Dynamic Management Kit 4.0, which currently exists as the JDMK 2.0.

Commercial JMAPI products might also come from future JMAPI licensees. Already, several companies have come out in support of JMAPI 2.0, including some important players in the management space, namely Tivoli Systems Inc., Austin, TX, Computer Associates International Inc., Islandia, NY, and Bull Information Systems Inc., Billerica, MA. Also jumping on the JMAPI bandwagon are companies as diverse as uninterruptable power supply (UPS) vendor Exide Electronics, Raleigh, NC, Jyra Research Inc., a U.K.-based startup that focuses on Java management issues, and publish-subscribe messaging middleware pioneer Tibco Software Inc., Palo Alto, CA.

If JMAPI pans out, it could represent important cost savings to management and device vendors alike. "Licensing JMAPI would mean reduced development time for us," says Peter Lynch, vice president of technology at Jyra, "because Sun has already done a lot of the interface work for us." For devices that include an embedded Java Virtual Machine (JVM), JMAPI will mean they are not limited in the number of management protocols they can support.

From a management framework perspective, Java and JMAPI are the future of object-oriented management products, according to Tom Bishop, chief technical officer at Tivoli. "Tivoli's philosophy has always been that the appropriate technology upon which to build an enterprise systems management solution is distributed object technology. For most of Tivoli's life, that meant CORBA, but Java allows us to go a step beyond to a cross-platform distributed object technology," Bishop says. How extensively Tivoli will integrate Java and JMAPI into its framework, however, is unclear.

Java may also be the answer to a lot of problems faced by network management systems today. Management systems based on SNMP and RMON central polling architectures, for example, suffer from scalability problems, according to a white paper published by Jyra Research, concerning its Jyra Service Management Architecture. Nor are these protocols suited to measuring application response time, an increasingly desirable metric to have in this age of "service-driven" networks. A management framework based on distributed Java technology, on the other hand, can scale to handle large networks with large amounts of network traffic and can monitor application performance with relative ease.–*ab*

and AT&T UNIX. But the CONNECT:Remote server only runs on Windows, placing it outside the reach of many UNIX-based back-office environments. To address this problem, Sterling recently announced that CONNECT:Remote Version 3.3 now integrates with Tivoli TME 10.

But framework vendors are quick to defend their wares as valid remote management products in their own right. "I think the criticism that Tivoli wasn't suited to remote management used to be true," says Tom Bishop, chief technical officer at Tivoli. "But not so much anymore." Bishop cites several examples of new Tivoli features that help further the remote management cause. For one, agent technology new to Tivoli 3.6 allows a managed client to dynamically download only those management components that it needs to perform a particular function. Also, "depoting"–the process of assigning one remote machine that will in turn broadcast to other machines on its LAN–has been improved in Version 3.6. With depoting, Bishop explains, you don't necessarily need to manage hundreds of remote clients. One machine will execute the remaining management tasks for you.

Computer Associates' Unicenter TNG also claims to have a rich set of remote management tools. The company's remote site management solution comprises several products that tie into Unicenter TNG. Together, they reportedly "give you the kind of control and management you normally see in a LAN environment," says Allan Andersen, product manager for desktop and server management solutions at Computer Associates. They address issues such as inventory control, software distribution, remote control, backup, virus control and security.

Computer Associates' remote management products differ from LAN-centric tools in several ways, Andersen says. For example, they feature different data transport techniques, additional multicasting technologies for software distribution purposes and "polite agent" technology from BackWeb Technologies, San Jose, CA, which only pushes downloads if there is enough bandwidth. "This way, you're not stepping on anyone's toes," says Andersen. Also, Computer Associates' remote site tools allow IT administrators to set up policies that can make it impossible for end users to change certain configuration options on their PCs–their IP address, for example–thereby sidestepping potential problems.

HP's OpenView, really an SNMP manager, but sometimes thought of as a framework, features limited remote management capabilities in the form of its IT Operations (ITO) product. But, in general, HP representatives admit that OpenView is better suited to managing stationary systems.

Companies Mentioned in this Article

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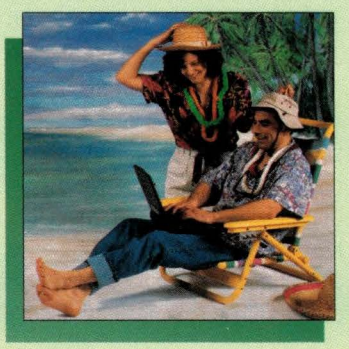

The Underlying IP Framework

For UNIX shops that have not invested in a framework, the remote systems management landscape may seem a bit grim. But remote management issues aside, analysts have their doubts about how appropriate frameworks are in most IT scenarios. "It's not at all clear that frameworks are the way to go," says Heroix President Howard Reisman. According to Gartner Group, about 70% of management frameworks remain unimplemented three years after they were purchased. The main problem with frameworks, according to IT staff, is the unexpected hardship of getting them configured.

Some industry insiders believe that the Internet is emerging as a valid underlying management vehicle. "The Internet will become the framework," Reisman says. As a first step, the industry is beginning to see more and more management functions being performed over the Internet and intranets via Web browsers. Management consoles were originally architected with a pure client/server architecture, which confined systems administrators to their desks. These days, however, a lot of management functionality has been converted to a browser-based GUI, Heroix's RoboMon is an example.

More and more control will be handed down to the Web-based GUI over time, says Reisman, especially once Microsoft and Netscape Communications Corp./America Online Inc. iron out their browser differences. Currently, developers who want to create sophisticated browser-based GUIs must choose between programming technologies–Java for Navigator, ActiveX for Internet Explorer–and, therefore, browsers. Or, if they don't want to exclude anyone, they can develop GUIs for both browsers. "But that gets pretty expensive," Reisman says.

The increasing popularity of frame relay installations for remote offices and virtual private network (VPN) solutions for laptops will make the Internet an even more logical management vehicle. Peter Kalida, corporate technology manager for SIG Inc., an IT consulting firm based in Houston, TX, is implementing a remote management plan for four branch offices and countless laptops that revolves around these two technologies. In this way, remote systems can securely connect to the SIG domain and, therefore, be managed from the home office with centralized management tools.

Also, technologies that were popularized by the Internet, "push" and "multicast," for example, are increasingly being used as the basis of remote systems management products. The aforementioned Tivoli OEMs software distribution technology from Marimba Inc., Mountain View, CA, once a rising star among "push" technology vendors, but now a much quieter, more pragmatic company.

But the day when all systems management is performed via the Internet is still far away, says Tivoli's Bishop. Chief among IT managers' concerns is that packets on an IP network such as the Internet can be looked at by packet sniffers. Unless they are using encryption, "an administrator in California doing a password change on a system in Boston might find that a bit undesirable," says Bishop. Simply put, "There are some management tasks that people will be comfortable performing over the Internet, but there are a lot they won't." ⊸

READER FEEDBACK

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Have Server, Will Travel

by **IAN WESTMACOTT, Technical Editor**

The VoyagerIIi mobile computer system from the newly formed Tadpole-RDI may be mobile, but it's no laptop. With a 300-MHz processor and up to 1 GB of main memory, this system is more like a server than a workstation.

Tadpole-RDI VoyagerIIi Mobile Computer

Tramping off to a trade show or presentation to demonstrate a new product; traversing mountain sides and jungle valleys to service equipment or collect data; battling city traffic with the corporate strike team for site support, training or sales; crisscrossing the globe with point-of-sale or mobile command post applications; high-pressure systems and data disaster recovery. There are many situations that call for robust and powerful mobile computing resources. If you're in such a position, then the 100% SPARC-compatible VoyagerIIi mobile computer system from Tadpole-RDI is for you.

Tadpole Technology has been in the mobile UNIX market since 1992, when it introduced the SPARCbook 1, a SPARC-based laptop computer. Today, Tadpole markets the SPARCbook 3 family of laptops and the ALPHAbook, a Digital Equipment Corp. Alpha-based laptop. With the acquisition this year of competitor RDI Computer Corp., the newly formed Tadpole-RDI has added the UltraBook, an UltraSPARC-based laptop, and the PrecisionBook, a laptop based on Hewlett-Packard Co.'s PA-RISC processor, to its mobile UNIX offerings.

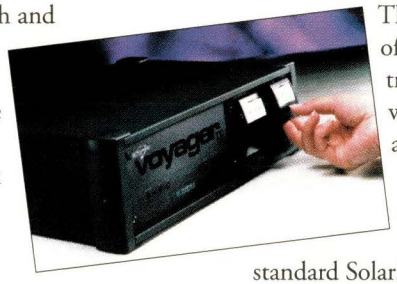
The Tadpole-RDI VoyagerIIi, with a 300-MHz UltraSPARC-IIi processor, 20 GB of removable disk capacity and up to 1 GB of memory, is designed for applications that require UNIX server functionality and performance in a portable form.

But the VoyagerIIi is not a laptop. It has no monitor, keyboard or pointing device. It does not run on batteries and it doesn't have a docking station. The VoyagerIIi is not for computing on the road, but for computing once you get there. With a 300-MHz UltraSPARC-IIi processor, 20 GB of removable disk capacity and 256 MB to 1 GB of main memory, this system is more like a server than a workstation. However, the VoyagerIIi weighs only 10 pounds and is just 13.2- by 10.5- by 4.5-inches in size–not your typical UNIX server.

The VoyagerIIi's target market is applications that require UNIX server functionality and performance in a portable form. Using removable disk packs, disk sets may be created for sales meetings, presentations, service and support, or any needed configuration. Whenever you have to hit the road, slide in the applicable disk pack, put the VoyagerIIi in its case and you're on your way. At your destination, attach any Sun Microsystems Inc. or PC-compatible monitor, keyboard and mouse, and you have a SPARC/Solaris server correctly configured for your needs. And, according to Tadpole, the 300-MHz system delivers approximately 12.1 SPECint95 and 12.9 SPECfp95.

Configuration

Tadpole sent us a VoyagerIIi equipped with 512-MB DRAM and 20 GB of storage, together with an optional wheeled carrying case. The unit itself is flat-black, .0625-inch aluminum with removable rubber feet. The front panel sports power, Power-On Self Test (POST) and run/stop LED indicators, a recessed reset switch and SCSI, Ethernet and (four) disk activity LED indicators. The two removable disk pack bays are also on the front panel. The rear panel includes power and run/stop switches, 10/100BaseT, Sun keyboard/mouse, PS2 keyboard, PS2 mouse, one RS232, one Centronics and one Ultra SCSI, SCSI 2 interface ports, two Type I/II (or one Type III) PCMCIA card slots and one 33-MHz, 32-bit PCI card slot.



Our unit came with an optional ATI 3d Charger PCI video card (occupying the PCI slot) and Solaris 2.6 Server preinstalled. Two disk packs were provided, with two disks each for the maximum of four internal disks (external SCSI disks are also supported). Using IBM Corp.'s Travelstar 5GS 5.1-GB drives, a total of 20 GB of internal removable storage is supported, using Ultra DMA with a transfer rate of 33 MB/s.

The run/stop switch either runs or stops the operating system when the unit is powered on (using the SPARC suspend feature). The run/stop indicator LED, together with the POST LED, indicate what state the unit is in at all times, without having to connect a monitor. They indicate, for example, whether there has been an error during the POST and if the operating system is running or has been stopped. Unfortunately, the run/stop LED on our unit was not functioning. We also found it odd that the Ethernet activity LED indicates *any* network activity, not just activity involving the unit, so it is just about always flashing, making it difficult to determine when the unit is actually using the network.

Inside the box, the Tadpole motherboard is mounted midline with some components connected from above and others below. Both the top and bottom panels of the box are removable with four screws. The only user-serviceable components are the memory and the PCI card. Eight SIMM slots accommodate standard 128-MB modules in pairs. The unit is cooled by four fans on one side and a vent on the other. The vent extends to the base of the unit and internal electronics are exposed, so you will want to avoid spilling any liquids near the unit.

The documentation covers both hardware use and troubleshooting, and standard Solaris use and administration tasks. VoyagerIIi systems include a one-year, return-to-factory hardware warranty and a 90-day software support warranty. Tadpole also sells extended warranties. Tadpole provides phone numbers and an email address for technical support. A faulty power supply on our first unit gave us occasion to contact support by email and we received a personal response within two hours.

Performance

We were tempted to toss the VoyagerIIi out our lab window to see how it handled the impact. However, we were relatively certain that would end our review, so we resisted the temptation. According to Tadpole, stress tests indicate VoyagerIIi can handle up to 0.5 G vibrating acceleration and up to 1 G nonvibrating acceleration, while shock tests indicate the unit can handle up to 10 G operating shock and up to 60 G nonoperating shock. Although the documentation lists natural disasters, mining and geological surveying as possible application areas for the VoyagerIIi, in our opinion the unit is not rugged enough for such environments. With the large vent interstices exposing electronics, unsealed joints and lightweight aluminum casing, we suspect the unit would not fare well in the wild.

There are plenty of applications that do not require extreme ruggedization, however, and here the VoyagerIIi will do well. Its small size is impressive, even in its optional carrying case, which has room for an optional mini keyboard. The whole package would fit in an airplane overhead compartment and isn't much larger than a standard laptop briefcase. Although the VoyagerIIi weighs only 10 pounds, the wheeled carrying case weighs roughly another 10 pounds, and with peripherals and/or documentation you will probably end up with a 20- to 30-pound package. We recommend the carrying case to save your arm some discomfort on long trips.

While, overall, we were impressed with the design and engineering of the VoyagerIIi, we did encounter several design and quality control problems. In addition to the malfunctioning run/stop LED and power supply problem, the disk packs did not fit quite right on one of our units and one of the screws holding the top panel was incorrectly machined. In addition, the removable rubber feet were too easily removed–so that just removing the unit from the case would cause them to fall off. However, as a first attempt at this form factor, Tadpole-RDI should be commended, and we expect manufacturing will work out the glitches. ⊷

VoyagerIIi Mobile Computer System

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Worst Feature
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Circle 177

by PATRICK T. COLEMAN, Staff Editor

The Morse Code of Data – XML

The integration of data from disparate sources with enterprise and, more recently, Web applications is a daunting task for any IT organization. In an attempt to find a solution to this problem, several vendors are turning to XML as a modern-day Morse code for data.

Illustrations by ERIN TERRY

In the mid-19th century, American inventor Samuel Morse experimented with electric circuits as a means of communication. While some historians have questioned whether or not Morse was the originator of the telegraph, it cannot be disputed that he was an innovator. Indeed, Morse demonstrated the practical use of the telegraph before the U.S. Congress in 1844. But in order to send meaningful messages, telegraph operators were required to use a basic language that everyone understood. Thus, Morse created a set of signals, collectively called Morse code, which represented the alphabet, numbers, periods and commas. With Morse code, a message could be sent via telegraph using a common, standardized format.

Ironically, the problem telegraph operators faced in the mid-19th century is similar to a problem IT professionals face today. The integration of data from disparate sources with enterprise and Web applications is a daunting challenge for IT organizations. At times, it's like having multiple telegraph operators on a network, each sending out messages based on their own code. Further complicating the matter are organizations that attempt to provide data to the masses through Web sites. "It's a huge problem," says Carl Olofson, research director of database management systems at International Data Corp., a research firm based in Framingham, MA. "What we have lacked is the ability to connect a front end to where the data is–in back-end sources."

The inherent difficulty in connecting multiple data sources to dissimilar front-end applications is the root cause of the problem. These data sources can be relational databases, flat files or even legacy systems. What many organizations are striving for is universal access to such data that is easy to read and in a format from which users can glean useful information.

What many organizations are striving for is universal access to relational databases, flat files or legacy systems in a format from which users can glean useful information.

To help facilitate this goal, several vendors are turning to XML as a type of Morse code for data. Short for eXtensible Markup Language, XML can convert data into an understandable format for disparate systems, in much the same way that Morse code is used by disparate telegraph operators to transmit their messages in an easily understood format.

Defined by the World Wide Web Consortium (`http://www.w3.org`), XML is a metadata language. It's used to describe the relationship of data elements to form meaningful units of information. Whereas Hypertext Markup Language (HTML) is a presentation language defining the appearance of data, XML gives that data meaning. The language is actually a subset of Standard Generalized Markup Language (SGML) and is designed specifically for use on the Web. As its name suggests, XML is extensible, allowing for

tags to be added to the language based on users' needs. Files containing XML data are self-describing and can be validated through Document Type Definition (DTD), which interprets XML markup.

Michael Goulde, vice president of research with Boston-based technology consultancy, Patricia Seybold Group, wrote in the November 30, 1998, issue of *Internet Tools and Technologies Weekly*: "Programs do not have to know how to handle binary message formats or have preexisting knowledge of the format of messages received. The document itself is easily navigable by an application that can parse XML because the document's data elements are self-describing through their meta tags." Because of this, Goulde adds, "An XML-aware application can process XML data from any source."

Thanks to XML's unique ability to handle data there is growing corporate interest in offering XML-based products. "XML appears like it's going to be the new standard for representing data over the Internet," says Benoit Lheureux, research director of application integration and middleware strategies at Gartner Group Inc., Stamford, CT.

Companies such as IBM Corp., Microsoft Corp., PeopleSoft Inc. and SAP AG have announced their support of XML. In addition, database vendors Oracle Corp. and Sybase Inc. have announced XML extensions to their respective offerings. "These companies are all strongly behind XML as a standard format for providing structured information," says Kevin Dick, founder of Kevin Dick Associates, a Palo Alto, CA-based software technology analysis firm specializing in XML technologies. "XML is set up to become the de facto format for structured information in everything from database data, wire protocol data, to structured Web documents."

One enthusiastic supporter of XML is Object Design Inc., Burlington, MA. Known for ObjectStore, an object-oriented database, Object Design plans to deliver an XML-based product called eXcelon sometime this quarter (a beta version has been available since November). "eXcelon is an XML data

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server," says Coco Jaenicke, product manager for Object Design. "It sits in the middle tier and ships the data up to a Web server or an app server."

eXcelon aggregates data in the middle tier where it can be manipulated with Document Object Model (DOM) and queried using eXtensible Query Language (XQL). The data is organized in a unified view and can be integrated from sources such as relational databases, documents and legacy systems. For example, eXcelon can integrate tables from a relational database and format that data into XML by doing runtime joins, mapping records to classes and mapping records to objects. This data is held in an XML Store and cached for distribution. Back-end data is persistently repre-sented as XML so that when an XML request comes from a client, the data is available in the proper format without the need for translation or a return to the original data source. What this means is eXcelon will enable data to be served directly to the Web or to enterprise applications. "We do load balancing and the distribution," says Jaenicke. "We can do extreme scalability and back-end connectivity."

Currently, XML is not supported natively in either Netscape or Microsoft browsers and the W3C is still working on the XML specification. The fact that XML is not proliferating the market has some users in a wait-and-see mode.

Currently, eXcelon doesn't allow for writing to the original data source, but rather to the eXcelon cache. "There are ways of connecting the XML database with the original data source," says Jaenicke. "You can go through ODBC/OLE/ADO [Object Database Connectivity/Object Linking and Embedding/Active Data Objects] or webMethod's B2B server, or use our API to propagate data back to the original source."

Other vendors jumping on the XML bandwagon include Poet Software Corp. with its Content Management Suite 1.1, a tool for manipulating XML content, and Ardent Software Inc., which plans to release an XML content management product based on its O2 object database. In addition, BlueStone Software Inc. has announced BlueStone XMLServer, a Web application server that deploys XML applications. "We don't think the only position that XML has in the market is as a data transference vehicle," says John Capobianco, senior vice president of marketing at BlueStone Software. "The program-to-program communication that can also be had with XML is an important feature for the future."

Down Side

Currently, XML is not supported natively in either Netscape Communications Corp. Navigator or Microsoft Internet Explorer (IE) browsers–although it is supported in the beta version of IE 5.0–and the W3C is still working on the XML specification. The fact that XML is not proliferating the market has some users in a wait-and-see mode. "I see a lot of interest in XML," says Phil Costa, industry analyst with Giga Information Group, Cambridge, MA. "But from the corporate-user perspective, XML is just in pilot projects."

Jaeson Paul, senior HTML designer with iXL, an Atlanta, GA-based company that provides custom digital media systems to corporations, says eXcelon could help his clients, but because XML is still in the early stages of industry deployment, he remains cautious. "We're looking at the standard itself and how it does in the marketplace. One of the things that is limiting is XML hasn't taken off in the big way that it needs to before it becomes really valuable," he says. "XML hasn't become reliable on the client side yet, and that's crucial."

Companies Mentioned in this Article

Ardent Software Inc.
50 Washington St.
Westboro, MA 01581
http://www.ardentsoftware.com
Circle 178

BlueStone Software Inc.
1000 Briggs Road
Mt. Laurel, NJ 06054
http://www.bluestone.com
Circle 179

IBM Corp.
Contact local sales office
http://www.ibm.com
Circle 180

Microsoft Corp.
One Microsoft Way
Redmond, WA 98052
http://www.microsoft.com
Circle 181

Object Design Inc.
25 Mall Road
Burlington, MA 01803
http://www.odi.com
Circle 182

Oracle Corp.
500 Oracle Pkwy.
Redwood Shores, CA 94065
http://www.oracle.com
Circle 183

PeopleSoft Inc.
4440 Rosewood Drive
Pleasanton, CA 94588
http://www.peoplesoft.com
Circle 184

Poet Software Corp.
999 Baker Way, Ste. 100
San Mateo, CA 94404
http://www.poet.com
Circle 185

SAP AG
Neurottstrasse 16
69190 Walldorf, Germany
http://www.sap.com
Circle 186

Sybase Inc.
6475 Christie Ave.
Emeryville, CA 94608
http://www.sybase.com
Circle 187

SunExpert Magazine Archive
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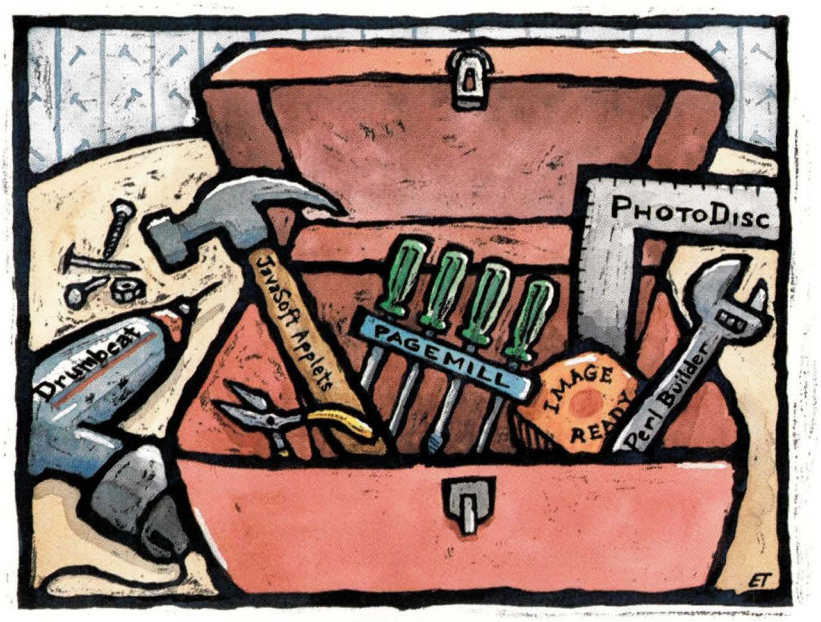
Search back issues of *SunExpert* Magazine for key product reviews, crucial technical articles and unsurpassed columns.
http://sun.expert.com

Paul A. Trunfio is research associate and director of education programs at the Center for Polymer Studies at Boston University. Email: trunfio@bu.edu

A Web Tools Shopping List

A look at some of the latest Web tools that should be on every Webmaster's shopping list.



When the Web was still in its infancy, there were only a handful of development tools on the market and all were completely free. The toolbox of the Webmaster (aka the smart-ass nerd) had little in it besides a simple UNIX text editor, httpd server and a Mosaic browser. Buyers had it easy back then. These days, however, there are literally hundreds of tools to choose from.

In this article, I'll take a look at what a typical toolbox might contain. This is certainly not a "best of" list, nor a complete guide to all the available tools; rather, it's a look at some of the major tools I've had a chance to work with in one way or another. Hopefully, this guide will help you get a feel for the lay of the land and, perhaps, it will help you draw up your own shopping list.

I will concentrate on Web development tools. I will not discuss security, servers, administration or business tools. Also, I will not talk specifically about multimedia tools, such as streaming media or Virtual Reality Modeling Language (VRML), because I discussed them a few months ago (see "Choosing the Right Multimedia Tools," `http://webserver.cpg.com/wt/3.6`).

So with that in mind, on to the list...

HTML Editors

HomeSite 4.0: This excellent HTML editor just got better with enhanced Cascading Style Sheet (CSS) options, JavaScript editing capabilities and Synchronized Multimedia Integration Language (SMIL) support. In addition, it validates by HTML level (that is, 3.2 or 4.0) and offers link-checking capabilities.

Company: Allaire Corp.
One Alewife Center
Cambridge, MA 02140
http://www.allaire.com
Platforms: Windows 95/98/NT 4.0
Price: $99
Circle 188

PageMill 3.0: This is an easy solution for those who wish to get a site up and running straightaway. If you want an HTML authoring tool that will allow you to easily integrate word processing documents, images or many other familiar office applications in a drag-and-drop fashion, then PageMill is for you. It includes a "lite" version of Adobe PhotoShop and ready-to-use graphics, Java applets and page templates to create sophisticated-looking pages.

Hopefully, this guide will help you get a feel for the lay of the land and, perhaps, it will help you draw up your own shopping list.

Company: Adobe Systems Inc.
345 Park Ave.
San Jose, CA 95110
http://www.adobe.com
Platforms: Windows 95/98/NT 4.0 and Macintosh 7.5.5+
Price: $99
Circle 189

HTML/DHTML Authoring

Dreamweaver 2: Released at the end of last year, this new version of Dreamweaver makes its way onto my shopping

list. Dreamweaver is a WYSIWYG HTML page builder that comes bundled with HomeSite 4.0 (for Windows, see above) and BBEdit 5.0 (for Macintosh) HTML editors and supports a decent set of precoded dynamic HTML features. Its collaborative authoring feature allows a Web site development team to work more effectively.

Company: Macromedia Inc.
600 Townsend St.
San Francisco, CA 94103
http://www.macromedia.com
Platforms: Windows 95/98/NT 4.0 and Macintosh 7.5.5+
Price: $299; $399 for the Dreamweaver and Fireworks "Web Essentials" package
Circle 190

Drumbeat 2.0: Drumbeat is another product that has recently been enhanced, with Version 2.0 offering itself as a tool for Web designers who don't plan on becoming programmers. I was pleased to see that the meager manual supplied with Version 1.0 has been replaced with a 600+ page revision that could hardly be better. While it shares many features with Dreamweaver, Drumbeat's claim to fame is its database connectivity support. With the DataForm Wizard, for example, you can easily generate pages on the fly from content taken from your homemade text-based data files or Object Database Connectivity (ODBC) databases.

Company: Elemental Software
5927 Priestly Drive, Ste. 101
Carlsbad, CA 92008
http://www.drumbeat.com:80/ElementalSoftware
Platforms: Windows 95/98/NT 4.0
Price: $699
Circle 191

Graphics

ImageReady: ImageReady is designed for pumping out Web graphics. It works hand-in-hand with Adobe PhotoShop, which allows you to create/edit images. I have talked about the special requirements of Web images, such as a color palette that uses only 216 colors and the need to use optimized graphics, several times in the past and this is where these kinds of tools come in handy. You can optimize your images by choosing different color palettes and compression schemes, then preview the images with Macintosh and Windows gamma previews. You can also perform some other Web-specific procedures and create backgrounds, animations or maps.

Company: Adobe Systems
Platforms: Windows 95/98/NT 4.0 and Macintosh 7.5.5+
Price: $219

Fireworks: With Fireworks, all your image editing can be done with one neat package, instead of having to jump between multiple applications. Its unique Slice feature, for example, allows you to break down an image into component parts, use different color palettes and compression schemes for each part, and zip it back together to create truly optimized images.

Company: Macromedia
Platforms: Windows 95/98/NT 4.0 and Macintosh 7.5.5+
Price: $299

Stock Graphics

PhotoDisc Digital Stock Photography: We all know how difficult it can be to build sites using your own digital photographs. Unless you're a professional photographer, it's downright impossible. PhotoDisc allows you to choose images from a wide variety of categories (from agriculture to science) and series (including animation, background and fine arts). The collection is fully searchable online and you can order individual images for download or whole collections on CD-ROM.

Company: PhotoDisc Inc.
2013 Fourth Ave.
Seattle, WA 98121
http://www.photodisc.com/index.asp
Platforms: All
Price: $19.95 per single image (72 dpi); $299 per CD-ROM collection
Circle 192

WebSpice Animations and WebSpice 1,000,000: If you really do not relish having to create your own graphics, these Web-ready images will make your life a whole lot easier. WebSpice Animations supplies three-dimensional animated objects, words, buttons and arrows. Tired of your old images? WebSpice 1,000,000 offers a huge collection of images, including 3D buttons, textures, rules and arrows. You will also find 35,000 blank buttons ready for you to customize.

Company: DeMorgan Industries Corp.
37 Danbury Road
Ridgefield, CT 06877
http://www.demorgan.com
Platforms: All
Price: $99 each; $149 for both products bundled together
Circle 193

Java Development Environments

JBuilder 2: Developers will find JBuilder's second-generation Java development system to be a huge step forward. In addition to supporting the latest Java Developer's Kit (JDK), JBuilder also supports JDK switching, so that you can easily switch between different JDK versions. In addition, JBuilder includes JFC/Swing components from Sun Microsystems Inc., which allow developers to build high-quality 100% Pure Java user interfaces. The Development Server for Java allows developers to deploy these full-featured Java applications (not applets), which require a specific version of the JDK and need access to your server's hard disk. JBuilder's Servlet Wizard helps create server-side Java applets, which provide similar functionality to that of CGI scripts. In addition, JBuilder 2 supports Java Database Connectivity (JDBC) and more than 200 JavaBeans.

Company: Inprise Corp.
100 Enterprise Way
Scotts Valley, CA 95066
http://www.inprise.com
Platforms: Windows 95/98/NT 4.0
Price: $99 (Standard Edition); $799 (Professional Edition, including servlets and JDBC support); $2,495 (Client/Server Suite, including enterprise-scale distributed applications)
Circle 194

Visual Café 3.0: Visual Café's latest upgrade includes significantly enhanced automated wizards for faster application development, which are designed especially for less experienced programmers, and support for Sun Microsystems' JFC/Swing components. Developers will also find an upgraded Just-In-Time (JIT) compiler, servlet support, support for any JDK version and more than 200 JavaBeans.
Company: Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014
http://www.symantec.com
Platforms: Windows 95/98/NT 4.0
Price: $99 (Standard Edition); $299 (Professional Edition); $799 (Database Edition)
Circle 195

Java Applets

JavaSoft Applets: Why reinvent the wheel? There are a number of excellent repositories that provide publicly available Java classes and, in many cases, source code. You should begin your search with JavaSoft (`http://www.javasoft.com`), Sun's Java technology division, which provides some of the "standard" applets and links to other Web resources, including developer.com's Java Directory (`http://developer.com/directories/pages/dir.java.html`) and The Java Boutique (`http://www.javaboutique.internet.com`).
Company: Sun Microsystems Inc.
901 San Antonio Road
Palo Alto, CA 94303
http://www.sun.com
Platforms: All
Price: Free
Circle 196

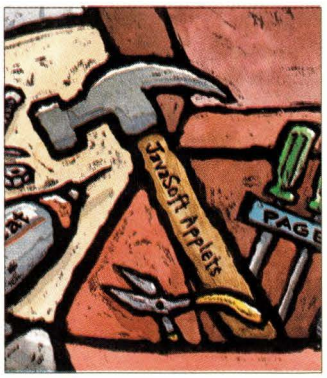
eSuite DevPack 1.5: The Lotus eSuite DevPack Release 1.5 provides a comprehensive set of Java-based business productivity applets and utilities that enable the rapid development of interactive Web applications. These applets include a spreadsheet, word processor, chart, project scheduling, presentation graphics and a JDBC applet to eSuite's CGI gateway applet.
Company: Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
http://www.lotus.com
Platforms: Windows 95/98/NT 4.0
Price: $114 (single-user license); $1,835 (Server Edition).
Circle 197

Perl/CGI Authoring

Perl Builder: This integrated development environment includes a CGI Wizard, which generates code automatically for processing forms, validating user input, sending email and generating HTML. In addition, the desktop CGI simulator allows you to run CGI scripts without a Web server.
Company: Solutionsoft
370 Altair Way, Ste. 200
Sunnyvale, CA 94086
http://www.solutionsoft.com
Platforms: Windows 95/98/NT 4.0 (scripts may be run on any system that supports Perl)
Price: $149
Circle 198

Site Management

Bazaar Analyzer Pro 2.0: This Pure Java log analysis tool (for both Web and proxy servers) is fully accessible through a Web browser. The Administrator Module allows for the configuration of multiple users with filtering of information to specific users or groups. Standard features include number of hits, requests and visits, most and least requested pages and visitor path analysis. Real-time analysis is also offered via the "Watch" feature, which displays current site activity as a function of time.



Company: Aquas Inc.
599 N. Mathilda Ave.
Sunnyvale, CA 94086
http://www.aquas.com
Platforms: Any Java-enabled Web browser
Price: $320 (single-user version); $999 (unlimited-user version)
Circle 199

WebChallenger: This tool does it all: log analysis, server analysis and site maintenance. The main drawback is that although your Web server can run on any platform, the WebChallenger package can only run on a Windows NT machine.
Company: WindDance Networks Corp.
1565 Carling Ave., Ste. 512
Ottawa, Ontario
Canada K1Z 8R1
http://www.winddancenet.com
Platform: Windows NT 4.0
Price: $1,800
Circle 200

The product descriptions are compiled from data supplied by the vendors. To contact them for more detailed information, circle the appropriate reader service number on the card located elsewhere in this issue.

URL/New Products

Content Management Software Service

Unified Research Laboratories has announced Version 3.0 of its I-Gear Internet content management software. I-Gear reportedly allows network administrators to establish unique Internet access permissions for individual users and computers, or groups of users and computers, across a network. Permissions can be based on identity, location or time of day. In addition, I-Gear provides for user-transparent auditing of unfiltered access, as well as detailed summary reports that can be used to pinpoint policy violations without restricting access, Unified Research says.

I-Gear 3.0 features a common object-oriented interface across all platforms, the ability to create virtual user accounts and multithreaded execution for increased efficiency and scalability. It is available for Solaris and Windows NT platforms and operates on any network running Check Point FireWall-1 from Check Point Software Technologies Ltd. Pricing for I-Gear starts at $2,405 for a 50-user (simultaneous) license. URLabs also offers a revenue-sharing program to Internet service providers (ISPs) that resell I-Gear and Mail-Gear software to subscribers.

Unified Research Laboratories Inc.
303 Butler Farm Road, Ste. 106
Hampton, VA 23666
http://www.urlabs.com
Circle 202

Speed Up CGI Scripts

Binary Evolution has announced an upgrade to VelociGen, its Web server plug-in, which is said to increase the performance of Web sites that depend on Perl as their scripting language. VelociGen 1.1 can be used in several modes, including CGI Compatible Mode, which speeds up CGI scripts without modifying existing code; Embedded Mode, which allows developers to mix Perl and Tcl code within an HTML page; and Persistent Mode, which precompiles and caches scripts for maximum speed.

Binary Evolution has also announced VeloMeter, a free, load-testing tool that measures server speed under various user loads. VeloMeter is said to help quantify the benefits VelociGen offers and helps justify its purchase.

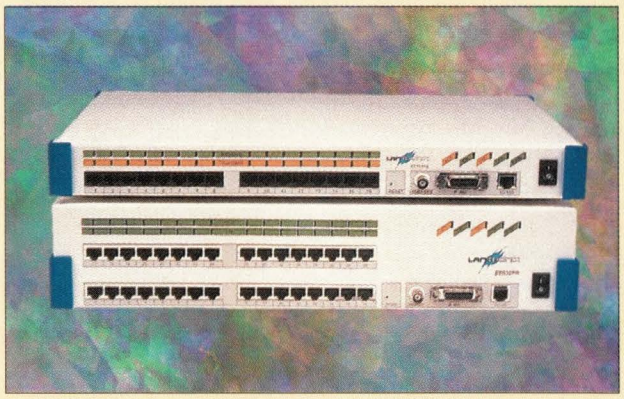
VelociGen installs on Solaris, IRIX, HP-UX, AIX and Linux platforms, as well as Windows NT for Intel. Supported Web servers include Netscape Communications Corp. FastTrack Enterprise Server, O'Reilly & Associates Inc. Web-

Thin Servers from Lantronix

Lantronix has announced one new thin server and three new terminal servers aimed at Ethernet networks. The MSS100 microthin server provides a serial-to-Ethernet conversion for environments supporting 10-Mb/s Ethernet and 100-Mb/s Fast Ethernet via a 10/100-RJ45 Ethernet interface with autosensing/autonegotiating capabilities. A DB-25 serial port with throughput of up to 115 Kb/s and full modem control is complemented by concurrent support of TCP/IP, IPX, AppleTalk and NetBIOS/NetBEUI, Lantronix says. Support for Digital Equipment Corp.'s Local Area Transport (LAT) is also available for an additional fee.

Also included with the MSS100 microthin server is Lantronix's redirector software, which allows network-based PCs to access the MSS serial port as if it were connected directly to the PC, the company says. Operating software resides in the Flash ROM, which may be updated for free. The MSS100 costs $499.

Lantronix has also unveiled the ETS32PR and ETS16PR terminal servers (featuring 32 and 16 serial ports, respectively) for networks needing higher port density, and the ETS4P terminal server model, which provides a combination of four Centronics parallel ports and four RJ45 serial ports for added flexibility in connecting terminals and other peripherals to one or more host computers on an Ethernet network. Installation



of the servers is simplified by the company's EZWebCon software, a GUI that enables administrators to manage the server via a Web browser or DECnet login, Lantronix says.

The ETS32PR, ETS16PR and ETS4P cost $2,995, $2,195 and $1,195, respectively.

Lantronix
15353 Barranca Pkwy.
Irvine, CA 92618
http://www.lantronix.com
Circle 201

Site Pro, Microsoft Corp. Internet Information Server (IIS)/Personal Web Server (PWS) and any other ISAPI-compatible Web server. Pricing ranges from free for noncommercial Linux applications to $4,999 for commercial UNIX platforms.

Binary Evolution Inc.
P.O. Box 3258
Rancho Santa Fe, CA 92067
http://www.binaryevolution.com
Circle 203

Enhanced Web Search Software

Infoseek, operator of the popular search engine site, has upgraded its Ultraseek Server navigation application. Several enhancements have been made to the product, including support for documents created in eXtensible Markup Language (XML), as well as the ability to manage indices and URLs on mirror sites. In addition, Infoseek has added support for Secure Sockets Layer (SSL) encryption, which enables Ultraseek to find documents served via HTTPS. The company has also added language support for Swedish, Danish, Finnish and Norwegian. Ultraseek runs on Solaris 2.5+ and Windows NT 4.0. Administrators can manage the software through Netscape Communications Corp. Navigator 3.0+ or Microsoft Corp. Internet Explorer 3.0. Pricing starts at $995 for a 1,000-document site or $4,995 for a 10,000-document site.

Infoseek Corp.
1399 Moffett Park Drive
Sunnyvale, CA 94089
http://info.infoseek.com
Circle 204

XML Business Forms Builder/Viewer

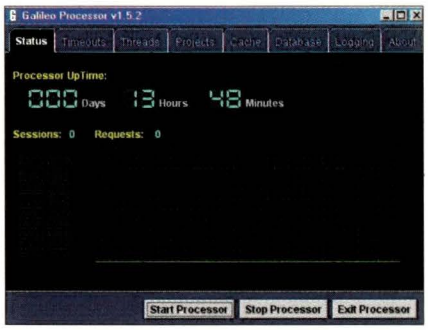
InternetForms Viewer 4.0.4 Gold and InternetForms Designer 1.1.1 Gold are the latest offerings from UWI.Com. InternetForms Viewer 4.0.4 Gold is designed to allow users to view, complete and submit eXtensible Markup Language (XML)-based documents from within a Web browser. It offers internal logic and computations, enclosures and context-sensitive help, the company says. InternetForms Designer 1.1.1 Gold is said to allow users to create complex Web-based forms in a drag-and-drop environment without having to learn XML syntax. Both products support eXtensible Forms Description Language (XFDL), an open, XML-based protocol for creating, completing and distributing business forms.

InternetForms Viewer costs $119 per seat for corporate users, or $3,500 for public Web site use. InternetForms Designer costs $1,495.

UWI.Com
2300 Clayton Road, Ste. 1590
Concord, CA 94520
http://www.uwi.com
Circle 205

Platform-Independent Java Application Server

Esemplare Development has released Galileo 1.5. Galileo is a fully scalable, platform-independent application server, which is said to allow developers to create database-driven Web applications using custom HTML tags. It has been designed to simplify the design, development, deployment and maintenance of Web-based applications, Esemplare says.



Written in Java, Galileo runs on any server supporting Java servlets. It comprises three components–a servlet, dispatcher and processor–and can be downloaded for free from the company's Web site.

Esemplare Development
32 Monsey Place
Staten Island, NY 10303
http://www.esemplare.com
Circle 206

Customized Web Content

Web site designers can now use Jio, the latest software offering from iDream Software, to create online catalogs that reportedly allow site visitors to gather products of interest into one area and then mix, match and compare them.

Jio creates Java-based applets that act as an Internet storefront and features a full set of components for creating and customizing content. The applets run in any Java-enabled browser, the company says. In addition, Jio comes with 110 customized templates so users can select a catalog style that is compatible with their Web site and includes JPEG, GIF and Meta file support. The content authoring component of Jio runs on Windows 95/98/NT. Java Run-Time environment 1.1.6 is required for Web deployment of the catalog applets. A single server license costs $14,995.

iDream Software LLC
18939 120th Ave. N.E., Ste. 111
Bothell, WA 98011
http://www.idreamsoftware.com
Circle 207

Open-Source Application Server

Hamilton, a Java-based Web application server, is currently available as open-source software from Microstate. Because it's the first application server to be released to developers, Hamilton fills a real need in the open-source software community, the company says.

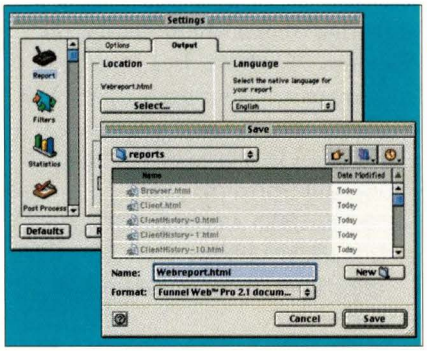
Microstate sees Hamilton being used by any software development organization that needs an application server for thin-client, Web-based business applications, especially those that pool data from diverse, heterogeneous information sources such as databases and wire feeds. Hamilton can be downloaded free of charge from the company's Web site.

Microstate Corp.
11166 Main St., Ste. 100
Fairfax, VA 22030
http://www.microstate.com
Circle 208

Continental Site Analysis

If you want to track the number of hits your Web site receives from the South Pole, then Active Concepts Funnel Web 2.5 just might help. This latest release offers new reporting features based on geographic regions and traffic paths through a site. Active Concepts has also added domain aggregating, offsite processing and additional operating system support.

Funnel Web's Regional Reporting feature displays the number of hits by continent, including Antarctica, while the new Mean Path reporting feature provides a representation of the most common path surfers take through the site, the company says. In addition, domain aggregating technology is said to enable customers to map several aliases for a Web site to a single report.



Funnel Web 2.5 is available for Solaris, HP-UX, Digital UNIX, Linux, FreeBSD, Mac OS and Windows 95/98/NT. The Standard Version costs $249. The Professional Version offers all of the above features plus virtual domain analysis, proxy analysis and real-time updates. It costs $499.

Active Concepts
159 Pelham St.
Carlton, Victoria
Australia 3053
http://www.activeconcepts.com
Circle 209

Email Application Servers

Mirapoint has unveiled two hardware/software application server bundles designed specifically for email, called M100 and M1000. The products are ideal for either a corporation or mid-size Internet service provider (ISP) that requires a package for transmitting and receiving email, Internet message routing and RAID-protected message storage, the company says. Both M100 and M1000 support Point of Presence (POP), Internet Messaging Access Protocol (IMAP), Simple Mail Transfer Protocol (SMTP) and Multipurpose Internet Mail Extensions (MIME), and are compatible with Internet email clients such as Qualcomm Inc. Eudora, Microsoft Corp. Outlook Express and Netscape Communications Corp. Communicator, the company says.

M100 is priced at $14,895 for a diskless system with a 300-user POP/IMAP license and M1000 is priced at $25,995 for a diskless system with an unlimited-user license. Both systems feature an Intel Corp. 400-MHz Pentium II processor with redundant system power supply and cooling fans. Each system also comes with a built-in administration console, a RAID-5 controller with Error-Correcting Code (ECC) memory and an embedded operating environment.

Mirapoint Inc.
2 Results Way, Ste. 100
Cupertino, CA 95014
http://www.mirapoint.com
Circle 210

XML-Based Scripting Tool

NetObjects has released Version 3.0 of ScriptBuilder, an eXtensible Markup Language (XML)-based scripting software application for creating dynamic Web sites. Version 3.0 adds several new features, including automation of tasks such as tag insertion and Web site navigation with embedded functions and objects, and support for multiple scripting languages.

In addition, Version 3.0 features ScriptInspector, which detects potential browser incompatibilities and offers solutions, and ScriptLibrary, which stores frequently used and previously created scripts, the company says. ScriptBuilder 3.0 runs on Windows 95/98/NT and costs $149. A trial version of ScriptBuilder 3.0 is available from the company's Web site.

NetObjects Inc.
602 Galveston Drive
Redwood City, CA 94063
http://www.netobjects.com
Circle 211

Hosting for High-Traffic Sites

Simple Network Communications, a provider of Web hosting services, and Cobalt Networks, a Mountain View, CA-based developer of networked communication and application solutions, have jointly announced SimpleRaQ, a service that reportedly provides dedicated Web servers and management services for organizations with high-traffic Web sites.

The SimpleRaQ dedicated servers, produced by Cobalt Networks, are preconfigured with the freeware Apache Web server and the Linux operating system from Red Hat Software Inc. The servers are housed at Simple Network's Internet data access center in San Diego, CA. The service provides the extra security and storage flexibility of a dedicated server with the customer support and services of a Web hosting provider, Simple Network says. Pricing for the SimpleRaQ servers starts at $150 (plus $50 per month), and bandwidth prices start at $150 per month for 128 Kb/s.

Simple Network Communications Inc.
225 Broadway, 13th Floor
San Diego, CA 92101
http://www.simplenet.com
Circle 212

Free Search Engine Software

Alexa Internet has released Alexa 3.0 search engine software to provide business users with extra information about the Web sites of customers, vendors and potential business partners. The software works with all Netscape Communications Corp. browsers running on Windows 95 or NT, as well as Microsoft Corp. Internet Explorer 3.0+.

Alexa provides users with a choice of four information panels: Site Registration for displaying the name and contact information for a site; Site Stats, which contains data on the popularity, response speed and update frequency of a site; Related Links, which suggests similar sites to visit; and Snapshot for

a brief highlight of the information in the other three panels. Alexa 3.0 can be downloaded for free from the company's Web site.

Alexa Internet
P.O. Box 29141
San Francisco, CA 94129
http://www.alexa.com
Circle 213

Cryptographic VPN System

CellCase2 is the latest addition to Celotek's (formerly Secant Network Technologies) cryptographic product line. Positioned as a virtual private network (VPN) system, CellCase2 is designed to secure data traveling over Asynchronous Transfer Mode (ATM) networks via T1 or E1 data rates, the company says.

With CellCase2, data (including multimedia files) can be securely transmitted over public switch telephone networks, Celotek says. The company touts this as an alternative to using a leased line or creating a private network. CellCase2 offers strong cryptography with Data Encryption Standard (DES), triple DES, Electronic Code Book (ECB) or counter mode data encryption, as well as Rivest-Shamir-Adleman (RSA), Message Digest 5 (MD5) and triple DES key management. Celotek has received approval from the U.S. Department of Commerce to export 168-bit triple DES encryption (without key recovery) to the banking industry. CellCase2 costs $17,500.

Celotek Corp.
P.O. Box 14285
Research Triangle Park, NC 27709
http://www.celotek.com
Circle 214

Create Sophisticated Storefronts

With iHTML Merchant 2.0 from Inline Internet Systems, Internet service providers (ISPs), Web developers and business owners can now deploy sophisticated online storefronts complete with shopping baskets, product catalogs, store search functionality, banner ad management, sales reports, customer management, shipping calculations, product style handling, electronic software distribution support and a fast ordering process, the company says.

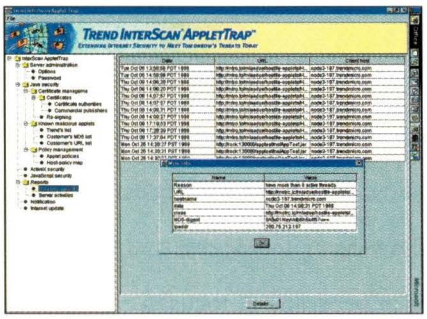
The product supports several transaction payment systems, including CyberCash, IC Verify, PC Authorize, Authorize Net, Internet Secure and Redi-Check. iHTML Merchant is built using Inline's iHTML programming language and can be customized with open-source access to the store software. A Web browser creation and management interface is also available for novice users.

iHTML and iHTML Merchant run on Solaris, Linux, BSD, FreeBSD and Windows via Apache, O'Reilly & Associates Inc., Netscape Communications Corp. or Microsoft Corp. Web servers. Pricing starts at $739. Upgrades from Version 1.0 cost $149.

Inline Internet Systems Inc.
7305 Rapistan Court
Mississauga, Ontario
Canada L5N 5Z4
http://www.inline.net
Circle 215

Tool to Trap Malicious Code

Trend Micro's InterScan AppletTrap is designed to stop malicious JavaScript applets and ActiveX objects at the Internet gateway before they can access and/or damage files on a user's desktop.



AppletTrap, which runs on the server, has three levels of security: certificate verification, a filter to identify known malicious code and a security monitor that checks an applet's behavior against corporate security policy. When a user attempts to download an applet or ActiveX object, the object's digital certificate is compared to a list of allowed certificate publishers, as well as a database of known malicious code. If an applet is found to be malicious, or has come from an unapproved source, it is blocked and an alert is sent to the user, the company says. Applets and ActiveX objects that are allowed to progress to the user's desktop are monitored for suspicious behavior. If an applet violates security policy, it is either automatically shut down or the user is given the choice of whether or not to allow it to continue (the network administrator can decide how much override control to give end users and can set different policy rules for different users and groups).

In addition, AppletTrap provides a log of system events so an administrator can track malicious applet activity and modify security policy accordingly, Trend Micro says.

AppletTrap runs on Windows NT 4.0, as well as any UNIX platform equipped with a Java Virtual Machine (JVM). However, it can only block–not selectively filter–ActiveX objects when running on UNIX. For full functionality, the company recommends running it on a Windows NT server. Pricing for AppletTrap starts at $600 for 25 users.

Trend Micro Inc.
10101 N. DeAnza Blvd., Ste. 400
Cupertino, CA 95014
http://www.trendmicro.com
Circle 216

Module to Parse XML Documents

Perl, the language behind many dynamic Web sites and eXtensible Markup Language (XML), can now be used with a new Perl module from O'Reilly & Associates. XML::Parser reportedly provides Perl developers with an efficient way to break down and process XML document parts. Developed in part by Perl creator Larry Wall, XML::Parser is based on the expat C library (expat, like Perl and XML, is Unicode-aware and is reportedly very fast). On the Windows platform, XML::Parser is available as part of the ActiveState ActivePerl development package from ActiveState Tool Corp. XML::Parser is available free of charge to UNIX developers from the Comprehensive Perl Archive Network (CPAN) Perl site.

O'Reilly & Associates Inc.
101 Morris St.
Sebastopol, CA 95472
http://www.oreilly.com
Circle 217

With the business-to-business segment of eBusiness headed towards one-quarter of a trillion dollars in 2001*, there's only one place you should head in 1999: Internet Commerce Expo®, at Boston's World Trade Center. ICe is the world's most comprehensive eBusiness forum. The 4-day conference and 3-day expo features over 200 exhibitors showcasing innovative and emerging eBusiness technologies. There will be in-depth tutorials and an extensive conference program all focused on knowledge management and eBusiness solutions. ICe will also feature keynote addresses by Newt Gingrich, Speaker of the House (1995-1998); Nicholas Negroponte, Founder and Director of MIT's Media Lab; and Tim Berners-Lee, President, W3 Consortium and Inventor of WWW. Plus numerous special events designed to keep you up-to-date on critical trends and developments. Join the eGeneration at ICe '99 in Boston. **Register now at www.iceexpo.com or 800.667.4423.**

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Circle No. 24

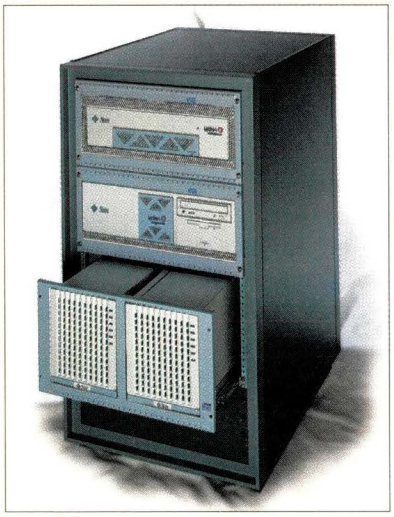
NEW PRODUCTS

The product descriptions are compiled from data supplied by the vendors. To contact them for more detailed information, circle the appropriate reader service number on the card located elsewhere in this issue.

19-inch Rack for Sun Tower Servers

SharkRack has added UniTower to its line of rack-mount systems for servers, storage products and arrays from Sun Microsystems Inc. UniTower is a 19-inch enclosure specifically designed for the Ultra 10, Ultra 20, Ultra 60 and StorEdge MultiPack products.

In one UniTower enclosure, eight Sun Ultra 60 tower systems can be mounted sideways. The rack's sliding rails are said to allow for easy removal for maintenance and/or replacement. SharkRack UniTower uses a universal base, bezel and slides, and has product-specific tie-downs and trim plates to secure servers to the base.



UniTower allows access to floppy drives and tape drives. Because Ultra 10, 30 and 60 systems are mounted sideways to occupy less space, SharkRack says, a problem may occur when trying to access a CD-ROM. A self-loading CD-ROM may be used to eliminate problems associated with the loading tray. The list price for the SharkRack UniTower is $792.

SharkRack Inc.
573 Maude Court
Sunnyvale, CA 94086
http://www.sharkrack.com
Circle 101

Browser-Based Access to X Applications

Hummingbird Communications has unveiled the JuMP management platform, an object-oriented, open standards architecture that enables administrators to deploy and manage any combination of thin clients for mainframe, midrange and UNIX/X Window connectivity, the company says.

JuMP reportedly provides on-demand delivery of Hummingbird's high-performance Java applets for TN3270E/TN5250E/Telnet terminal emulation and X Window application access to desktop Web browsers. The Exceed Web and HostExplorer Java applets feature the same look and feel as Hummingbird's other fat-client products, thus reducing the amount of user training required during migration, Hummingbird says.

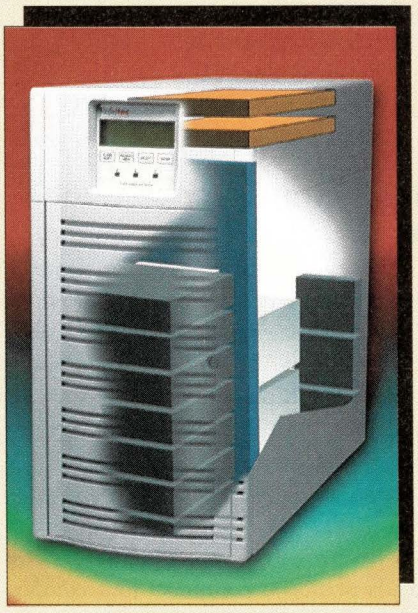
JuMP features a component-based design that offers interoperability, compatibility and platform independence. It comprises three components: JuMP middle-tier management services, integrated Web and Lightweight Directory Access Protocol (LDAP) servers and Hummingbird's Jconfig management interface.

The JuMP management platform supports Windows NT 4.0 and has a base price of $1,595, which includes a JuMP server, LDAP server and Web ser-

Data Protection Regardless of Operating System

FlexArray-HI is said to support so many host computers that loading and updating software drivers is not required. The new Wide Ultra 2 Low-Voltage Differential (LVD) SCSI RAID subsystem from Raidtec is designed to offer fault-tolerant data protection regardless of the operating system being run by the host computer. The subsystem comes with a three-channel SCSI-to-SCSI bridge controller called UltraRAID-HI LVD, which supports up to 80-MB/s data transfer rates with full fault-tolerant protection, the company says. It also supports up to eight virtual array groups, each with its own user-selectable RAID level (including levels 0, 1, 1+0, 3 and 5).

FlexArray-HI can be configured as a deskside tower subsystem or in a 19-inch industry standard rack. Each enclosure supports seven 3.5-inch SCSI drives. Up to four FlexArrays, totaling 28 drives, can be cascaded together providing more than 500 GB of storage from a single RAID controller. Fans, power supplies and drive bays are all redundant, hot-pluggable and hot-swappable. The array can be administered via an LCD or RAIDman GUI software tools. FlexArray-HI is available to VARs, channel partners and systems integrators. Contact vendor for pricing.



Raidtec Corp.
400 Overlook Business Park
Bldg. 12
1360 Union Hill Road
Alpharetta, GA 30004
http://www.raidtec.com
Circle 100

ver. HostExplorer Web applet costs $149 per user for 50 users and Exceed Web costs $319 per user for 50 users.

Hummingbird Communications Ltd.
1 Sparks Ave.
North York, Ontario
Canada M2H 2W1
http://www.hummingbird.com
Circle 102

Control up to 128 Systems

Network Technologies has announced the availability of On Screen Display (OSD), a keyboard, video and mouse switch that is designed to allow a single user to control as many as 128 computers. Also known as the SE-8M13W3-8-0 (eight-port Sun Microsystems Inc. switch), it appears on a user's monitor, so all "Scan," "Broadcast" and "Command" functions can be viewed and controlled directly with the keyboard. The OSD switch can be rack-mounted or housed in a cabinet system away from the control point.

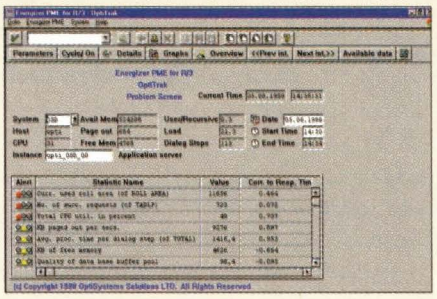
OSD is designed to work with all Sun systems. Embedded micros emulate keyboard and mouse presence all of the time, so computers can hard or soft boot error-free, the company says. In addition, the switch supports 1600-by-1200 dpi resolution. OSD is housed in a plastic case, measuring 10 by 3.3 inches, and is powered by 110 or 220 VAC. It costs $1,870.

Network Technologies Inc.
1275 Danner Drive
Aurora, OH 44202
http://www.networktechinc.com
Circle 103

Real-Time Management for SAP R/3

Energizer Performance Management Environment (PME) for R/3 provides real-time management and problem resolution for SAP AG's R/3 system, resulting in increased throughput, extended system availability and improved user response times, according to its developer, OptiSystems Inc. (a subsidiary of OptiSystems Solutions Ltd.).

The product, which runs on the Solaris platform, comprises four components: OptiTrack, for identifying problems as they happen; OptiWatch, for



configuring application, database and operating system parameters to their optimum settings based on how the R/3 software is being used; OptiGrowth, which provides for complete service-level definition and reporting, as well as capacity planning; and OptiManage, which performs dynamic, real-time performance management.

Each component runs as an integrated application within R/3. Although all four components can be installed separately, each provides part of a logical progression, which together form a complete solution for R/3 performance management, the company says. OptiTrack and OptiManage are priced at $57,500 for 100 users, while OptiGrowth and OptiWatch cost $34,500 for 100 users.

OptiSystems Inc.
1100 Fifth Ave. S., Ste. 308
Naples, FL 34102
http://www.optisystems.com
Circle 104

Software to Analyze Network Security Risks

Internet Security Systems, a provider of adaptive network security software, has introduced a decision-support application that is said to automate the collection, integration, analysis and reporting of enterprisewide security information from multiple locations and sources. The product, called SAFEsuite Decisions, is the first release in the company's new line of SAFEsuite Enterprise security management applications. SAFEsuite Decisions automatically correlates and analyzes data from multiple sources and develops a security risk profile of the entire network, the company says.

Some of the key features include risk management reporting, which provides security reports on real-time risk and threat conditions; customizable execution and distribution of reports; and centralized management of security data.

Pricing for SAFEsuite Decisions starts at $25,000. It runs on Solaris 2.5/2.6.

Internet Security Systems Inc.
6600 Peachtree-Dunwoody Road
Atlanta, GA 30328
http://www.iss.net
Circle 105

DIY CD Mastering

Ultera Systems' CD-R MultiMaster2 is said to offer a low-cost platform for producing multiple master CDs. Available as a stand-alone controller or bundled with two to 12 CD-Recorders, it can be used with either PC, Macintosh or UNIX (including Solaris) platforms. It has a SCSI interface and can operate with all popular CD-Recorders, Ultera says.

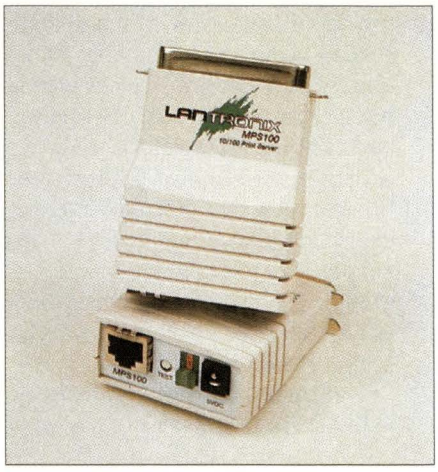
MultiMaster2 is priced from $2,495 for a two-drive version to $11,995 for a 12-drive version.

Ultera Systems Inc.
26052 Merit Circle, Ste. 106
Laguna Hills, CA 92653
http://www.ultera.com
Circle 106

Lantronix Print Servers

Lantronix has announced three new print server products: two multiport models, EPS2-100 and EPS4-100, and the single-port MPS-100.

The EPS2-100 and EPS4-100 print servers both feature an internal power supply, which is intended to provide a higher degree of fault tolerance, the company says. Model EPS2-100 has two parallel and two serial ports, while model EPS4-100 has four parallel and two serial ports. Both offer data rates up to 230 Kb/s. Concurrent network protocol



support includes TCP/IP, IPX, AppleTalk and NetBIOS/NetBEUI. Support for Digital Equipment Corp.'s Local Area Transport (LAT) for controlling terminal traffic in a DECnet environment is optional. Both models have a 10/100-RJ45 autosensing/autonegotiating network port for adaptability to any 10- or 100-Mb/s network.

Model MPS-100 features one 10/100-RJ45 autosensing/autonegotiating port and supports the same network protocols as the EPS2-100 and EPS4-100. It attaches directly to a printer's parallel port. Management software includes SNMP, Dynamic Host Configuration Protocol (DHCP) and Telnet. The MPS-100 also comes with an external power supply.

Models EPS2-100 and EPS4-100 are priced at $369 and $449, respectively. Model MPS-100 costs $279.

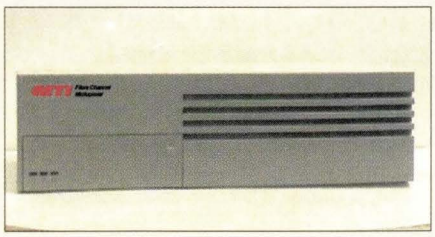
Lantronix
15353 Barranca Pkwy.
Irvine, CA 92618
http://www.lantronix.com
Circle 107

Fibre Channel-to-SCSI Router from MTI

MTI Technology has announced Gladiator Fibre Channel Multiplexer (FCM), a Fibre Channel-to-SCSI router that allows customers to seamlessly attach SCSI-based MTI Gladiator RAID array storage systems to Fibre Channel host systems. FCM allows customers to leverage previous investment in MTI data storage systems by redeploying them in new Fibre Channel installations without having to completely replace existing storage hardware, the company says

FCM provides support for 100-MB/s Fibre Channel. With FCM, MTI RAID arrays–which previously supported two to 16 hosts–can accommodate the storage requirements of up to 30 hosts, allowing for improved management and resource allocation, MTI says.

FCM converts Fibre Channel data to SCSI data and vice versa, the company says. It is transparent to existing applications and does not require special



patches or changes to the host operating system. There are two 100-MB/s Fibre Channel optical media connections, which allow dual redundant loop attachment for improved availability. Four Ultra SCSI ports provide connectivity to the redundant, automatic failover RAID controllers in MTI SCSI-based arrays, MTI says.

FCM supports HP-UX host systems with MTI Gladiator RAID arrays and costs $45,570. Support for Solaris will be available sometime this quarter.

MTI Technology Corp.
4905 E. La Palma Ave.
Anaheim, CA 92807
http://www.mti.com
Circle 108

A Look Ahead

March

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- Interfaces
- Heterogeneity
- Managing for Compatibility

WebServer Supplement: Outsourcing Hosting

April

Sun and the CAD/CAM Market
- Standards and Trends
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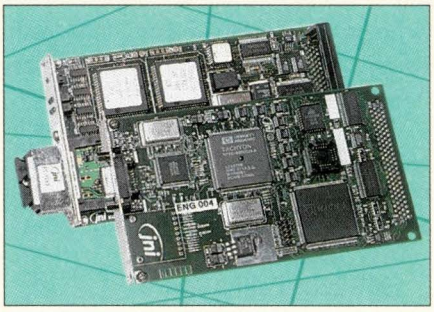
Circle No. 25

SBus-to-Fibre Channel Card

The FibreStar Model FC64-1063-L SBus-to-Fibre Channel adapter from Jaycor Networks is said to enable workstations and file servers to connect to a hub on a local area network (LAN) located up to 10km away. The longwave optical interface of the FibreStar adapter helps solve the LAN equipment connection needs of corporations, universities and other organizations with large networks, Jaycor says.



The adapter's 64-bit processing capability reportedly enables it to maximize the flow of data to and from a CPU, producing a data transfer rate of 1.063 Gb/s. It supports all Fibre Channel connection modes, including Class 1, Class 2, Class 3 and Intermix, and it can handle data over point-to-point, arbitrated loop and switched network topologies.

The adapter comes as a single-slot card that fits into a workstation or file server employing the SBus internal bus architecture, such as Sun Microsystems Inc. SPARC computers, and supports Solaris 2.4-2.6. It costs $4,257.

Jaycor Networks Inc.
9775 Towne Centre Drive
San Diego, CA 92121
http://www.jni.com
Circle 109

VPN Alternative Offers End-to-End Security

For users dissatisfied with the security offered by a virtual private network (VPN), J.River has announced ICE.PPN, a portable private networking product that secures data transmitted over the Internet from end-to-end, not just from the client to the firewall as is the case with VPNs, the company says. ICE.PPN is targeted at remote offices and "road warriors" that connect to the network via a laptop.

ICE.PPN relies on Secure Sockets Layer (SSL) with triple DES encryption to secure data transmitted to and from UNIX and NT servers. Telnet logins and passwords are fully encrypted to avoid being uncovered by a sniffer. Digital certificates authenticate the server. Nevertheless, ICE.PPN remains easy to configure and use, the company says.

On the server, ICE.PPN supports Solaris, AIX, Linux, SCO UNIX and UnixWare. Supported clients include Windows 95/98/NT on a recommended 100-MHz Pentium with 16 MB of RAM and 3 MB of free hard disk space. Pricing for a single server license with five clients is $1,195.

J.River Inc.
125 N. First St.
Minneapolis, MN 55401
http://www.jriver.com
Circle 110

Hitachi Unveils Storage Subsystem

Hitachi Data Systems has announced the Hitachi Freedom Storage 5800 for use with clustered servers in UNIX, Windows NT and NetWare environments. Designed for use in storage area networks (SANs), the Freedom 5800 provides a single point of management via the Hitachi Storage Central suite of customizable software. It also supports SNMP for enabling configuration and management of multiple networked systems and applications from a single point of control.

Freedom Storage 5800 is available in both rack-mount and cabinet models and can be configured to provide more than 1 TB of storage space and up to 4 GB of cache memory. Equipped with up to four Fibre Channel connections to the host processor, it can also be configured with one to eight Ultra SCSI or Ultra 2 SCSI connections. The product supports RAID 0, 0+1, 1 and 5–all of these RAID levels can be intermixed concurrently within the 5800 subsystem.

Pricing for Freedom Storage 5800 ranges from $45,000 to $140,000, depending on configuration.

Hitachi Data Systems Corp.
750 Central Expressway
Santa Clara, CA 95050
http://www.hds.com
Circle 111

New Drive Boasts Faster Performance

The MegaRam-35/300 solid-state disk drive from Imperial Technology has an Ultra SCSI interface and boasts data transfer rates of 40 MB/s and access times of 0.050 msec. The fast data transfer rate and access time enables the MegaRam-35/300 to process thousands of I/O transactions per second, the company says. Traditional disk drives with access times of 10 to 15 msec are limited to I/O rates of 75 per second, according to Imperial. In addition, the MegaRam-35/300 has a memory capacity range of 134 MB to 804 MB for systems that require nonvolatility and up to 2,010 MB for systems that do not require the nonvolatility feature.

Supplied with an 80-pin SCA connector, the unit can be inserted directly into enclosures configured for conventional disks. An adapter module is available for customers who need separate SCSI and power connectors.

The MegaRam-35/300 also comes with Imperial's error detection and correction system, which can correct errors as large as six bytes without data loss or interrupting system performance. The operator is notified of any errors and the details are stored in a nonvolatile register for later analysis. This is said to enhance system availability because corrective action can be delayed so it doesn't interrupt system operation.

Pricing for the MegaRam-35/300 varies depending on configuration. A typical entry-level 268-MB drive with nonvolatile memory costs $10,700 (end-user price), while a 268-MB drive with volatile memory is priced at $8,700.

Imperial Technology Inc.
2305 Utah Ave.
El Segundo, CA 90245
http://www.imperialtech.com
Circle 112

High-Performance File System

For users of Programmed Logic's High Throughput File System (HTFS) on Solaris or on its own StackOS storage-centric operating system, the company has announced a new High-Performance Computing Access Method (HPC AM), which optimizes throughput for gigabyte- and terabyte-size files on 64-bit systems. In particular, HPC AM is useful in applications such as video, medical imaging and energy management, the company says.

HPC AM works by eliminating metadata bottlenecks. That is, HPC AM stores user data within a large file seperately from metadata and other small, frequently accessed system files. HPC AM can then choose the most appropriate access method for the kind of file it is opening. A traditional file system, on the other hand, stores both types of data on the same device, which, Programmed Logic says, can lead to read/write contention between user and system files. In an HPC environment, data is stored on a RAID 5 device. HPC AM maximizes throughput by matching user data block sizes to the dimension of the RAID 5 stripe, guaranteeing alignment and enhancing RAID 5 performance, the company says.

HTFS with HPC AM access is available on hardware devices that run the company's StackOS operating system, as well as on Solaris, where HTFS mounts as an additional file system. HTFS with HPC AM is priced at $4,995 for Solaris.

Programmed Logic Corp.
4041 Hadley Road, Bldg. S
S. Plainfield, NJ 07080
http://www.plc.com
Circle 113

Correction

In "Upgrades, Enhancements, Additions...," December 1998, Page 72. The correct name of Box Hill Systems Corp.'s product should be "SAN Spanning," not SAN Spamming.

Upgrades, Enhancements, Additions...

■ Empress Software has introduced a C++ interface for Empress RDBMS Version 8.10, the company's database application development software. The new interface is capable of calling kernel-level `mr` and `mx` routines from C++ programs to perform high-speed Empress database manipulations, the company says. In addition, programmers can use C++ and Empress RDBMS to store information as objects. Pricing starts at $180 (the product is designed to work in conjunction with the Empress RDBMS). Pricing for Empress RDBMS starts at $1,000 for a standard toolkit, which includes Empress RDBMS, Empress Connectivity (ODBC server), Empress Hypermedia (Internet application development toolkit) and Empress Dynamic SQL. The Empress C++ interface runs on SunOS, Solaris, AIX, Digital UNIX, HP-UX, IRIX, Linux, SCO OpenServer, UNICOS and Windows 95/98/NT. **Empress Software Inc.**, 6401 Golden Triangle Drive, Greenbelt, MD 20770, *http://www.empress.com.* **Circle 114**

■ FullTime Software's FullTime Cluster 4.1 for Solaris and FullTime Cluster 4.1 for Windows NT are software packages that enable the management of cross-platform clusters from a single interface using a single configuration image that is replicated across the cluster, the company says. This latest version reportedly allows customers to group servers running on Solaris 2.5.1 or 2.6 and Windows NT 4.0 Service Pack 3 together in the same cluster. A new central management console allows customers to manage their FullTime domain from a central point, regardless of whether the servers are running on UNIX or Windows NT. Pricing for FullTime Cluster 4.1 starts at $15,000 for a Solaris two-node cluster configuration and at $6,000 for a Windows NT two-node cluster configuration. **FullTime Software Inc.**, 177 Bovet Road, 2nd Floor, San Mateo, CA 94402, *http://www.fullsw.com.* **Circle 115**

■ The Rhapsody 2.0 visual programming environment from I-Logix is said to provide full lifecycle support for the rapid turnaround of embedded real-time software. Version 2.0 allows users to import legacy code, reducing development time by allowing developers to reuse code. It also includes support for architectural, mechanical and detailed design patterns outlined in the book, *Real-Time UML: Developing Efficient Objects for Embedded Systems* by Dr. Bruce Powel (published by Addison-Wesley Publishing Co., 1998, ISBN 0-201-32579-9). The patterns, which solve common design problems associated with embedded real-time design, offer reusable components that designers can use to further compress code development time, the company says. Rhapsody 2.0 costs $10,000 and runs on Windows NT 4.0. **I-Logix Inc.**, 3 Riverside Drive, Andover, MA 01810, *http://www.ilogix.com.* **Circle 116**

■ Control Data Systems has announced a new version of its X.500 directory, Global Directory 2000, or GD2000. GD2000 includes a new embedded Lightweight Directory Access Protocol (LDAP) Version 3 server. Access to the LDAP server is secured with Secure Sockets Layer (SSL) encryption, which is also used to provide secure access to meta connector pipelines, other meta directories and the new administration application, Global User Administration 2000, the company says. GD2000 runs on Solaris, AIX, HP-UX and Windows NT and costs $2,500 per server, plus $0.25 to $1 per seat (depending on volume). **Control Data Systems Inc.**, 4201 Lexington Ave. N., Arden Hills, MN 55126, *http://www.cdc.com.* **Circle 117**

■ Spectra Logic's Spectra 10000 line of Advanced Intelligent Tape (AIT) tape libraries now offers a fully integrated Fibre Channel connection that allows users to take advantage of network-attached storage and emerging storage area network (SAN) technologies, the company says. Spectra 10000F is reportedly the first AIT tape library to integrate a Fibre Channel-to-SCSI bridge directly into the tape library design. Fibre Channel technology provides transfer rates up to 100 MB/s and allows extended cabling distances up to 10km. Spectra 10000F can be used in UNIX and Windows NT environments. A new unit costs between $22,170 and $41,970. **Spectra Logic Corp.**, 1700 N. 55th St., Boulder, CO 80301,*http://www.spectralogic.com.* **Circle 118**

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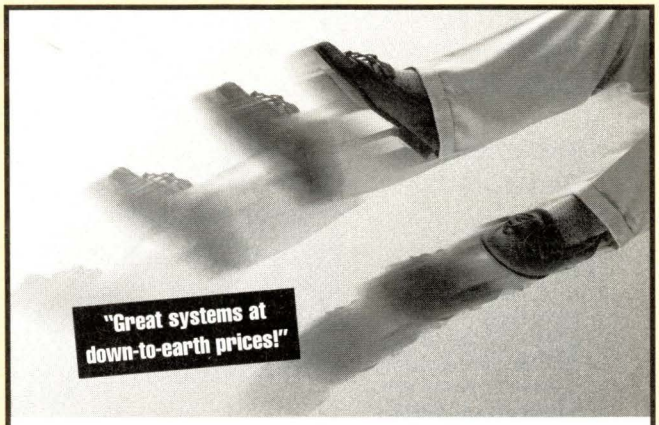

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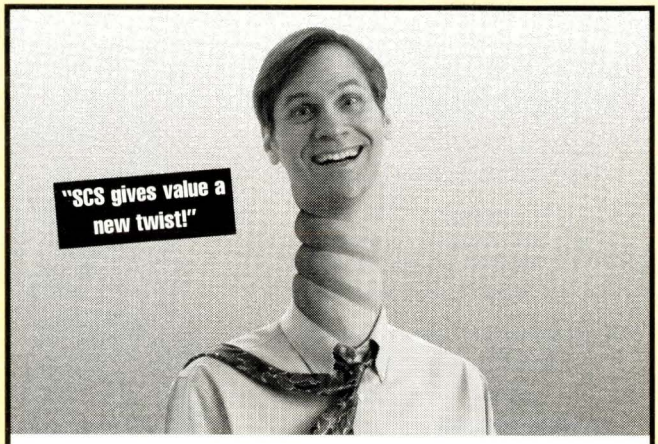

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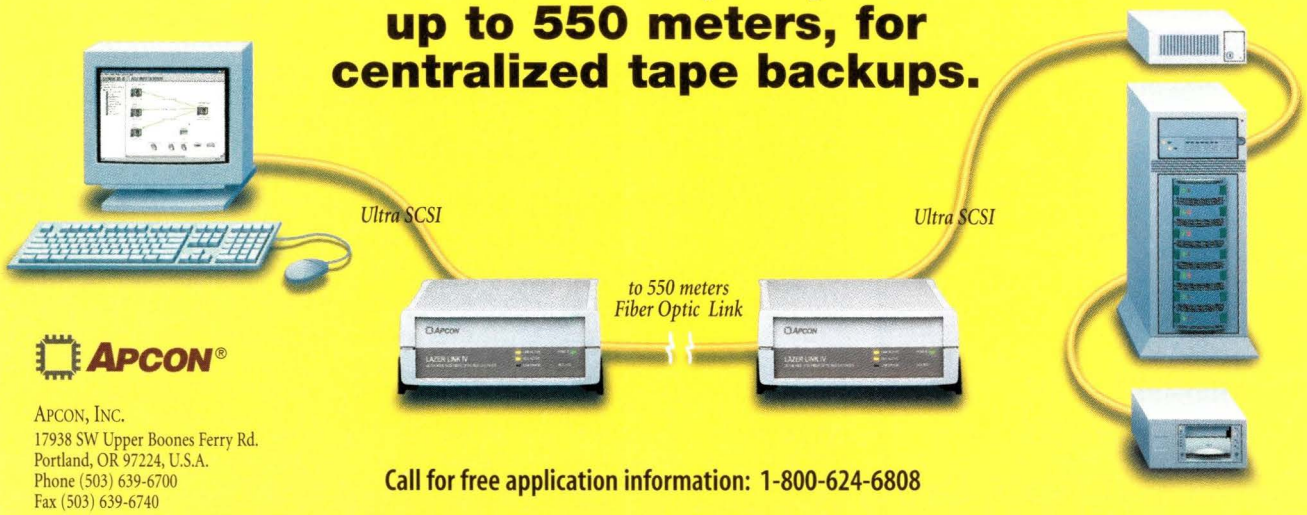

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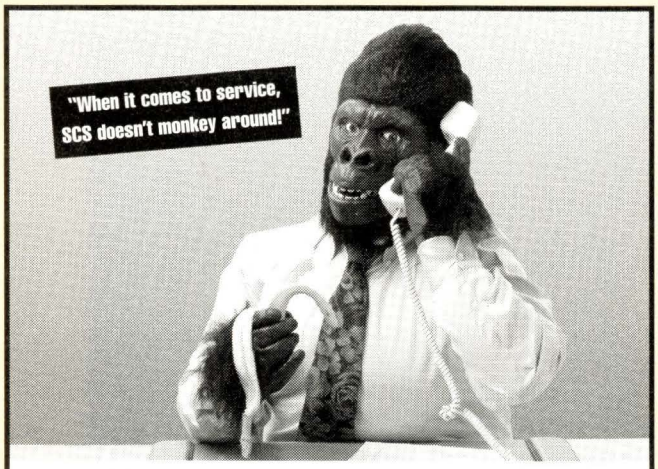
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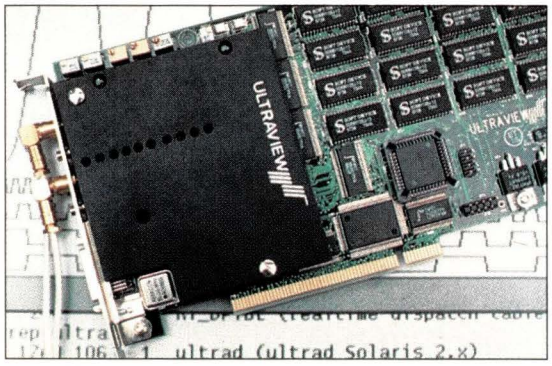

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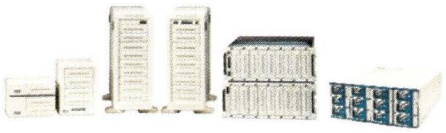

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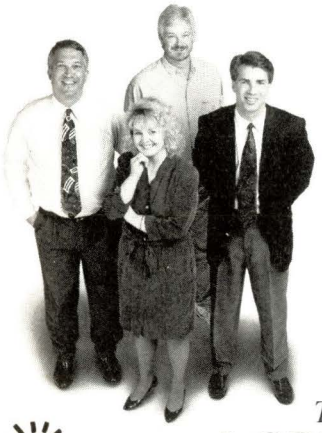

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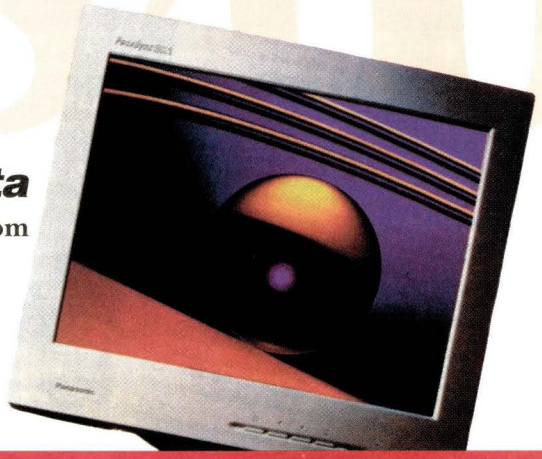

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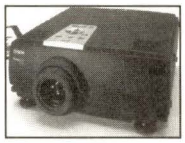

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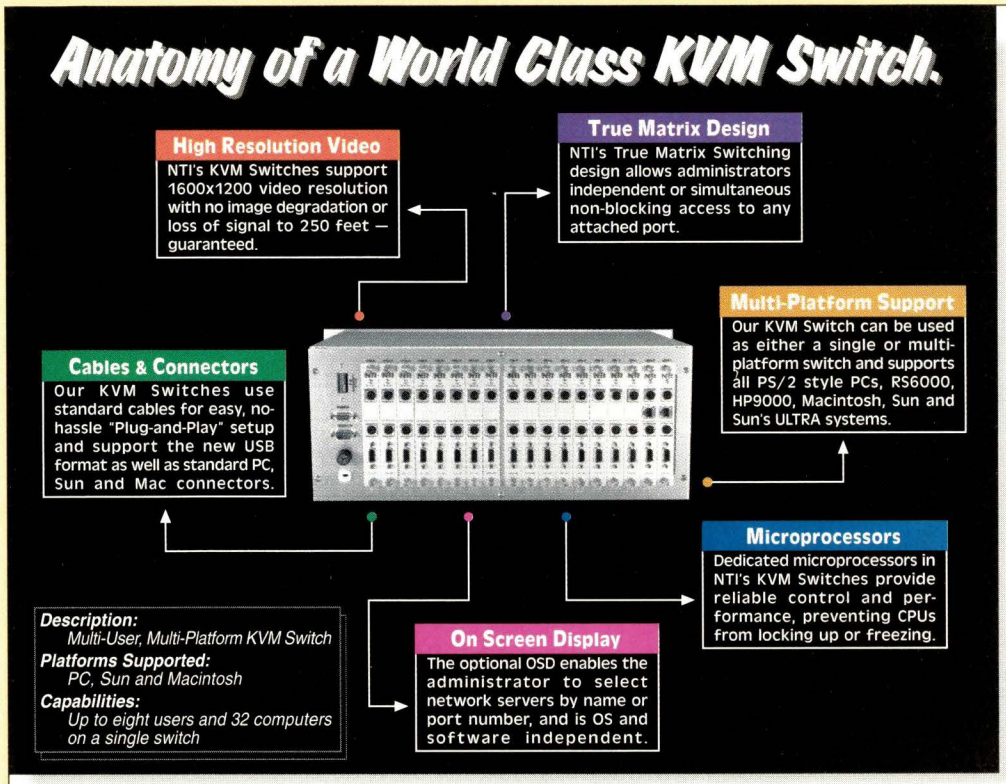

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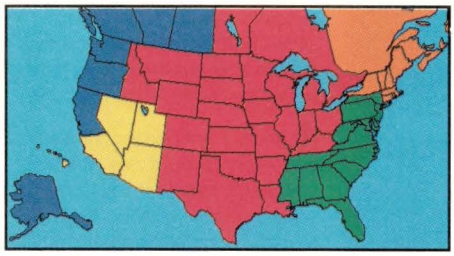

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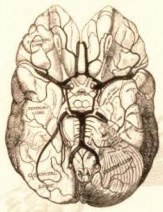

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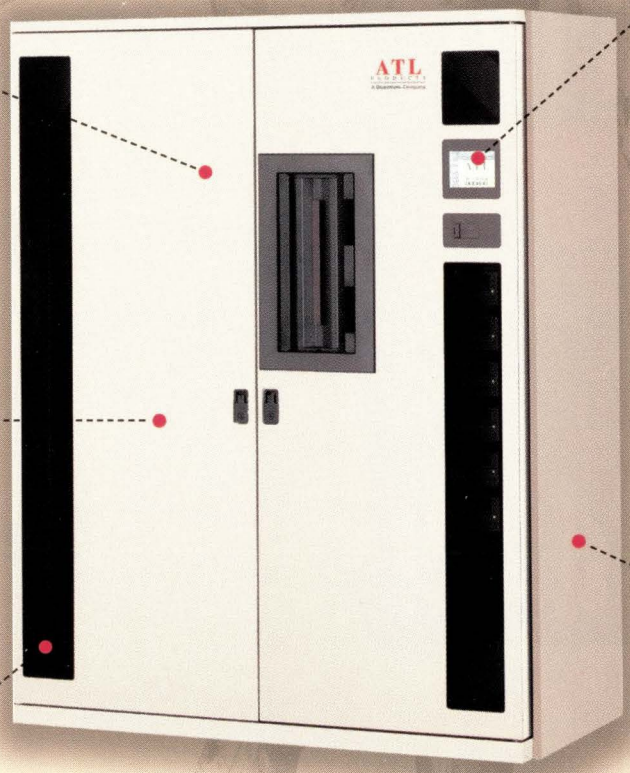
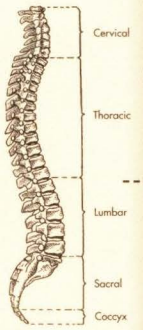


III. The Skeleton –*The human body has two arms and two legs. The P3000 delivers the same high availability (HA) design with redundant AC cords, power supplies and fans. Plus, the power supplies, fans and DLTtape drives can be hot-swapped.*

VII. The Spine – *The backbone of the P3000's design is a PCI expansion bus supporting SCSI interface, Fibre Channel, tape array and server PCI cards –"future proofing" your library with a modular upgrade path.*



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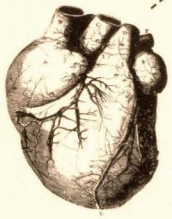

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