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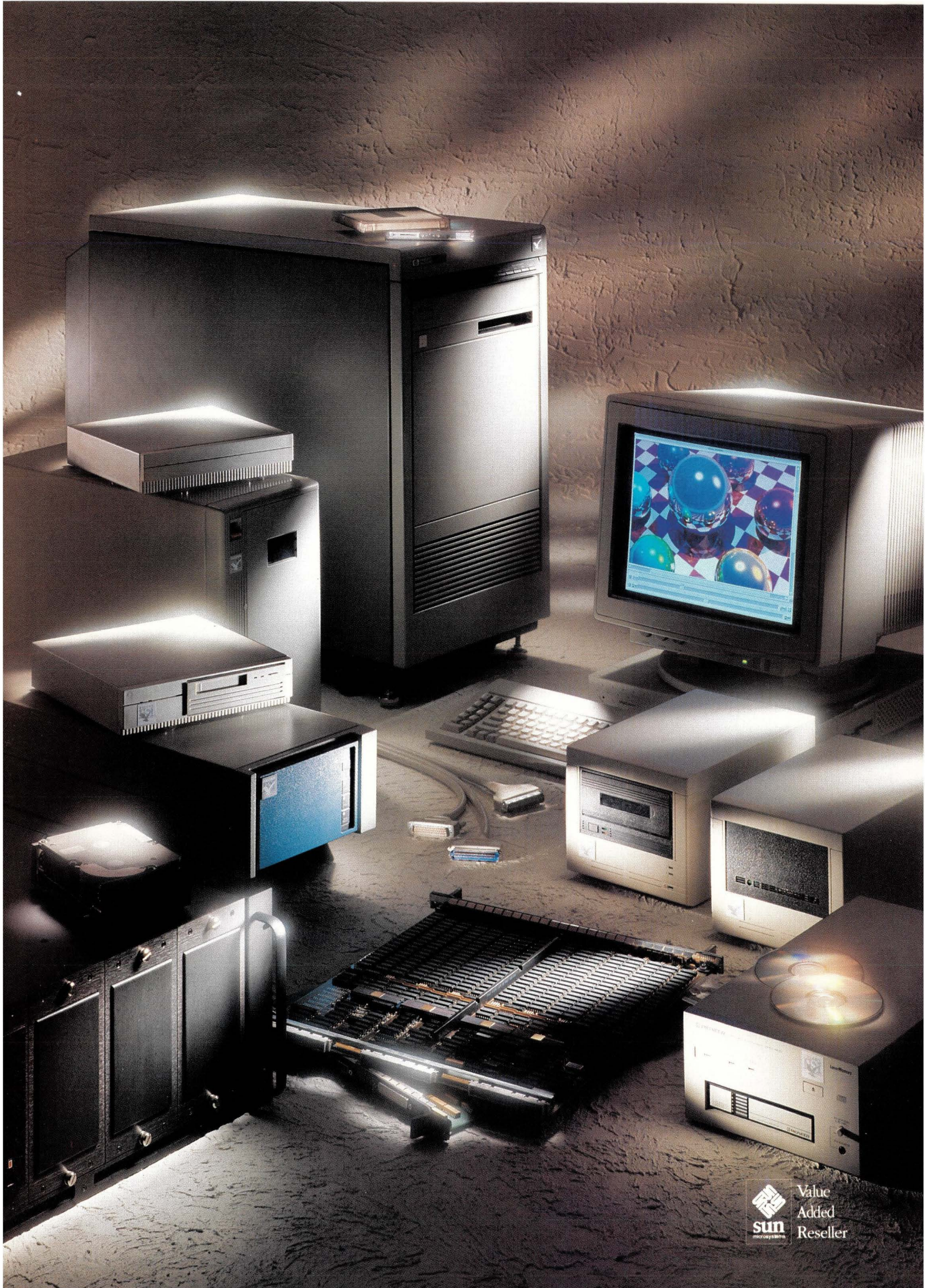
FEBRUARY 1993 Vol. 4 No. 2 \$5.50

Maintenance
Memo



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Reviews: Opti/Max, MultiModems



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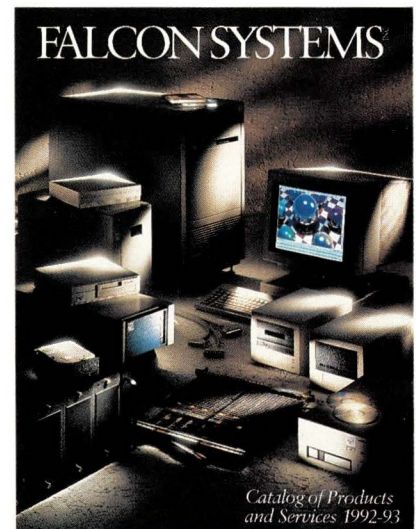
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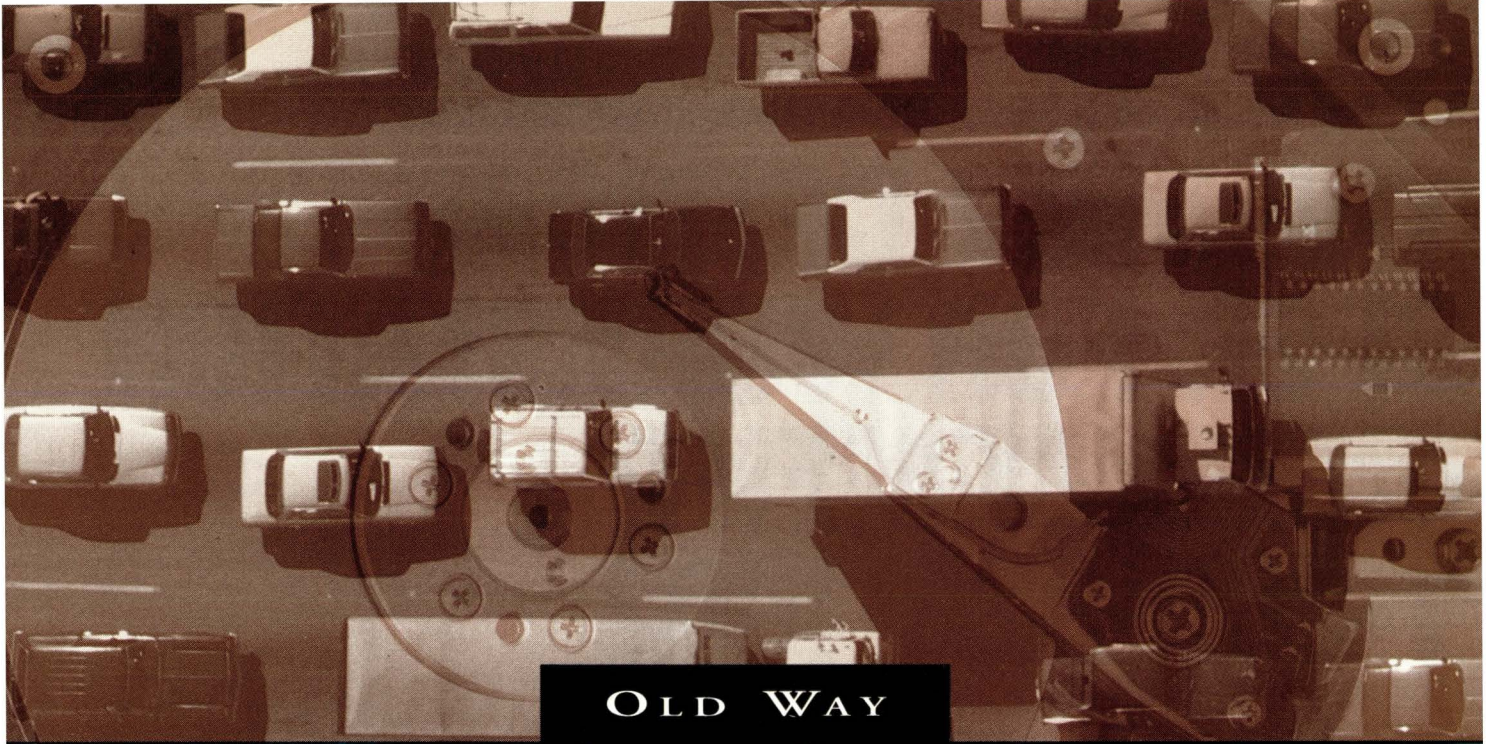


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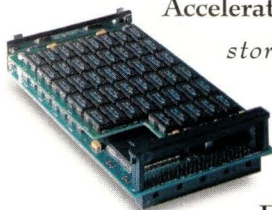


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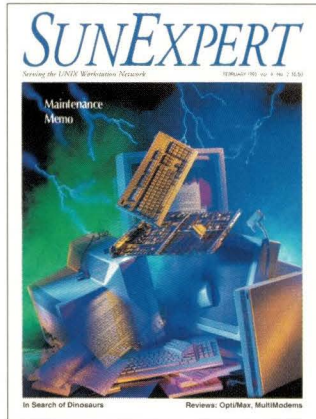
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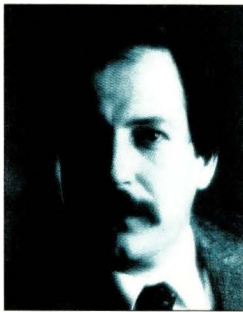
serves the UNIX workstation environment, emphasizing Sun, SPARC and Sun-compatible systems.

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Editorial

Maintenance Mayhem

In this month's cover story, the further adventures of Our Fearless Reporter take us into the thicket of maintenance. His workstation "started doing a fairly decent impression of an English Muffin in mid-



crisp," as he explains, right in the middle of our production cycle. This time he "burned out the fan, crashed the net, found out that the necessary replacement parts aren't available any more, wasted whole days of our system administrator's time, and generally reduced the office to mild to middlin' havoc for the greater part of a week." The memo that is our story mixes the details of Fearless Reporter's misadventure with insights into the maintenance industry as it tries to cope

with users in transition. In essence, he tries to hit a moving target from a moving platform. FR says, "As a result of these changes in the service customer, service providers are themselves undergoing a radical and rapid evolution. They are, in some cases, pursuing entirely new business models, some of which are exotic in the extreme." But you'll see those outlined as you read.

Also this month, Paul Kamp of Pacer Software gives us a tour of DAL, short for Data Access Language. Distributed as part of Apple's System 7 software, DAL—an SQL dialect—represents one effort to bring corporate data to the desktop without the hassles of rekeying or format translations. It also signals the growth of UNIX and the client/server paradigm in mainstream computing. The story outlines DAL's key technical features and briefly discusses how workstation users might benefit from its use.

Reviews this month, "Data with Legs," include a V.32bis modem from a well-known name and an unusual read/write magneto-optical disk drive with very impressive vital statistics.

And from the unusual file, "Dinosaurs Have Their Day in the Sun" illustrates how a group of vendor volunteers can join forces to bring new technologies to bear on very old problems. As part of a joint project involving the Children's Hospital of San Diego and the Natural History Museum of San Diego, the group devised a clever way to use CAT scans to peer inside dinosaur eggs.

Doug Pryor

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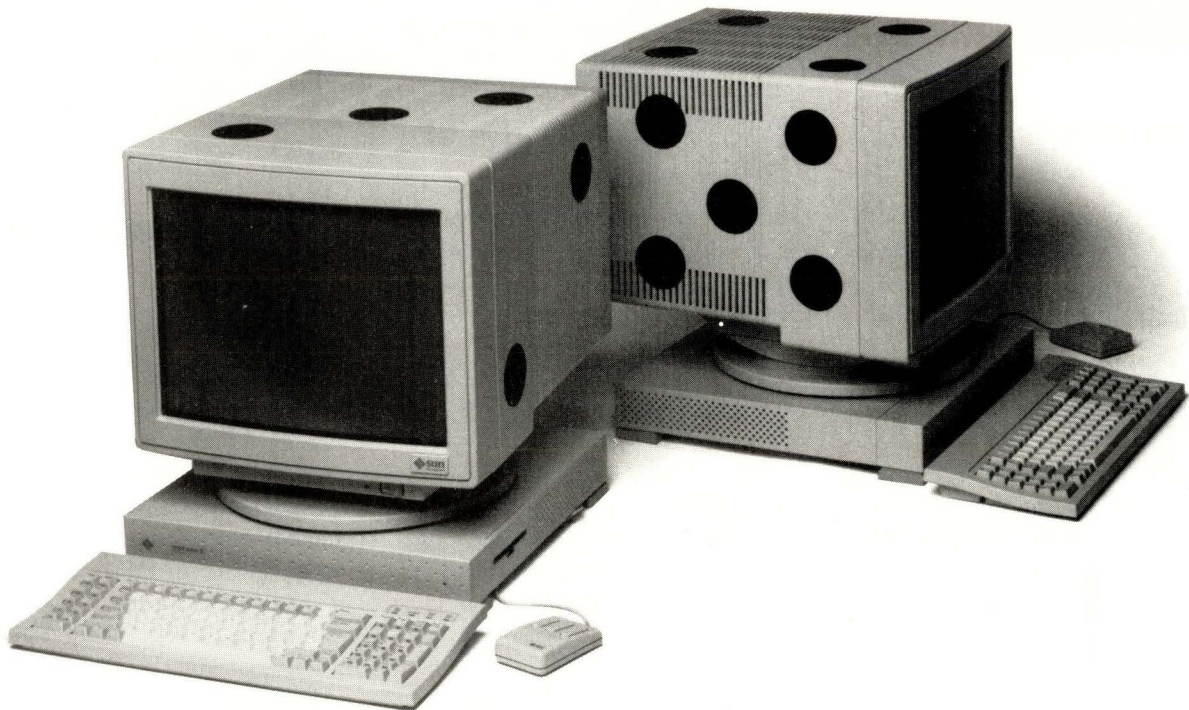
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LETTERS

"Letters to the Editor" may be edited to conform to SUNEXPERT style-guide and space requirements. The views expressed are those of the author and not necessarily those of SUNEXPERT

For the Record

Dear Editor:

I'd like to correct an inaccurate statement that was attributed to me in the article "The Real (Low-end) Thing" (*SunExpert*, December 1992, Page 6).

The article indicated that Sun Microsystems Computer Corp. plans to remove the SPARCstations ELC, IPC and IPX from its price list by May 1993. In fact, Sun currently has no plan to do this. SMCC will offer these products as long as there continues to be adequate customer demand.

Jeff McFadden
Director of Desktop Systems
Sun Microsystems Computer Corp.

Awkward awk

Dear Editor:

I read with interest the article in the December 1992 issue, "Space Police." The `awk` filter in Listing 3, Page 48, is in error. Since I'm no expert at `awk`, I can't figure out how to make the darn thing work. I know that typesetting listings can be a problem, but I hope you can assure that the listings presented, however small, are accurate as published.

I like the magazine and look forward to each issue. I find that most every issue has something of interest to me in it. Keep up the good work.

Ted Frohling
uunet!opus.telcom.arizona.edu!tsf

Doug Pryor replies:

Thanks for the feedback. If you remove the # before the BEGIN in the second line, the script will work. Sorry for the inconvenience.

What's in a Nameserver?

Dear Mr. Protocol:

Thanks again for the `traceroute` info (*SunExpert*, December 1992, Page 22). One last question if you don't mind: My SPARCstation doesn't seem to have a nameserver running, hence if I try `traceroute` to a node beyond my known gateway (which is `gw1`), it doesn't know about it. This isn't surprising. I found that I can send mail through this gateway by using the form `@gw1:xxx.xx.x.xx`. The question is, is there something similar that I can do to tell `traceroute` to use `gw1` to reconcile the destination name?

Carl H. Miller
millerc@v3.hanscom.af.mil

Mr. P replies:

Unfortunately, no. That's because the name-to-address lookup taking place in your gateway happens at the SMTP level, which is a much higher level than that used by traceroute. traceroute generates raw ICMP packets, which exist at the IP level. There isn't even a place in such a packet for a name as opposed to an address. In your mail messages, the gateway is actually the receiver of the mail; it then takes the "To:" field apart and figures out where the mail should be forwarded to, and repackages it and sends it off. This is handled by mail application software, not by the low-level net software used by traceroute.

Mike O'B for Mr. P:

That will be two cookies, please.

A Real Complaint

Dear Peter Collinson:

Finally got around to reading your column on `find` (*SunExpert*, October 1992, Page 26). You say that `find` is criticized as having idiosyncratic and cranky syntax. Well, maybe; as a programmer, I am not completely deterred by that.

On the other hand, when I tried some of the examples in your column on my IPC, I discovered something to

really complain about. `find` is SLOWWWWWW!

How come you didn't mention this in your column?

Max.Stern@TorreyPinesCA.ncr.com

Peter Collinson replies:

Well, I took it for granted that searching a file system is limited by disk speed. I probably shouldn't have.

Tracking Down traceroute

Dear Mr. P:

Regarding your column "How Wide is Round" in the December 1992 *SunExpert* issue [Page 22]:

I found this column a real delight, starting with the clever `traceroute` program. It always strikes me that cleverness and knowledge of the "nuts and bolts" are no less valuable on our mega-host Internet than they were back in ancient history when we old folks started learning about instruction sets and assembly language. `traceroute` is clever.

With regard to the question you mentioned at the end of the column (how many hops will be needed to traverse a future Internet)... You see, Mr. P, the wide divergence of opinion is due to a kind of fuzziness between pure routing and the naming and/or physical hierarchy of the network. It is absurd to think of a network with more than 100 "hierarchical" hops, even if our toasters start sending packets to electric generating plants. For naming purposes, even 10 layers is probably enough (until we need domains beyond the solar system!). But for IP hops as they exist presently, I would have to agree that expanding a couple of orders of magnitude beyond the 20 or so that you have demonstrated in the column is prudent. In the IP, a hop is a hop is a hop. It is just silliness to speak of "hippitys."

Harry Forbes
uunet!sentry.foxboro.com!hforbes

P.S. You will load the archie servers with finding `traceroute` if you don't mention where it is in your column!

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Mike O'B for Mr. P:

Well, if it isn't in /usr/etc already, a quick bout with "archie" reveals

Host ftp.uu.net

Location: /systems/unix/bsd-sources/usr.sbin

Thorough, Fair

Dear Editor:

Please express my compliments to Michael Jay Tucker for his story "i860-based Accelerators," (*SunExpert*, August 1992, Page 61). The article was interesting to me in my professional role, and I find it timely to the work I am presently doing.

May I also express a well-intentioned criticism? While the article did not pretend to be a comprehensive survey of the SPARC-coupled i860 market, it does have an omission that I consider noteworthy. The Cray Research Superserver product is a SPARC platform with a tightly coupled i860 applications accelerator. For the sake of completeness, I think that the article might have reviewed it as representing

the "high end" of the SPARC-plus i860 spectrum.

Steve Stringer

sfs@alamos.cray.com

Mr. Protocol Goofs!

Dear Editor:

In *SunExpert* (September 1992, Page 6) in the Letters section, there is a letter titled "Nonunique Ethernet." Mike O'B replies for Mr. P that changing the Ethernet address is not something that should be done and says: "If DEC does allow this, Mr. Protocol would love to know why."

The response to Sean Murphy implies that changing the Ethernet address is something that isn't done.

This is far from the case. The DECnet protocol stack is one major reason for changing an Ethernet address. True, the factory-assigned address can't be changed (as Mr P. mentioned, this is burned into a ROM chip or equivalent). However, the station address (the address that the Ethernet hardware uses for receipt

of direct cast messages) can be changed on most all vendors' platforms. Sometimes, it's a requirement that the system be rebooted before the change can take effect. This is true of the IBM RS/6000 AIX operating system. Other systems, such as Sun SunOS and SGI IRIX, let you change the station address at any time.

In the case of DECnet, the address must be changed to a value of the form AA-00-04-00-xx-zz. This is a requirement of the DECnet Phase IV specification. True, changing the address can cause some confusion on a network. Many vendor systems, however, can deal with this just fine. For those systems that have problems, having the node that changed its address do a ping to the network broadcast address is usually enough to keep TCP/IP working. A similar function may also be required for other protocol stacks. As a vendor of DEC protocol stacks (DECnet, LAT, MOP, LAST, LAD) for non-DEC systems on most UNIX platforms (Sun, SGI, IBM RS/6000, HP

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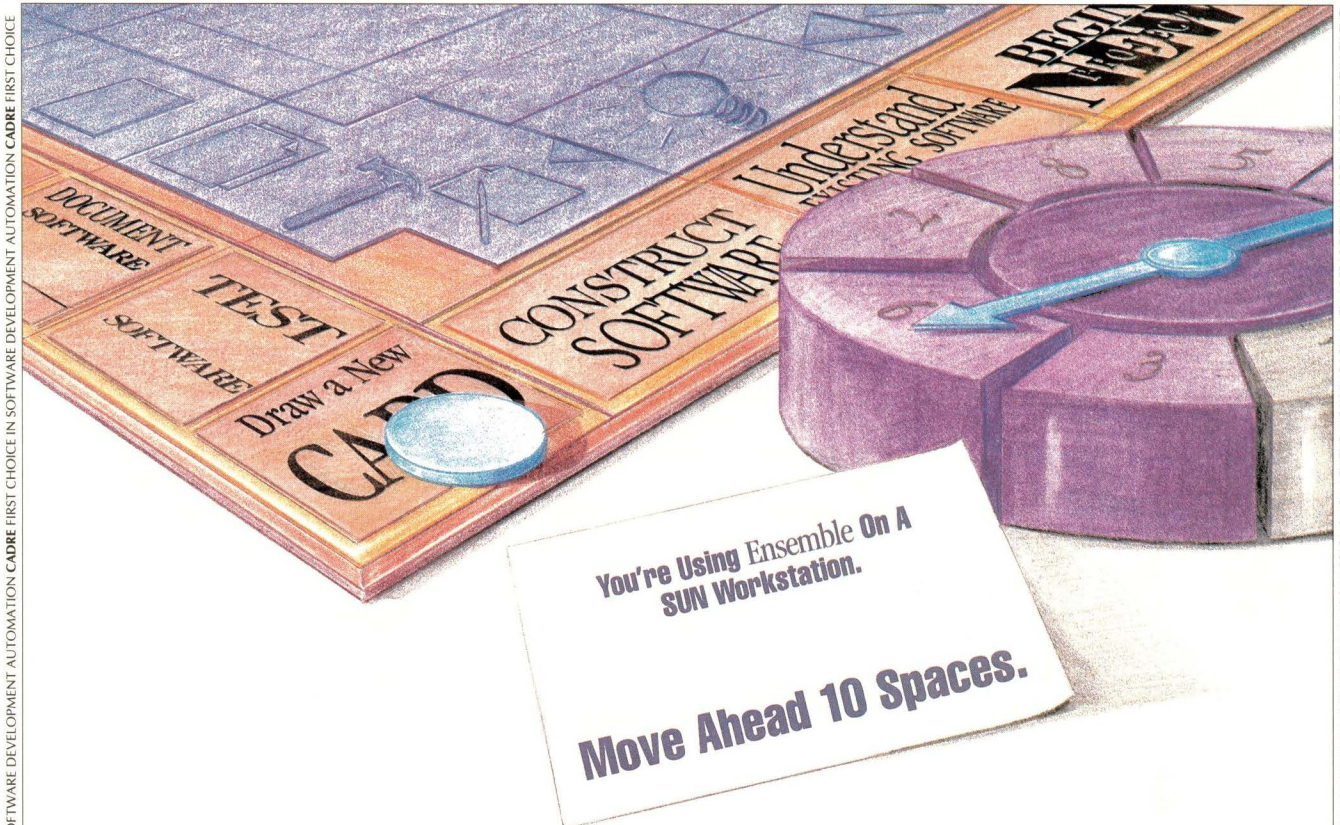


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9000/[300, 400, 700, 800], Encore 88K, Encore Multimax, MIPS, Motorola, AT&T, SCO, Aviiion and many others), we know for a fact that this capability is possible.

I agree that the requirement of DECnet to do this change is both a) silly, and b) dangerous. It is not, however, useless. A common mistake that occurs in a DECnet network is having two nodes with the same physical Ethernet address. For an experienced DECnet manager, this is easy to recognize and fix.

Dan Watts

uunet!ki!dwatts

Dear Editor:

Ah So! Someone has finally found a small hole in Mr. Protocol's near-total knowledge base.

I don't know about DEC hardware, but the Ethernet addresses of Sun hardware are most definitely "agile." There is a default address in each workstation's ID ROM, and normally all interfaces in the workstation will be set to use this one address, but any interface can be set differently using

ifconfig(8).

I recall some traffic on the sun-managers mailing list about how installing DECnet on a Sun caused its Ethernet address to change from the default (which is, of course, from one of Sun's address blocks) to something in one of DEC's address blocks. (Mr. Protocol will presumably not be surprised to hear that this can cause problems with ARP caching.) I believe the reason had something to do with an implicit assumption in the DECnet addressing scheme that only DEC-addressed equipment would ever use DECnet.

Of course, this is a personal statement. I do not speak for any organization.

Perry Hutchison

uunet!xerox.com!Perry_Hutchison

Culpum, mea maxima Ding-Dong

Mike O'B replies for Mr. P:

An endless (and seemingly never-ending) parade of letters has pointed out that when Mr. Protocol claimed, right out loud in print, that no hardware ever

changed its Ethernet address, he was speaking through his Ding-Dong.

Apparently, DECnet has done this for years. DECnet stations change their Ethernet addresses to correspond to their DECnet station IDs, because DECnet doesn't have ARP or anything like it. Mr. Protocol was appalled and figures this just about justifies his opinion of DECnet. So much for separation of the network layers. If the box you're looking at speaks DECnet, trust no Ethernet address you may see from it.

At least each box, when delivered, does have a unique Ethernet address burned into the hardware. It may decide to change it, but Mr. P cannot be held responsible for any such fall from grace.

In fact, can you imagine how history might have been different if this practice were widespread?

Roman soldier: "Are you Yeshua, a k a Jesus, a k a King of the Jews?"

Man praying in olive garden: "I'm Je... (catches sight of spears), Why, uh, no, I'm Judas Iscariot; that's Jesus over there in those bushes."

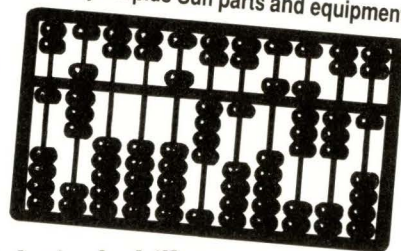
Judas Iscariot: "Wait! Stop! NOOOOOOooooooooo...."

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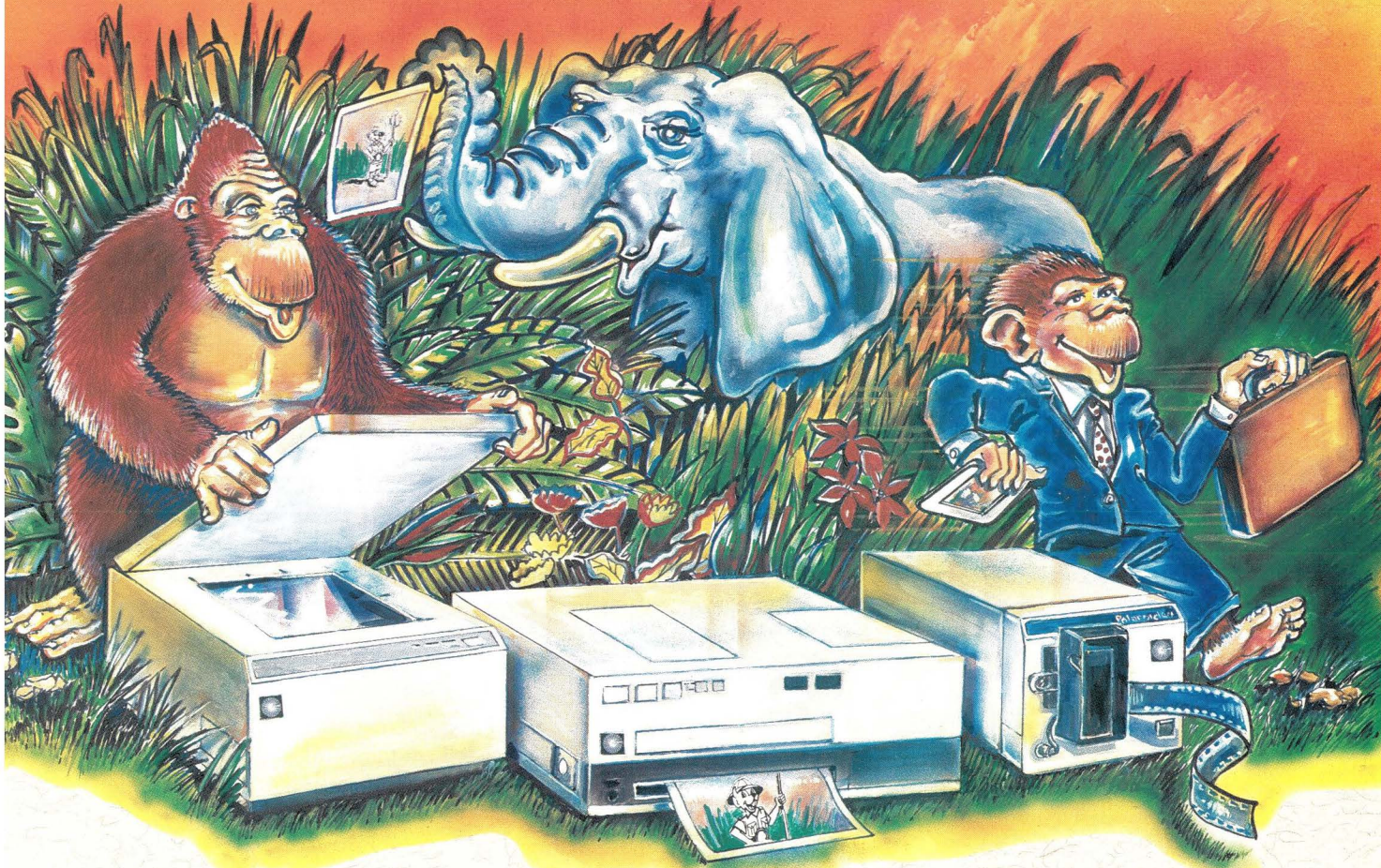


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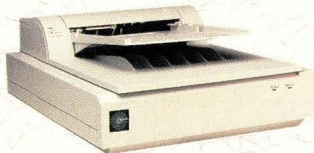


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NEWS

Microsoft, UI Fire New Salvos

Even though delivery of product to end-user customers is still a few months away, the war of the words is already in full swing in the 32-bit desktop operating-system arena. So far, UNIX users have been as curious, if not more so, about Microsoft Corp.'s Windows NT product as they have been about the various desktop UNIX systems.

To counteract NT's mind-share dominance, the UNIX camp is going on the offensive. In December, UNIX International issued a report entitled "Desktop UNIX System V and Microsoft's Windows NT: A Functional Comparison." The materials accompanying the report claim, "It's war! Let's get past Microsoft's hype because NT is less than it seems."

"We want to change the perception that NT and OS/2 are the only systems for high-end desktops," says David Sandal, vice president of UI. "UNIX has been out there for years. It has friendly GUIs [graphical user interfaces] and plenty of apps." Sandal says the fact that there are multiple implementations of desktop UNIX and a handful of desktop UNIX GUIs is a plus for the end users because "it gives them a choice." At the same time, he says, the UNIX vendors are drawing closer together via their adherence to standards, such as the X Window System. "Microsoft has helped coalesce the UNIX community even further," Sandal claims.

The UI report, which the Parsippany, NJ-based UNIX International prepared with UI member Locus Computing Corp., compares NT with

Santa Cruz Operation UNIX/Open Desktop, SunSoft's Solaris 2.0 and Univel's UnixWare, three System V-based UNIX systems that run on Intel X86 platforms. The categories evaluated in the study are heterogeneous platform support, pricing, standards (POSIX and XPG) adherence, application availability, ease of use and administration, networking facilities and graphics capabilities. Not too surprisingly—given the authors of the study—NT is found wanting in almost all of these areas.

Among the most damning of the findings itemized in the report:

- NT lacks multiuser capabilities.
- NT supports POSIX.1 and TCP/IP minimally, at best.
- NT doesn't support X Window System.
- NT fails to support UNIX file sharing (NFS, RFS).
- NT provides no network security facility.
- NT is still more than four months away from delivery to end users and is thus an untried OS with few, if any, applications available for it.

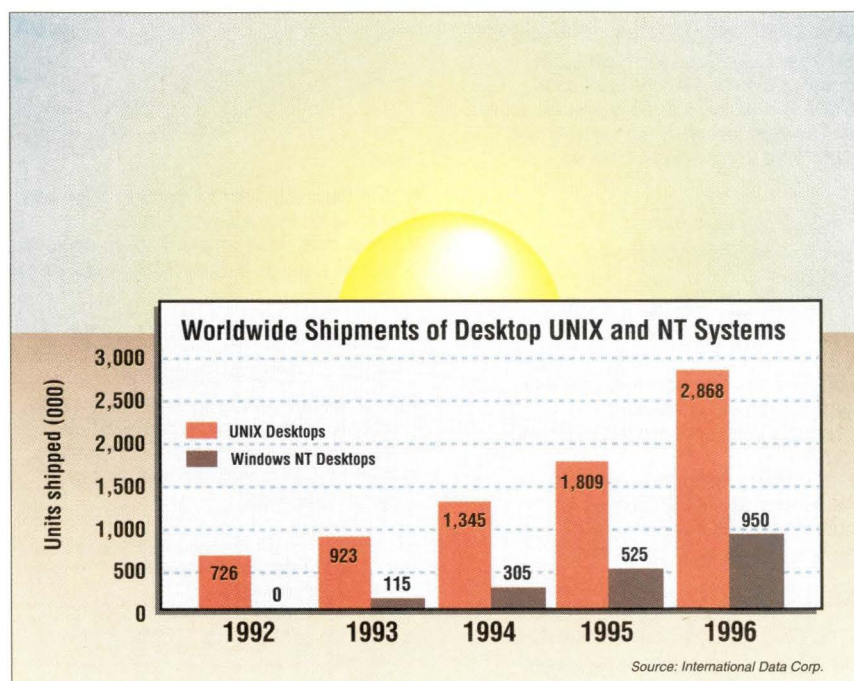
"UI didn't do its homework," counters Rich Barth, Microsoft product manager for Windows NT. Barth points out that UI wrote its report

based on the July 1992 developers' release of NT. The newest beta version, slated to be made available to developers sometime this quarter, is much more robust and delivers many of the previously lacking features, Barth says.

For example, NT comes with TCP/IP support built in, Barth says. "One could argue that we support TCP/IP better than UNIX does, because we support binary Sockets for TCP/IP, rather than source Sockets." Barth also questions UI's and other industry watchers' claims that Microsoft's own LAN Manager will be the only network operating system that NT supports. "We will support [Novell Inc.'s] NetWare fully," he says. "The NetWare Requester for NT from Novell is already available to NT developers." NFS support for NT is likewise a reality today, Barth says, with both SunSelect and FTP Software Inc. having demonstrated NFS running on NT at Comdex/Fall.

Noting that "multiuser means different things to different people," Barth concedes that NT won't offer multiuser capabilities "out of the box"—if multiuser means, "as it does to UI, the ability to hang multiple dumb terminals off of NT." Citrix Systems Inc.

Desktop UNIX will continue to ride roughshod over NT through 1996 in terms of units, but not necessarily in terms of dollars, says IDC.



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will provide multiuser capabilities through an add-on option, Barth says. Barth also acknowledges that Microsoft has no plans to offer X Window System support as part of the NT kernel. Again, Microsoft is expecting third-party providers, among them Digital Equipment Corp. and Hummingbird Communications Ltd., to pick up the slack.

Barth says Microsoft's decision against including features such as X Window support and full Telnet support as integral parts of NT is not without reason. "The world is going client/server," he explains. "Today, X Windows terminals cost more than PCs. Net bandwidth is very valuable. We're supporting the client/server solution" over the server/X terminal

one. And NT does provide the capability of Telnetting from an NT client to a UNIX host, he points out.

Answering the UI report's claim that NT isn't yet up to the task of acting as both a client and server OS, Barth retorts, "NT makes a good client *and* server OS. The hardware distinction between servers and desktops has disappeared. Over the next three to five years, true distributed computing, where there is true load-sharing among clients, will become the reality."

On the topics of security and applications availability, Barth has a bone to pick, too. As of late December, NT was being evaluated by the U.S. government for C2-level security clearance. Because Windows 3.1 applications are 100% binary compatible

with NT—regardless of the platform (Intel, Digital Equipment Corp. or MIPS) on which it is running—NT already is ready to run the more than 5,000 Windows apps, not to mention the 50,000 DOS apps, that exist today, Barth claims.

In spite of all the claims and counter-claims, Microsoft's strategy, at least for the time being, doesn't seem to be to attack the desktop UNIX vendors. Solaris, UnixWare, OpenDesktop and NeXTstep are all "good implementations," Barth says. "But there are too many options." He adds, "I don't think NT and UNIX are on a collision course. I think they're on an interoperability course."—*mjf*

Surveying Sun Server Options

Sun Microsystems Computer Corp. is expanding storage options for its 600MP family and simultaneously cutting system prices. At the same time, SMCC is making way for its new SPARCcenter 2000 products, the first of which aren't due to ship until April, by offering enclosure-exchange and SCSI disk upgrades.

For 600MP customers who want to up their I/O throughput and increase their disk capacity, SMCC is offering a variety of new data-center packages. The 690MP data-center package, for instance, features a 2.1-GB differential SCSI-2 disk option and drops the entry-level system price by 24%. The new 2.1-GB differential SCSI disk pedestal for the 630MP and 670MP increases storage capacity to 41 GB; 690MP disk capacity will be able to be maximized to more than 100 GB (using more than 24 differential SCSI disks and future Solaris 2.X releases). Besides the expansion pedestal and 2.1-GB disk, other new 600MP options include a 10-MB/s differential SCSI-2 adapter, which supports up to six disks per single host adapter, thereby increasing I/O throughput and conserving SBus slots, and a six-disk tray for storage expansion.

SMCC also has announced that it has slashed prices for all packages and models of its SPARCserver 670MP and 690MP by \$10,000.

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A Match Made in Heaven?

At press time, the jury was still out on how Novell Inc.'s intended acquisition of UNIX System Laboratories Inc., the AT&T division charged with developing, marketing and maintaining UNIX System V, would affect UNIX vendors and users. And given the fact that the merger was still awaiting stockholder and regulatory approvals—as well as that it resembled the ill-fated Novell-Lotus Development Corp. marriage a little too closely for comfort—few industry watchers were making wagers on when, how and if the deal would shake out.

But given that AT&T owns approximately 77% of the outstanding shares of USL and Novell owns another 5%, stockholder approval seems to be a sure thing. One of the remaining 11 USL stockholders, Sun Microsystems Inc., issued a public statement regarding its position on the merger. Sun said that Novell's proposal was evidence of the continued momentum and success of UNIX. "It's good for UNIX and bad for other proprietary system vendors and Microsoft Corp.," claimed a Sun spokeswoman. At press time, however, Sun wouldn't say whether it intended to give a formal thumbs up or thumbs down to the merger.

As Sun itself has pointed out, there remain a number of questions about Novell's intentions regarding SVR4. Novell has said it plans to make USL a wholly owned Novell subsidiary and leave it in Summit, NJ. But there was no word on its plans regarding royalty rates, source-code access, publication of interfaces and APIs and numerous other points of interest to UNIX licensors and licensees. Will Univel, the Novell-USL desktop-UNIX joint venture, have an unfair leg up on other desktop UNIX competitors? How will the merger affect the ongoing USL vs. Berkeley Systems Development Inc. lawsuit? What will Novell do to maintain and/or enhance Open Look, the GUI for which Sun gave it marketing and development rights a few years ago?

At least one other party, USL's sister organization UNIX International, claimed to be in favor of the merger. "We expect we will still deal with USL by providing product requirements and maintaining the evolution of System V through our members," said UI Vice President David Sandal. "We think the move strengthens the UNIX industry."

Indeed, more than one industry watcher has noted that one of the biggest, if not the primary, benefits of a USL-Novell merger will be the creation of the first, credible, storm breaker against Microsoft and the NT wave. This reason alone could quiet much of the unrest created by the pending deal.—*mjf*

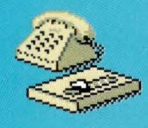
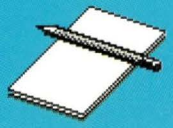
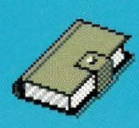
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already champing at the bit for the newest technology, SMCC has announced upgrade paths to the forthcoming SPARCcenter 2000 products. Upgrades will be available at the same time as the SPARCcenter 2000 systems, beginning in April.

Enclosure exchange upgrades are available from the SPARCserver 690MP, SPARCserver 490 and SPARCserver 390 rack servers. And disk upgrades from IPI to differential SCSI-2 are available for all SPARCcenter 2000 customers. (It's important to note that IPI drives are not supported on the SPARCcenter 2000; SPARCserver 690MP, 490 and 390 memory is not supported on the SPARCcenter 2000; and some SBus cards that work with the 690MP won't work with the 2000.)

Customers with 690MP Model 41 systems can migrate their SM41 modules to the SPARCcenter 2000. And customers with 600MP Models 120 and 140 can upgrade them at "no penalty" prices to SM41 modules and use the SM41 modules in their SPARCcenter 2000s. "No penalty" means customers can buy a SPARCserver 600MP Model 120 or 140 machine now and upgrade later to a Model 41 for the same price they would have paid for the 41. —*mjf*

Desktop Developments

On the desktop, Sun Microsystems Computer Corp. has slashed SPARCstation IPX prices by up to 13%, made a promotional model a permanent part of its SPARCstation 10 family and rolled out two new single-board computers. Meanwhile, the SS10 Model 41 will begin shipping in volume next month. The 52 and 54 won't be available in volume until "shortly after March," according to a SMCC spokesperson.

Now, a color IPX, configured with a 424-MB internal disk, 16 MB of memory and a 16-inch monitor, is available for \$8,995, rather than \$10,295. A premium 16-inch color monitor version is priced at \$9,995. The 19-inch color monitor version can be had for \$10,995, and a 19-inch monochrome monitor for \$8,995.

SMCC also has opted to make the

SPARCstation 10 Model 20 a permanent part of its SS10 line due to the machine's popularity. Originally, SMCC was making the 33-MHz Model 20 available as a stopgap solution to customers who had ordered the SS10 Model 41 but couldn't wait for chip supplier Texas Instruments Inc. to remedy its 40-MHz SuperSPARC yield problems, which were delaying system shipments. Sun had intended to end Model 20 shipments as of September 30, 1992 (see *SunExpert*, December 1992, Page 8).

The uniprocessor Model 20 delivers 41 SPECint92 and 44 SPECfp92. The standard configuration includes 32 MB of memory, a 424-MB internal drive and GX graphics. Monitor options include 19-inch gray scale, 19-inch color and 16-inch color. The price for a fully configured gray-scale system is \$16,495. The Model 41 upgrade is \$6,500.

At the board level, SMCC unveiled two new systems, the SPARCclassic engine and the SPARCengine LX.

According to Sun, the SPARCclassic engine offers twice the performance at less than half the price of SMCC's lowest cost SPARCengine board.

The SPARCclassic engine, like the SPARCclassic workstation it powers, clocks at 59.1 MIPS. It features the 50-MHz microSPARC processor, up to 96 MB of on-board memory, Ethernet and 10-MB/s SCSI. The SPARCengine LX, also based on the 50-MHz microSPARC, features 16-bit audio, ISDN connectivity and GX/GXplus 2D/3D graphics.

Both boards are available from Sun direct sales and various Sun resellers and master resellers. The SPARCclassic engine is priced at \$3,100 and the SPARCengine LX at \$4,250. —*mjf*

An Even More PC Sun

Continuing its push into the PC networking space, Sun Microsystems Inc. has merged its Sitka Corp. subsidiary with its SunSelect operations. The new combined business, which will carry the SunSelect name, will be based at

SunSelect's New Lineup

Cross-Platform, Peer-to-Peer Networking

Sitka 10NET 5.0 – provides peer-to-peer networking for DOS and Windows users.

NetPrint Sun 1.0 – gives Sun, Mac and PC users access to NeWSprint and PostScript print services.

SunTOPS 3.0 – enables resource sharing among Suns, Macs and PCs on a SitkaTOPS network.

MacTOPS 3.1 – supplies Mac users with connectivity and file/printer sharing on mixed networks.

DosTOPS 3.0 – supplies PC users with connectivity and file/printer sharing on mixed networks.

Mobile Computing

PenTOPS 1.0 – links pen-based systems to PCs, Macs and Suns.

PenCentral 1.0 – links multiple pen tablets to PCs and LANs via serial or parallel ports, or modems.

Open, Client/Server Networking

PC-NFS 4.0 family – provides PCs users with UNIX system connectivity, enhanced terminal emulation, email and other advanced capabilities.

NetWare SunLink 1.0 – links NetWare LAN users with SPARC/Solaris systems.

Emulation

SunPC 3.0 and Acceleration family – lets users run Microsoft Windows and DOS applications on SPARC workstations.

Source: SunSelect

nSelect headquarters in Chelmsford, MA, and be managed by Carl Ledbetter, general manager of nSelect.

The Sitka line provides cross-platform, peer-to-peer networking solutions for mobile and pen-based systems. SunSelect offers solutions for integrating PCs into UNIX networks. Sitka's specialty is Mac and PC connectivity," Ledbetter says. "Sun is very interested in this area. We expect the merger to result in Sitka's getting TCP/IP solutions out the door faster." Deborah Triant, the former president and CEO of Sitka, says the merger came in direct response to recent moves by Novell Inc. and Microsoft Corp. Last year, Novell unveiled NetWare Lite, a peer-to-peer, low-end version of its NetWare product, and Microsoft rolled out Windows for Workgroups, which consists of LAN Manager bundled with Microsoft Windows. "There's a need to integrate peer-to-peer solutions into larger client/server networks," she says. "We're following suit."

The merger comes on the heels of nSelect's strategic repositioning of PC-NFS product as a head-to-head competitor with NetWare, LAN Manager and other PC network operating systems.—mjf

Tadpole Strikes Again

Tadpole Technology Inc. seems to be able to do no wrong. Late last year, the Austin, TX-based branch of Tadpole Technology plc announced it had signed an agreement with IBM Corp. to develop a notebook workstation based on the PowerPC architecture. And this month, the ARCalike industry darling began shipping its next-generation SPARC-based notebook, the SPARCbook 2. The SPARCbook 2 is based on a 60-MHz Cypress Semiconductor Corp./Ross Technology SPARC processor (rather than on the Texas Instruments Inc. microSPARC, as many industry watchers had anticipated the second-generation Tadpole product would be). The base configuration includes 16 MB of RAM; two internal SCSI drives (250 MB or 500 MB); a 9.4-inch, 640-by-480

TFT display; SCSI, Ethernet, audio, serial and keyboard I/O ports; a 9.6/38.4-Kb/s internal modem (the Rockwell 96ACW); and choice of Solaris 1.0 or 2.1 operating environment. All of this fits into the same 6.5/7.0-pound case that houses the other SPARCbooks. An entry-level system with 250-MB disk, Solaris 1.0.1, a 12-month warranty and 90-day support package lists for \$10,950.

Expected markets for the SPARCbook 2 parallel most of those for the existing SPARCbook products, according to George Grey, Tadpole CEO. But some, such as oil and gas, exploration analysis and GIS mapping, are likely to be extremely strong candidates for the SPARCbook 2, since it offers improved graphics features, Grey says. Besides employing an MBus frame buffer, rather than a VGA controller, the SPARCbook 2 supports VGA, XGA and Sun (1,152-by-900 resolutions).

Tadpole is hard at work on future SPARCbook enhancements, Grey adds. These include extensions to the Nomadic Computing Environment, such as network configuration and security/authentication; provision of multimedia applications, such as voice mail/messaging and video; and, in the longer term, third-generation SPARCbook systems incorporating microSPARC and SuperSPARC, Grey says.

At the same time, Tadpole is on the road to building a second potential notebook empire—this time, in conjunction with IBM. The first fruits of the partnership between IBM and the Tadpole OEM division (not the SPARCbook division) will be based on the PowerPC 601 chip being developed by IBM and Motorola Inc.; first-customer ship is still a year away. Tadpole will develop and build the machine, and IBM will market it exclusively. IBM has licensed the Nomadic Computing Environment. (Sun is still only in the early stages of NCE licensing discussions with Tadpole.) Under terms of the arrangement, IBM has invested half a million dollars of equity in Tadpole, with an option for another 10%.—mjf

SunPro Paves the Parallel Way

Admitting what the programming community has been saying all along—that its NSE product isn't the be-all and end-all of workgroup development tools—SunPro has unveiled its Solaris 2.X parallel-development tools. SPARCworks/TeamWare and ProWorks/TeamWare (for Intel Corp. X86-based platforms) will streamline version control, release integration, project builds and other code-management functions, says the Sun Microsystems Inc. planet. (For more on TeamWare and other configuration-management products and technologies, look for *SunExpert's* special report on software development in next month's issue.)



SunPro's TeamWare: more than version control, less than configuration management.

SunPro has been beta testing the SPARCworks version of TeamWare for almost a year at sites including Eastman Kodak Inc. and Andersen Consulting, not to mention within SunSoft's own Solaris development organization. SunPro began shipping the SPARCworks version in volume to its resellers last month; the ProWorks version is due to ship to resellers in mid-1993.

TeamWare consists of four key tools: Code Manager, for graphical project integration and release management; VersionTool, for visually inspecting and managing multiple versions of source files; CheckPoint, for capturing project source file configurations for later retrieval; and ParallelMake, Sun's own parallel make tool for accelerating project builds. Each tool has its own access control panel, allowing developers to set customizable functions. But the tools are integrated closely enough

so that a user can issue mail between individual work spaces, explains SunPro's director of marketing, Paul Henderson.

TeamWare also takes advantage of the Manager and FileMerge SPARCworks and ProWorks modules, incorporating them into the TeamWare environment. If customers so desire, however, TeamWare can be purchased and used without SPARCworks and ProWorks, Henderson says. "This package is more than version control software, but less than full-blown configuration management," Henderson explains.

TeamWare is built upon the SCCS UNIX utility and supports the "copy-modify-merge" paradigm to which NSE adhered. Suggested retail price for both SPARCworks/TeamWare and ProWorks/TeamWare is \$995 each. Quantity discounts are available for 10, 25 and 100 licenses. All configurations include AnswerBook documentation and network licensing. Both products are designed for operation with Solaris 2.X; however, the SPARCworks version will work with

Solaris 1.0 to help ease the OS transition, according to SunPro. Tellingly, NSE will not be ported to Solaris 2.X.—*mjf*

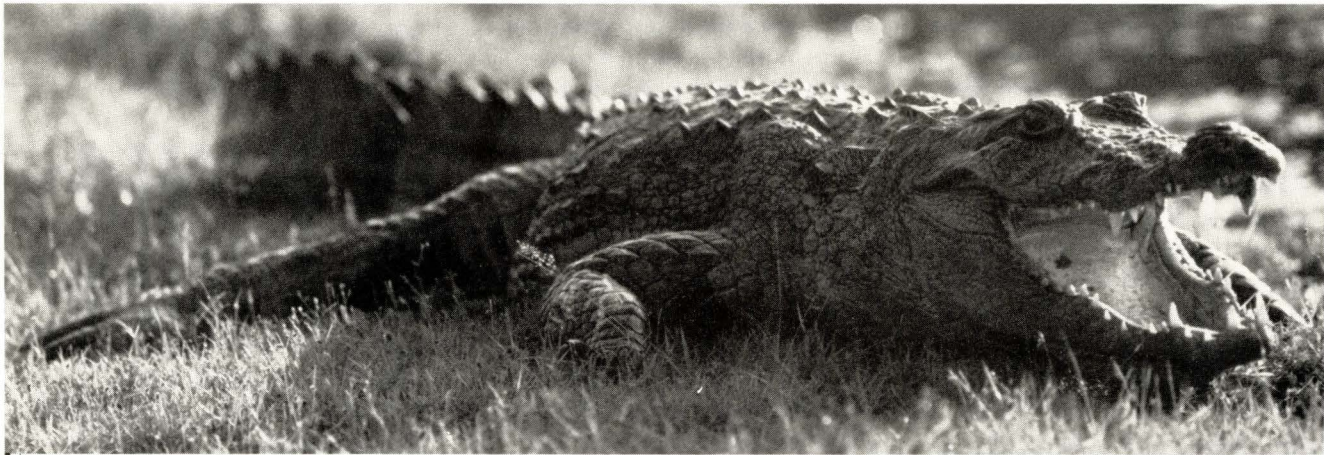
This Just In...

- *SunPro* signed a technology development and licensing agreement with *The Numerical Algorithms Group Ltd.* (NAG) for its FORTRAN 90 technology. FORTRAN 90 is the new international FORTRAN language standard that incorporates numerical processing and software engineering capabilities to the existing FORTRAN 77 standard. NAG will supply SunPro with FORTRAN 90 compiler front-end technology, which SunPro, in turn, will couple with its highly optimized code generators to create a FORTRAN 90 SPARCcompiler and related SPARCworks development environment, according to the company. NAG is based in Oxford, England.

- An interactive information repository for the education and research communities that lets Sun users more easily access public-domain software, shareware and other materials, includ-

ing research articles and images, has been established by *Sun Microsystems Computer Corp.* and the *University of North Carolina at Chapel Hill*. The repository, called SunSITE, resides on a dedicated SPARCserver 2 at the university. Users need only anonymous ftp into the machine using a simple user interface based on a new standard protocol, the Wide Area Information Server (WAIS), which accepts queries in plain English. For more information on how to access SunSITE, send a request to info@sunsite.unc.edu.

- A number of networking vendors, including Cayman Systems, Cisco Systems, FCR Software Inc., Novell Inc., Shiva Corp., Wellfleet Communications Inc. and 3Com Corp., have joined forces with Apple Computer Inc. to form the *AppleTalk Networking Forum*. The group plans to define and promote interoperable AppleTalk networking technology. One of the first areas the group intends to address will be methods to extend AppleTalk networks across other networks by encapsulating AppleTalk in other protocols, such as



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• Pushing the fault-tolerant envelope: Systems integrator *National Peripherals Inc.* has signed an agreement with *Array Technology Corp.* to develop disk-array subsystems for the Sun environment. The subsystem will incorporate RAID-5 technology with a fault-tolerant hardware design. NPI expects to begin marketing the subsystem during the first quarter of this year. NPI is based in Westmont, IL; Array Technology, a wholly owned subsidiary of Tandem Computers Inc., is headquartered in Boulder, CO.

• *Aggregate Computing Inc.*, one of the pioneers in the parallel make tool world, is expanding its business scope. The Minneapolis-based company has rolled out Release 1.2 of its NetMake product and is embarking on its heterogeneous platform porting program. More significantly, the company is beginning to get the word out about its distributed computing services technology, called NetShare. NetShare allows users to locate and use the "best" resources on a network, with no knowledge of the resources' states and/or locations. NetShare is application- and operating-system independent. It will provide a base layer for the development and location of transparent and network-parallel applications, says company President Joan Wrabetz. A NetShare developers' package is due out next year.

• *Adobe Systems Inc.* has unleashed TranScript Version 4.0 software for printer customers everywhere. TranScript is a suite of programs that convert files into PostScript and enable UNIX applications to communicate with PostScript output devices. New features in the latest version include: a Motif GUI; direct support for Ethernet and parallel printers; and support for PostScript fax printers. A SPARC single-user binary license is \$495, a single CPU source license is \$1,795, and a sitewide source license is \$2,950. The UNIX version of the product is available exclusively through Qualix Group Inc., San Mateo, CA.

• SPARC system vendor *ICL* has been on the move, as of late. The com-

pany announced it is expanding its LAN capabilities to include token-ring compatibility, with its first DRS/NX version supporting TCP/IP and OSI protocols. Its token-ring controllers for its DRS 6000 servers can be used with either 4- or 16-MB token-ring LANs. An SNA-over-token-ring feature will be phased in during the year, says the Irvine, CA-based vendor. Other recent

ICL announcements include: the introduction of Dialogue Management System, a client development environment for on-line transaction processing that integrates multiple TP systems across a network without reengineering; incorporation of support for high-resolution graphics displays and X Window System applications in its DRS/NX operating system; and licens-

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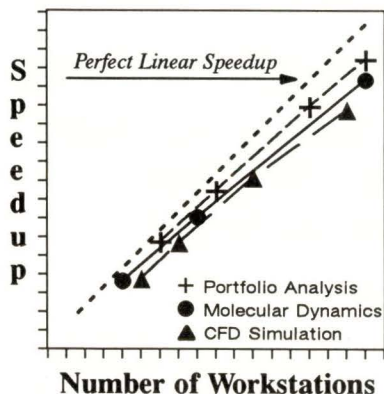
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ing of the Chorus Systems SVR4 microkernel.

- *XDB Systems*, Laurel, MD, has introduced what it's calling the first 100% IBM Corp. DB2-compatible database server for UNIX. The product, XDB-Server for UNIX, is a multi-user database that runs on Solaris 1.1 or higher. The company also has unveiled the XDB-Workbench for UNIX, a DB2-compatible development and production environment for Suns and LAN environments. The Workbench consists of a SQL database engine, COBOL precompiler and suite of utilities. The product enables COBOL programmers to develop, test and run full-scale DB2 apps on Sun workstations and servers, and subsequently migrate the apps to a main-frame without modification, according to the company.

- *SunSelect* has signed a number of top PC distributors as part of its ongoing campaign to take on the PC LAN vendors. SunSelect has inked new agreements with Tech Data, GBC Technologies, Transparent Technologies, Intelligent Electronics, Arrow Electronics Inc. and Merisel Canada. SunSelect products are available through these vendors, as well as through SunSelect's existing resellers—ComputerLand, Access Graphics, SunExpress and Sun Microsystems Computer Corp.

- *Alsys*, a subsidiary of Thomson-CSE, has acquired *TeleSoft*. The resulting company, which will operate under the Alsys Group name, is said to be the world's largest Ada products and services company, with combined revenues of \$40 million in 1992. Headquarters will be in Washington, DC.

- Systems integrator and contract programmer *Mastech Systems Corp.*, Pittsburgh, has formed an Open Systems Technology Group to handle its "growing volume of UNIX-related contracts." The group will handle projects in the areas of client/server distributed systems design and implementation, object-oriented programming, communications, GUIs, databases, 4GLs and systems administration, and will employ more than 200 field consultants. Mastech is the fastest growing independent software

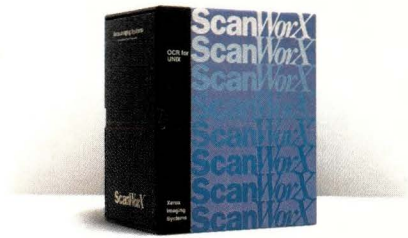
services company, according to *Inc.* magazine.

- *Rave Computer Association Inc.* is now an authorized reseller of used Sun Microsystems Inc. products. The Grosse Pointe, MI, remanufacturer will offer SPARC and MP series equipment—refurbished by Sun—that includes a 90-day warranty from Sun. The products ship from Rave's Sterling Heights headquarters.

- *Texas Instruments Inc.*, *Andersen Consulting* and *Unisys Corp.* have ported their CASE tools to the SPARCstation platform. TI is working with Sun Microsystems Computer Corp. to make its integrated Information Engineering Facility (IEF) available on Sun hardware. The IEF Implementation Toolset for SPARCsystems is available on a limited basis for field test. TI expects porting of additional IEF products, including the IEF Workstation, IEF C/S Encyclopedia and C/S Construction Toolset, to be completed by mid-1993. Andersen is porting its client/server CASE product, Foundation for Cooperative Processing, to SPARC systems, including the SPARCcenter 2000. Unisys has moved its Mapper 4GL environment to Sun, as well as IBM RS/6000 and SCO UNIX platforms. U.S. availability of Mapper for Sun is slated for mid-1993; the product is available in Europe now.

- *Epoch Systems*, *StorageTek* and *Sun Microsystems Computer Corp.* have signed an agreement to develop and market Epoch network data management software for SMCC's SPARCcenter 2000 server. Epoch and SMCC will work together to port EpochServ, EpochBackup and EpochMigration software to Solaris 2.1. Epoch and SMCC will jointly market the new systems. StorageTek will sell and market its 4400 Automated Cartridge System libraries that supply near-line high-volume automated tape subsystems to the Sun network market. Information stored on the SPARCcenter 2000 can be backed up or migrated through StorageTek's NearNet system, running Epoch software, to StorageTek's 4400 ACS. →

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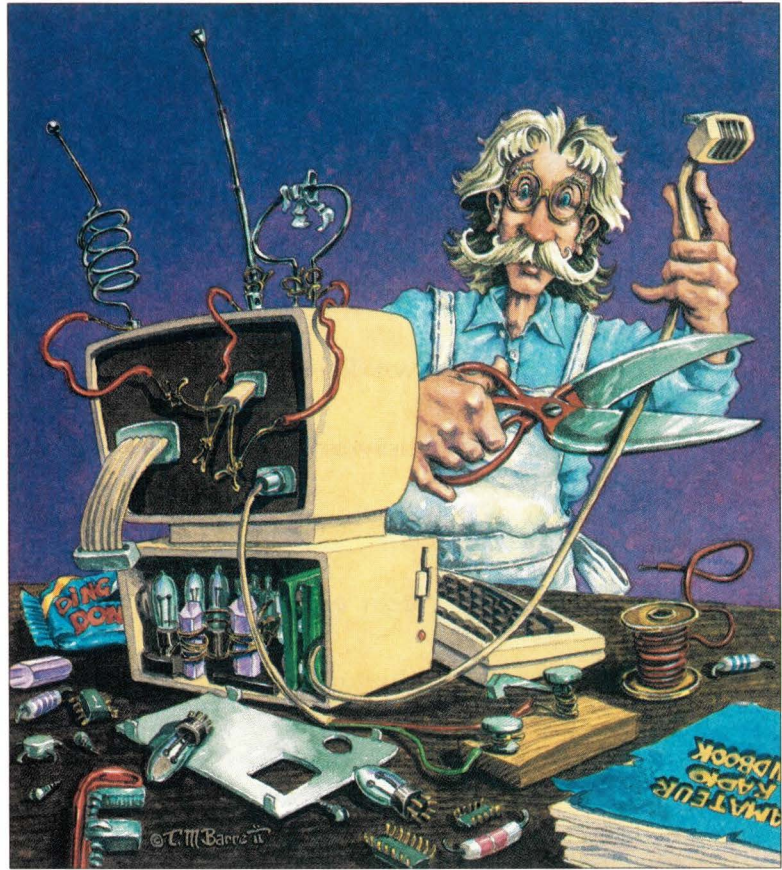


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Circle No. 50 on Inquiry Card

Ask Mr. Protocol



TOM BARRETT

by MICHAEL O'BRIEN

"The TNC is the most important piece of equipment in a packet station; thus, it is a good idea to pick your TNC first and arrange your station around it."

—Jonathan L. Mayo
The Packet Radio Handbook

"#&#&#(\$# No-code Technicians!"

—Subject of a more than ordinary
Usenet-like packet radio bulletin

"Solving the Riddles of the Ancients by Radio"

—Bruce McCall, *Zany Afternoons*

Mr. Protocol Pulls the Plug

Q: I can't believe my eyes! Mr. Protocol, of all people, seems to be reading Usenet! Doesn't he have anything better to do with his time? This is most shocking!

A: Oh, go down to K-Mart and rent a clue. Usenet is a wonderful information resource. However, Mr. Protocol is not reading Usenet. He's reading something that vaguely looks like Usenet, but isn't. He's reading bulletins on amateur packet radio. And that's our job today, to look at an alternative to the Internet, to see what lessons it has to teach us.

Mr. Protocol has looked at amateur packet radio before, but this time he's going to take a different perspective on it. This time, he's going to look at the

services that have developed on it, and see how they compare with the network world with which we're familiar. First, though, we'll have to establish a little context.

People become amateur radio operators for all sorts of reasons. Luckily or not, the FCC does not have a space on Form 610 labeled "Reason," when you apply for a license. In fact, there are plenty of amateurs who would claim that possessing any sort of "reason" is definitely not a requirement for an amateur license.

Actually, the reason that the U.S. Government established the amateur service in the first place was to provide a pool of trained operators upon which to draw in time of war. (Another, less openly expressed intent was to establish a pile of radio spectrum space that could be quickly

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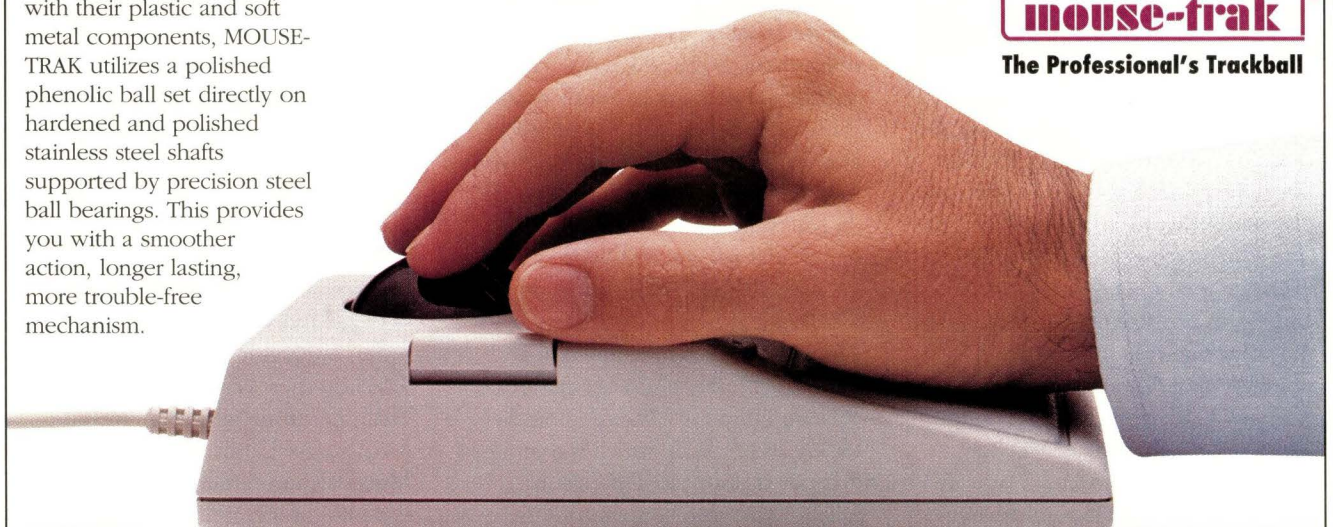
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grabbed under the same circumstances. In fact, in both cases in which the government actually exercised this prerogative (WW I and WW II), suits against the government were required to get the spectrum space back. Luckily, the current tendency toward not bothering with a formal declaration of war before going out and cleaning someone's clock has also prevented amateur spectrum space from being quite so summarily grabbed.)



However, amateur radio possesses a critical leavening in its population: the tinkerers and experimenters, who a) like to play with radios, and b) like to play with other techno-toys. There is a natural tendency (natural in these folks, anyway) to combine cases (a) and (b). When technology advanced to the point that case (b) referred to personal computers, a problem arose.

The FCC has gone to great lengths to ensure that the amateur service remains just that: amateur. There are prohibitions against transmitting any music, making any sort of an undirected broadcast not directly related to the amateur service itself, and against

promoting the business affairs of any party over the air...which has generally been interpreted so strictly that amateurs can't even use the radio to order a pizza. Since the FCC monitors the amateur bands to ensure compliance (or, at least, it does when it has the money, which sure hasn't been the case lately, boy howdy), they also prohibit the use of any "codes or ciphers," except of course for the venerable Morse and Baudot codes, which have been in use so long that they're regarded more as a necessity than an obfuscation.

The prohibition against codes and ciphers did more than any other single factor to delay the development of computer networking over amateur radio. It took approximately 10 years of work to convince the FCC that the transmission of ASCII over the air waves did not constitute a fatal loss of control over the airwaves. Amateurs in places such as Germany and Canada, therefore, began experimenting with radio-linked computers long before Americans were allowed to join in. This is still a sensitive area—it is difficult for radio amateurs to be technical pioneers if the pioneering activity is illegal.

Why is all this relevant? Mr. Protocol is glad you asked. It is relevant because what radio amateurs are doing today, your office may be doing tomorrow. Products are now gearing up to eliminate the expensive cable plant necessary for local-area networks by replacing the cable taps with radio transceivers. So far, the most widespread network currently on radio is the amateur AX.25 network, so amateur experiences may be relevant. In the light of the previous paragraph, do you want the FCC to be able to step in and tell you that your local-area network is illegal? Well, get ready, says Mr. Protocol.

As Mr. Protocol mentioned in a previous column, packet operations on amateur radio use a variation on the ISO X.25 protocol, which is a connection-based protocol. This variant, called AX.25, can contain routing information in the address field, which is made up of amateur radio call signs as opposed to ISO standard addresses.

Aside from the addressing issues, AX.25 is very similar to X.25.

Because it is connection-based, AX.25 virtual circuits color the whole range of services offered on the amateur packet network. In the main, the networking aspects (at least at the link levels) are not contained in the host computers, but are handled by outboard "packet modems" called Terminal Node Controllers, or TNCs. A TNC is a form of dedicated, special-purpose computer system combined with a modem and (usually) some amount of signal-processing capability, and comprises a plug-and-play interface between a computer (or a terminal, hence the name) and a radio.

Most of the networked applications with which users interact directly are connection-oriented applications, so one might think that the parallels between amateur packet radio and workstation computing are even closer than they are. However, there are a large number of applications that are not connection-oriented, NFS perhaps chief among them. Sun workstation network computing is extremely distributed today and growing more so, but amateur packet radio uses network services purely explicitly. Nevertheless, there are parallels to be drawn.

Most amateur communications consist of straight station-to-station communication, with two operators communicating directly. The most familiar such communication is of course voice communication, with two fellows chatting back and forth. Of course, the communication is generally half-duplex so that it is not possible for one operator to interrupt another's diatribe to get his attention. This is because it is not possible to receive the other station's signals when one's own transmitter is in action. His signal strength and yours differ by many orders of magnitude at your receiver. The next most common form of communication is via the venerable Morse code. Oddly, many if not most Morse code communications are, if not full-duplex, at least multiplexed. In what is called "full QSK" operation, the transmitter is in operation only while actually sending a dit or a dah,

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and you can hear the other station's signals interspersed with your own if he wishes to interrupt. The technology needed to allow a radio receiver to recover from overload in that small period of time is awe-inspiring to Mr. Protocol.

Other forms of direct station-to-station communication include RTTY, which uses the old five-bit teletype Baudot code (upper-case only), and straight ASCII, as well as a peculiar form of communication called AMTOR, which is based on the ship-to-shore SITOR protocol.

It shouldn't be surprising, then, that direct station-to-station communication via packet is much more prominent than the most likely equivalent in a Sun environment, which would probably be "talk." In fact, such communication takes place not only because of a paucity of imagination on the part of the participants, but also because this adherence to the KISS principle (Keep It Simple, Stupid) is very valuable in times of emergency. In fact, in the hours immediately following the recent San Francisco quake (Mr. Protocol insists I refer to it as the Loma Prieta quake, although few people outside California know it by that name), most of the communication with the outside world was via amateur packet radio, since the telephone system was inoperative.

There is more to packet radio than this, of course. In fact, most packet communications in a populated area take place between users and centralized service systems, called BBSs, due to their resemblance to the dial-up variety.

These systems have interfaces that resemble those of dial-up BBS services, but by a form of parallel evolution and the availability of communication channels, they have come to resemble Usenet to a large degree. These BBSs have features usually found on a dial-up BBS, such as file upload and download areas, and bulletins. The bulletins are all contained in a single, common area, unlike Usenet, but they are all, in fact, structured as mail messages, complete with "To:" addresses.

These addresses are used by filters, which users may use to examine only

those bulletins matching a certain pattern. The format of a message is similar to that of an Internet standard mail message, `USER@DEST`, except that both `USER` and `DEST` may be arbitrary, within limits.

The `USER` pattern may be completely arbitrary. The `DEST` pattern is less arbitrary and is used to specify the distribution of the message. `WW` means worldwide, `ALLUS` means the entire United States, `ALLUSW` means the Western United States, `ALLCA` means California, and `ALLCAS` means Southern California. A bulletin sent to `SALE@ALLUS`, for example, would be a likely way to sell some equipment (the prohibition on business does not apply to personal exchange of amateur gear—the only exception allowed).

packets from all of them compete for the channel. Collision detection is obviously a prime requisite of TNCs, and they indeed have it.

In fact, in response to the vagaries of radio communication, TNCs have an unbelievable number of settable parameters, all of which have their analogs in local-area networks, and almost none of which are tunable by users therein. This aspect of amateur packet radio is a living nightmare to most amateurs, who as a rule are most definitely not link-layer protocol experts, and who mostly wish all these things would go away. However, as amateur packet radio is still, in some sense, experimental, no one setting, or combination of settings, is appropriate for all conditions.



At the lower frequencies used for long distance, bandwidth restrictions limit the communications channel to 300 baud, which is painful for any sort of packet communications.

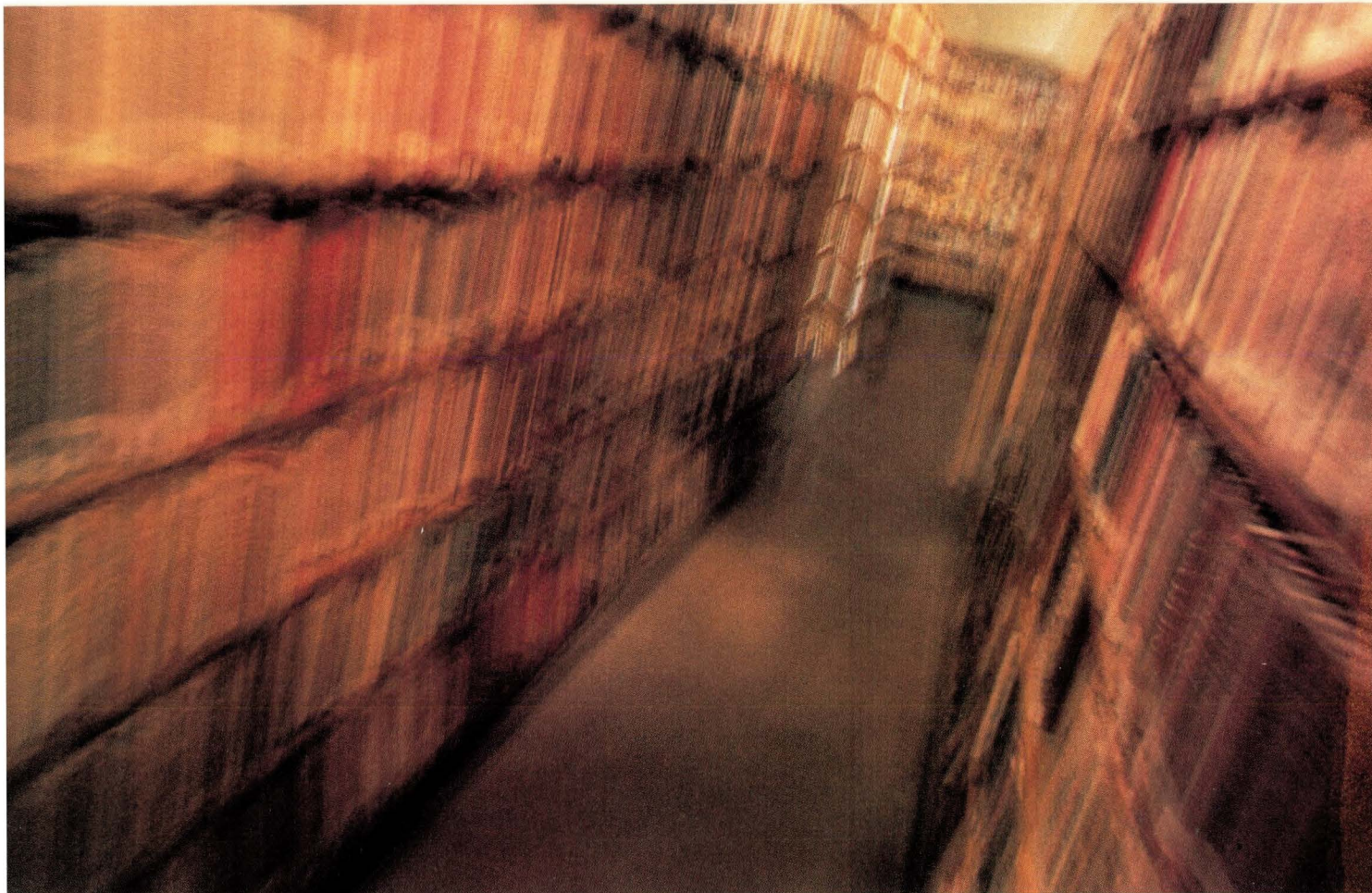
The BBS systems are linked into an explicit network. Each one knows its neighbors, and the quality of the link to each is known as well. The routing tables used by BBSs are entered by hand, to a certain extent, in that some connections are specified explicitly and the link quality fixed (for instance, if two BBSs "cheat" and exchange information by telephone).

However, the tables are also adaptive to a certain degree, in that they remember how much time has passed since they have heard from a neighboring BBS, and if too much time has passed, the route is dropped. Also, new entries can be added as new BBSs are heard from.

BBSs hear from and about each other, and exchange routing information, since each BBS is also a radio station. A given frequency can be shared by several dozen BBSs, and the

In addition to bulletins addressed to various areas, personal mail may be exchanged. The BBS systems exchange routing information and hence are able to pass mail back and forth. Since the frequencies used for most packet communications work only over an area about the size of a city, long-distance communications require many hops, unless one of two alternate methods is used. Some BBSs are connected by "wormholes," long-haul leased lines (often arranged for by hams who piggyback their BBS communications over business lines used by the companies they work for). Also, there is a wide-area network used in amateur radio, where packet communications take place over long-distance frequencies.

This is another touchy area. At the lower frequencies used for long distance, bandwidth restrictions limit



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the communications channel to 300 baud, which is painful for any sort of packet communications. In addition, this spectrum space is so precious that the FCC has never allowed automatic packet operations. For a time, some stations had temporary authorization to operate unattended packet systems, which formed the backbone of the long-haul net, but this authorization has recently been withdrawn, so that any future packet work will have to have a human operator at one end of the link at least. This has put a crimp in the entire amateur packet network.

Addressing in the amateur packet mail domain is done using the same type of domain name addressing that the Internet uses, though the domains are geographically based and are not identical to their Internet counterparts. Since the net is store-and-forward at the message level, each hop being handled over a virtual circuit, the net takes about the same time as the Usenet to traverse end-to-end: several days.

On the whole, the amateur packet system is a startling case of parallel

evolution to the Usenet. However, since it does use packet protocols, it affords us a preview of at least some of the things that we can expect to see when local nets become wireless.

Certainly one of the big problems is going to be interference. The amateur packet net takes place mostly at 1,200 baud for most users, and at 300 baud for the long-haul network. That means that network interference is very obvious when it occurs—you can watch it in the lights! It will be necessary, in the case of multiple local-area network wireless installations, to coordinate the frequencies of those within range of each other, to avoid co-channel interference. As far as wireless nets are concerned, just being in proximity and on the same frequency is the same as being on the same cable. And, though the frequencies contemplated for use in wireless nets are sufficiently high that most forms of radio noise will be eliminated, that does not mean that they will be entirely immune to all noise sources.

The question of frequencies brings up another point. Currently, there are

negotiations in progress for spectrum space to hold these wireless nets. None is currently allocated (though that may change by the time this column hits print). Now, it is not the case that free, unallocated spectrum space just springs out of the woodwork as required. For every allocation there is a consequent deallocation. If, for any reason, wireless nets end up losing popularity, the spectrum space will be allocated elsewhere, after a real Rose Bowl game of political football, and your net will suddenly become illegal. Never mind that it still works. It conflicts with established use; go away. Or, worse yet, the space could be reallocated to "secondary" usage. That means that if the bubble-gum factory next door, with its wonderful new truck-tracking system, suddenly gets primary allocation in the middle of your net frequency, you get to slide your packets in between the bubble-gum wrappers, and if you wind up interfering with their operations, you get to either find a new frequency for all your stations, or start stringing that good old cable again.

Mr. Protocol, for one, would not care to read in the newspaper that the FCC says that his entire local net gets to be reoutfitted or replaced. When the government regulates your network hardware, the advantages of the technology had better be substantial. →

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 at an aerospace research corporation.

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

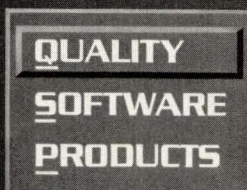
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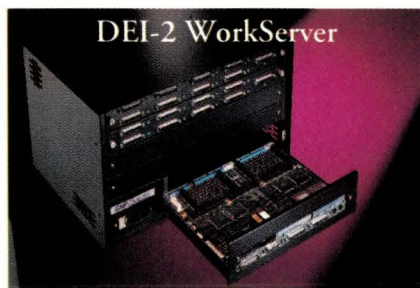
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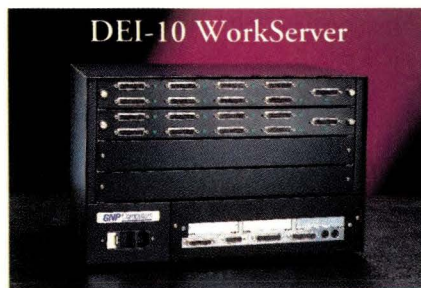
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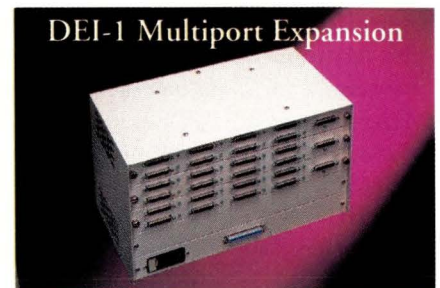
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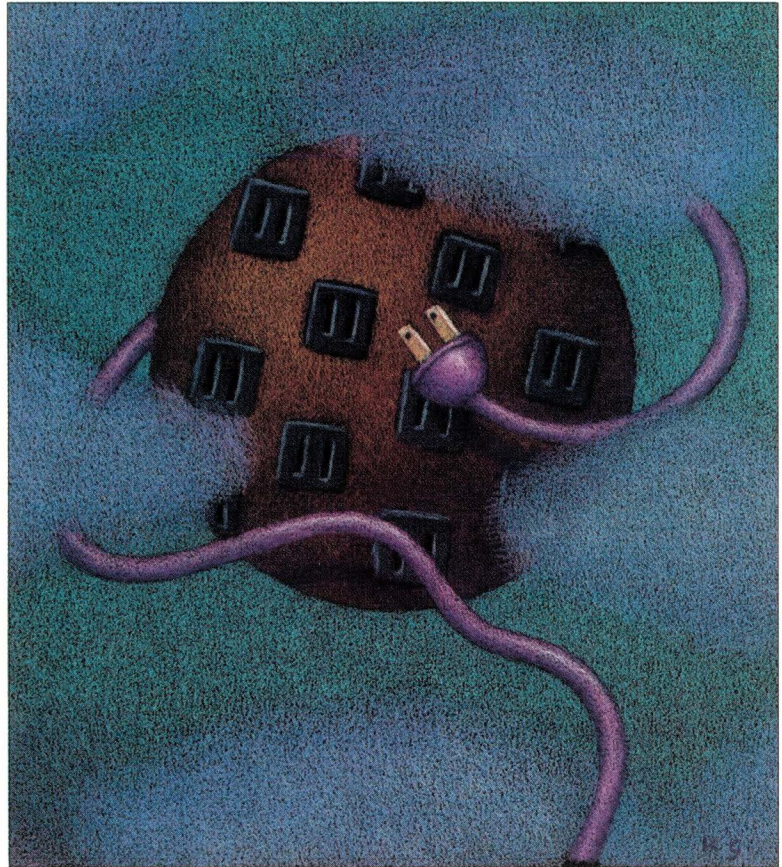
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FTP

by PETER COLLINSON,
Hillside Systems



KEITH GRAVES

It probably has not escaped your notice that I have been talking about intermachine communication in the last few columns. This month I am going to look at a program that allows you to reach out from your machine and access files on machines all over the world: `ftp`. Unlike most of the other intermachine communication systems, `ftp` was not designed solely with UNIX in mind. It was very consciously defined to permit communication between different machine architectures running widely different operating systems. It was formalized as a protocol about 10 years ago and is publicly documented in several Request for Comment (RFC) documents, the most interesting one being RFC959. In the text below, `ftp` means the “ftp program” and FTP means the “ftp protocol definition.”

Using ftp

From the outset, FTP was intended to supply an interactive process to the user. When you want to reach and move files from one machine to another, you fire up `ftp` and participate in dialog that looks like a terminal session. Actually, your command set is limited to a small number of commands that are translated into protocol primitives and sent to the remote machine. The remote machine sends back answers that are similarly coded. This communication takes

place down one TCP connection between the machines. Another TCP connection transmits any data you might transfer.

However, starting `ftp` is like running a remote login program. Imagine we want to transfer a file from a machine called `local`:

```
% ftp
ftp> open local
Connected to local.
220 local FTP server (SunOS 4.1) ready
Name (local:pc): return
331 Password required for pc.
Password: type password
230 User pc logged in.
ftp>
```

The `ftp` program starts and prints its prompt `ftp>`. We have entered the `open` command to tell the program to connect to the machine called `local`. The program looks for the IP address of the machine and connects using TCP. This is shown by the third line. The remote FTP server wakes up and sends a message “220” followed by a line of text. The “220” decodes as “Ready for a new user.”

But where “knowing the systems” gets complex is the very big shops... where there are thousands of nodes, from many different companies, doing many different things, and all connected with everything from Ethernet to smoke signals. In that situation, maintenance becomes a connectivity issue. Some people are even saying that, in the long run at least, the whole con-

cept of “service and support” will change almost beyond recognition. It will be more, they say, a systems integration and networking function.

That day isn't here yet, but it does seem to be coming. “As the industry becomes more and more a commodity business,” says Mike Mahoney, vice president of open systems services operations for Bull HN Information

Systems, “the real glue holding everything together—and, hopefully, someday, the profit margins—comes from the networking.”

Bull HN, by the way, is an interesting example of the kinds of companies that are getting into Sun service today.

Originally, of course, it was Honeywell, and the fact that it does service at all was largely an accident. When Honeywell merged with Bull, the resulting company found itself with a large but underemployed field service staff. “We found ourselves with that investment [in personnel and resources]...and we were looking for something for those people to do.

Initially, we thought that service was just a crack-filler while we waited for a new market opportunity. Turned out that service was the new market opportunity.”

Specifically, the opportunity was larger corporations—not small companies, nor even the divisions of larger ones, but rather Fortune 1,000-style

multinationals. At this level the customer wants exotic new services, far removed from the traditional definitions of “service”—like, for instance, equipment audits. “It is getting to be like PCs,” says Janet Wallace, vice president of marketing, development and support at Bell Atlantic, which provides Sun service on contract to Sun itself. “The corporations have large populations of workstations that are completely unaccounted for.” In days past, when there was one mainframe and it cost a small mint, companies didn't have much difficulty keeping track of their computer investment. When workstations cost \$5,000 and appear on petty cash accounts, it's not so easy.

Then, of course, there's the fact that not all of those workstations, and still less the other equipment in the net, will be from the same vendor. In some cases, customers have support, but they have no idea which of the various support organizations they have is actually the one they want for any particular part. In that case, the customer may be willing to pay for a TPM just to avoid confusion. “Our customers are heterogeneous,” says Stephen Basile, manager of technology resources at ERI, a systems integrator and TPM.

Still more dramatic, the purchaser of service is changing as well—at least in the large organizations. The buyer is slowly becoming an individual who may have never seen a workstation, and who may indeed not like them particularly—the MIS officer. “Downsizing,” explains George Brooke, project manager, UNIX systems, at Bell Atlantic. “We see considerable interest in downsizing.”

Commercial MIS is moving, per force, to open systems—including Suns—whether it wants to or not. “I do presentations on open systems for commercial environments,” says Bell Atlantic's Wallace. “A year ago, the MIS officers, the bastions of the data center, would practically take the donuts off the snack table and throw them at me...now, they're starting to nod. They've given up fighting it, and now they're trying to deal with it. The denial stage is over.”

Training: The Forgotten Feature

In technology as in many other things, ignorance tends to be bliss only in the short run. Yet, training may be the most overlooked of all the things lumped into the general category of service, support and maintenance.

Perhaps that's because there's more than one function included in the word. At its very simplest, “training” can mean simply the business of educating end users in the business of workstations and UNIX. And a respectable industry exists to provide seminars, tapes and books to do this very thing (see *SunExpert*, September 1992, Page 12).

But, for self-maintainers, the word can also mean the investment you have to make in your own staff to make certain it can self-maintain. “You can't just buy PC techs a bag of SBus boards and say they're workstation techs,” says Frank D'Alessio, divisional vice president of service provider Maintech. “And there are hidden costs associated with training. You may have to fly a guy out to California for two weeks, and you've got to pay for him to be in a hotel there, and you've got to figure out who's going to cover while he's away.”

But the real danger may be not to self-maintainers but to those who sign on with third party maintenance (TPM) providers that are not competent. As networks become increasingly heterogeneous, TPMs are being asked to service machines that may be far removed from their actual area of expertise. A TPM skilled with DEC machines, for instance, may not be able to easily switch skills to Sun workstations.

But because training is expensive, some TPMs delay making an investment in it. This could mean disaster for a client whose critical server goes down, and who cannot wait for a TPM to spend a couple of weeks in school. “We see a lot of TPMs who say, ‘Hey, if I contract, then I'll invest,’” says Dan Wolfe, national account manager for Apex Computer. “But by then, it's too late.”

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...and generally reduced the office to mild to middlin' havoc for the greater part of a week.

OK, now, when I do this story on service, support and maintenance, I'm actually going to have a thesis and a point of view. I'll get that down first, so you know what to expect when I actually get around to doing the story.

In short, the thesis is as follows: *As recently as three years ago, the industry believed that service and support would gradually shift from third-party maintenance (TPM) providers to fourth-party vendors...*

Let's take a moment to explain all that. Sun Microsystems Inc. itself has never attempted to provide all the service and support for its own systems (see "The Sun Selection"). As a result,

Service vendors have come back strong, at least for mission-critical systems. The general pattern is self-maintenance on the desktop, and TPM for the servers.

most of the service that is done on Sun workstations is done by other companies—TPM vendors. Fourth parties, meanwhile, are companies that supply spare parts, expertise, training and so on to TPMs and to those end users who are sophisticated enough to provide their own maintenance.

As workstations have become increasingly reliable, and increasingly inexpensive, the industry began to believe that end users would do so much of their own maintenance that, in the end, the TPMs would actually be overshadowed by their suppliers. That was the theory. Now back to the thesis.

In fact, this shift has not occurred. While there has been continued interest in self-maintenance, there has also been a small boom for TPM vendors. This seems to have been because while workstations are indeed becoming increasingly reliable and easy to service, several entirely new kinds of service customers have come on-line.

I'll explain that too. You see, the assumption that users will maintain

their own workstations also assumes that workstation users will remain fairly technical people. Yet, as I myself prove—being a fuzzy-headed liberal arts major doing word processing on a 3/50 configured to run as an X terminal—that's not necessarily the case. There are new, commercially oriented users who have neither the expertise nor the inclination for self-maintenance.

No. Really. I'm serious. I've even got evidence. For instance, when I called up NCE Computer Group, a San Diego-based TPM, their vice president of strategic sales, Eric Slifkin, put it bluntly: "Most of our new customers are out of the commercial world. They tend to be larger shops, with a larger number of workstations, and some servers."

And the reason those larger shops are going for TPM agreements is simple: They simply don't want to bother doing it themselves. "CAD/CAM people would just open up the cabinet and do their own work," says NCE's vice president of corporate sales, Jerry Puda. "A financial services guy, a bond trader, just isn't going to do that."

Then, too, there's the recession. Before, companies might have been willing to spend the money necessary to maintain large inventories of spare parts, and to have their own repair people. But now, in an age when many companies are "focusing on their core business" and outsourcing whenever possible, they may not be quite so eager to do so. "People are saying, 'Hey, it's not worth the headaches,'" says George Brooke, program manager, UNIX Systems for Bell Atlantic. Bell, it will be remembered, is one of the companies (another is Eastman Kodak) that Sun itself uses to provide field service. More likely than not, the Sun repairman who shows up at a customer site is

actually a Bell or Kodak employee.

In addition, there is the question of critical systems. An engineer's workstation, or even a financial trader's workstation, is not a mission-critical device. If it fails, you can simply swap in a spare, particularly given the rock-bottom prices of workstations these days. But servers are another story. If they go down, the entire business goes down.

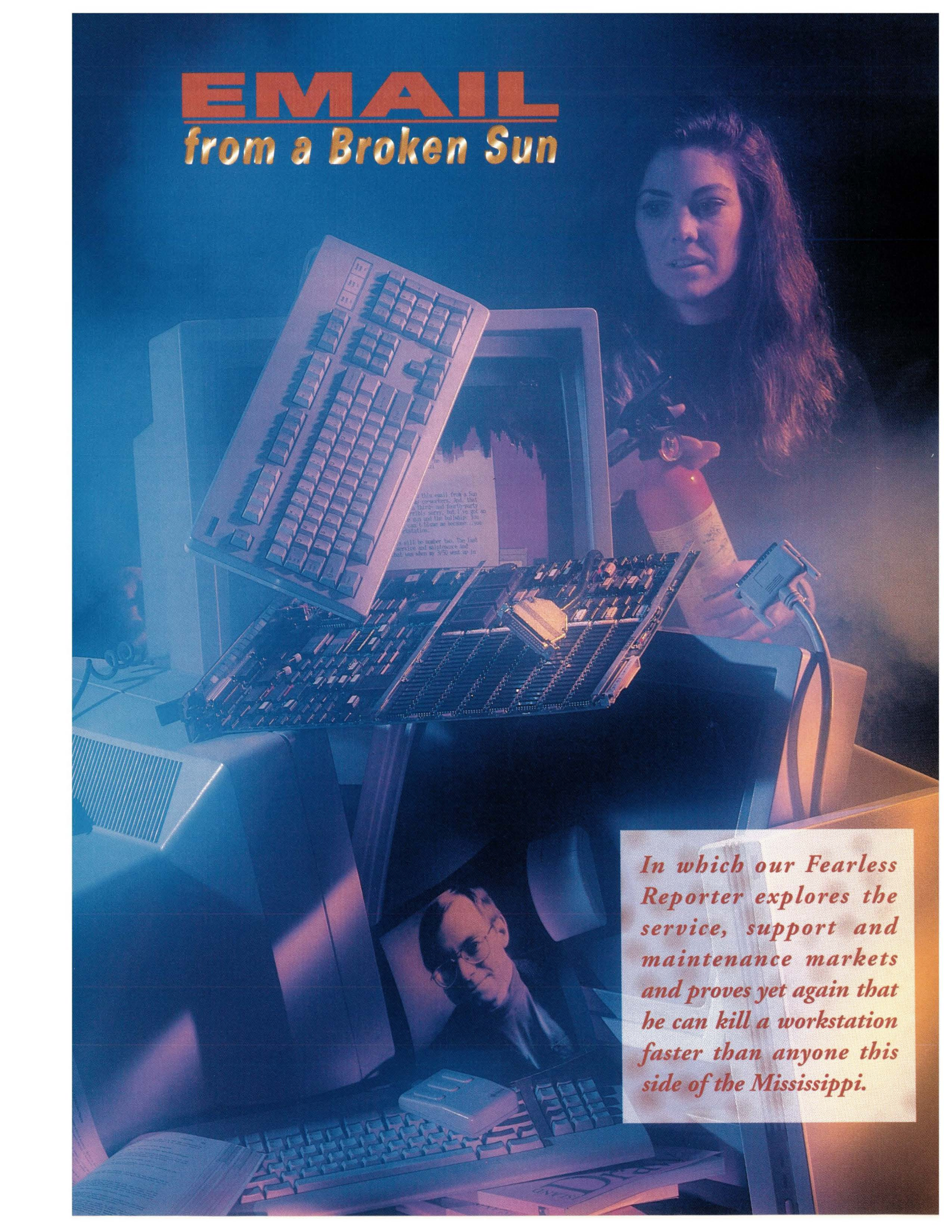
Thus, even companies that are capable of doing their own service may not wish to. "Sure, you can do self-maintenance, but do you have enough critical mass to warrant the investment in spare parts?" asks Stephen Davis, president of US Computer Maintenance Inc., which specializes in providing service to mission-critical systems on Wall Street. His argument is that most companies cannot afford to have all the spare parts, and all the expertise, to keep their systems running all the time. "Even if you hook up with a fourth party, you still are going to have to wait to get parts."

As a result, service vendors have come back strong, at least for mission-critical systems. The general pattern is self-maintenance on the desktop, and TPM for the servers. It is what Frank D'Alessio, divisional vice president of service provider Maintech, calls "hybrid accounts...where we provide third-party service on servers, and fourth-party service on their workstations." Maintech has also recently introduced a program called Depot Express, which combines features of both TPM and fourth-party service by providing door-to-door service parts delivery and loans. "Basically," he says, "the program tries to take the sting out of self-maintenance."

Donuts off the Table

What has changed is customer demand. TPMs, and fourth parties, are finding that their customers want a good deal more for their money. "They want someone to be really responsive to their problems," says David Myers, a marketing representative for the TPM Wiztec Inc. "They want to see the same one or two field engineers—FEs—going to their sites at all times, for example. They want someone who knows about their systems."

EMAIL from a Broken Sun



In which our Fearless Reporter explores the service, support and maintenance markets and proves yet again that he can kill a workstation faster than anyone this side of the Mississippi.

SERVICE AND SUPPORT

Lisa Guisbond, Managing Editor, SunExpert Magazine
DM: Michael Jay Tucker, Executive Editor
e: I do it again.

Hi Lisa,

I'll come right to the point. I'm sending you this email from a Sun workstation that I've borrowed from one of my co-workers. And, that means I'm going to be late with my story on third- and fourth-party service, support and maintenance. I'm terribly sorry, but I've got an excuse, so please put down the knife, the gun and the bullwhip. You see, it wasn't my fault, and you really can't blame me because...you see...I seem to have killed another workstation.

What do I mean by another? Well, this will be number two. The last time I was doing this article...on service and maintenance and in stuff...was when I got my first. That was when my 3/50 went up in smoke in the middle of a phone interview. You do recall that one, don't you? I was right in the middle of a productive chat with a systems administrator in Boston (I think), and just as I was asking about service warranties...my workstation started doing a fairly decent impression of an English Muffin in mid-crisp. Really it wasn't the time I only burned out the fan, crashed the net, found out that I don't make the necessary replacement part of my system administrator's very expensive

```
/home/usr2/dpryor>
```


Solaris 2.0. In Solaris 2.0, the file /etc/default/passwd specifies these limits.

```
#ident "@(#)passwd:passwd.dfl 1.1"
MAXWEEKS=26
MINWEEKS=4
PASSLENGTH=6
```

MAXWEEKS: longest time a password can be used without being changed
 MINWEEKS: the time before which the password cannot be changed
 PASSLENGTH: minimum acceptable password length

SunOS 4.1 supports password aging by individual user only and only for the local host, not for passwords maintained in NIS. The password command with -x and -n parameters is used to set up password lifetimes in SunOS 4.1.

```
passwd -x 180 -n 30 wildbill
```

Ms. Lambkins can also force a user to change his password on the next login with the `passwd -f <user>` command in Solaris 2.0 or the `passwd -e <user>` command in SunOS 4.1. In Solaris 2.0, he won't be able to enter the same password but is required to enter a password that differs in at least three characters.

Guidance for Ms. Lambkins

The trusting Ms. Lambkins will be wise to recognize that there are many Mr. Condons in the world. Regardless of

whether or not she suspects that her network is a target, good security practice is in the best interests of her users. Here's a list of pointers to give her:

- Tell her to develop a security policy that clearly states the rules about password privacy, publish it and enforce it.
- Have her generate reasonable passwords for users or enforce good passwords with software like `npassword` or subsequent checking with `crack`.
- Suggest that she put expiration dates on accounts, especially if she is not good about removing accounts when people leave. Ask her to watch for files whose permissions might leave the system vulnerable.
- Remind her of the special vulnerability of setuid programs and suggest that she eliminate them when possible.
- Ask her for firm guidelines on how to use superuser access and remind her that superuser access should only be used when there is no alternative. Remind her that never, even for an instant, should anyone who cannot be trusted be provided superuser access. Provide her with tools and ideas for routinely monitoring accounts.

Disclaimer: Ms. Lambkins and Mr. Condon are fictitious. Any resemblance to real persons is strictly coincidental. ⇔

S. Lee Henry is on the board of directors of the Sun User Group and is a systems administrator for a large network of Suns in the federal government. She also runs The Next Page Inc., a consulting firm specializing in software documentation.



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later reads and uses. One easy way for Ms. Lambkins to be sure that she will not mistakenly invoke a Trojan Horse is for her to set up an alias for the `su` command, equating it to `/usr/bin/su`. If she adds a hyphen to this alias, she will also acquire root's environment (root's search paths, environment variables and aliases) whenever she uses this command.

```
C Shell: alias su /usr/bin/su -
Korn Shells: alias su="/usr/bin/su -"
```

Another way for Ms. Lambkins to avoid this problem is by making sure `.` (current directory) is not in her path or to make sure that it appears last in her path. That way, the intended `su` command will always be encountered first (of course, she must be sure that `/usr/bin` is in her path).

Another golden rule that Ms. Lambkins should adopt is that no one who is not trusted and briefed on the responsibilities of superuser access should ever be allowed this access. Even if she is looking over Mr. Condon's shoulder, Ms.

Great Security Shareware

npasswd by Claude Hoover, University of Texas, Austin, does not allow users to select poor passwords and is configurable to allow the user to specify some of the parameters that define rules for each site. Get it from `emx.utexas.edu` in `pub/npasswd`.

COPS by Dan Farmer of Sun is a collection of scripts and programs that look for various security holes on UNIX systems such as permissions on important files that might open a door to Mr. Condon, for example, `setuid` programs, writable `/dev/kmem` and many other possible weaknesses. Look for it on `cert.sei.cmu.edu` in `pub/cops`.

crack by Allan David Muffet, University College of Wales, United Kingdom, sets up a massive attack on passwords, trying like a bandit to crack them, and reports findings. Download from `wuarchive.wustl.edu` in `packages` directory. Alternate dictionaries like those used by Dan Klein can be found on `ftp.uu.net` in `pub/dictionaries.tar.Z`.

An obvious password detector by John Nagle of Stanford University is available from `comp.sources` archives.

Great Security Book

UNIX System Administration: A Guide for Users and System Administrators, David A. Curry, Addison-Wesley, 1992

Lambkins' attention can wane. Superuser access should never be bestowed for convenience. If Ms. Lambkins cannot defend her decision to give superuser access to Mr. Condon in front of all users whose data and productivity she is risking, she must not grant the access. The need to protect the security, reliability and availability of the computer systems that she is responsible for outweighs any other consideration.

Monitoring Accounts

Ms. Lambkins should also proactively monitor accounts for vulnerability. She should look for security holes, peruse accounting files and make sure that all user accounts are password protected.

When she examines accounting reports, she should make note of whether certain special privileged commands are being used. For example, is anyone other than the system administrators using the `su` command? She might detect Mr. Condon trying to guess someone else's password. If Ms. Lambkins is running the C2 software, she can easily monitor privileged commands anywhere on her network or monitor all commands executed by a suspect individual.

Group or shared accounts are always a menace. Ms. Lambkins should provide separate logins if she can't eliminate them altogether. Multiple login entries with different userids and passwords but the same uid can be differentiated in `/var/adm/wtmp` file where logins are recorded.

```
wildbill:x:123:123:shared:/export/home/sharhome
:/bin/csh
kless:x:123:123:shared:/export/home/sharhome
:/bin/csh
```

```
wildbill console Feb 3 09:39
kless console Feb 3 11:55
```

Ms. Lambkins won't be able to set this up with the `useradd` script in Solaris 2.0 or most scripts for adding users because these scripts will generally check for duplicate login names. She will have to make the additional entries to the `/etc/passwd` file or the `/etc/passwd` and `/etc/shadow` files manually.

With Solaris 2.0, Ms. Lambkins has ASET (Automated Security Enhancement Tool) software to help her look for security holes. With three security levels to choose from, ASET can check and change permissions on important system files, verify their content, check `passwd` and group entries, and examine user configuration files (like `.cshrc`). ASET can even verify EEPROM settings and build firewalls on routers.

Ms. Lambkins should occasionally check logins in `/var/adm/wtmp` with the `who` command and examine `su` entries in `/var/adm/sulog`. If she automates much of this checking, she might also generate useful statistics that will help her characterize usage of the network.

Password Aging

Ms. Lambkins can also make use of minimum and maximum password lifetimes available in both SunOS 4.1 and

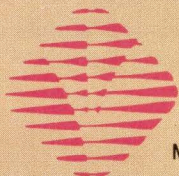
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privilege to read and modify anyone's files, and start or stop processes, access to the root account can result in any amount of damage and compromise of any data on Ms. Lambkins' system. If the particular host on which Mr. Condon has become superuser is a trusted host on the network at large, all systems on the network are similarly vulnerable.

Ms. Lambkins needs to be sure that her users have passwords that will be hard to guess or crack, but not impossible to remember. If she makes passwords too difficult, giving Mr. Bill the password `g8j;kqd`, he is likely to write it down. For some users, passwords that represent the words of a sentence, like "I won't let Mr. Condon get into my files" `IwlMCgimf`, in upper and lower case, may be both easy to remember and impossible to guess.

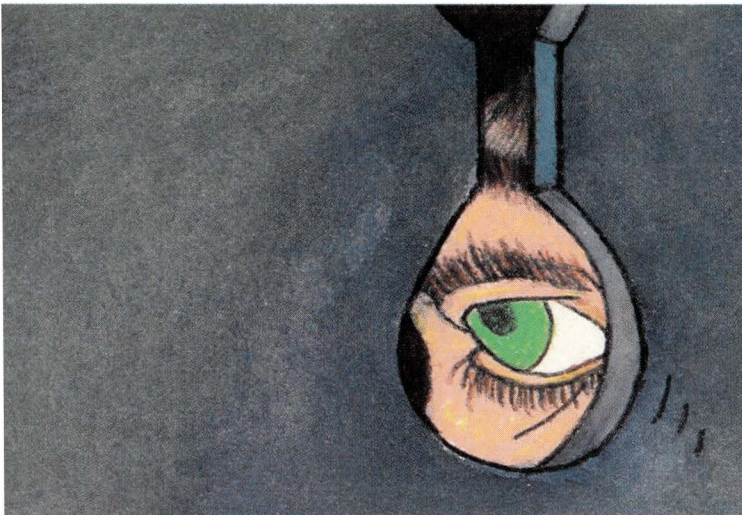
Ms. Lambkins can ensure the use of proper passwords in several ways. She can build or acquire a password generator that creates secure passwords. She can use software, like `npasswd` (see "Great Security Shareware"), that checks the

NIS, and `nispaswd` for NIS+, follow the same rules as the `passwd` command, but change the password in the NIS or NIS+ database. Users cannot issue these commands unless `rpc.yppasswdd`, the server for modifying the NIS/NIS+ password, is running.

The shadow password file helps reduce some of the vulnerability of passwords by maintaining the encrypted keys in a separate file that is not readable by ordinary users. Crackers, therefore, cannot copy the passwords to a local machine and attempt to crack them off-line. The shadow password file is used with the C2 option of SunOS 4.1 and with Solaris 2.0.

Using Superuser

To minimize risks, Ms. Lambkins should be religious about changing the root password often (once every few months is not too often) and should be careful to make the password nonobvious. If other users or systems administrators will be using root access on the same hosts, Ms. Lambkins should disable login as root, requiring, instead, that privileged users



In Solaris 2.0, the password will not be accepted if it is not at least six characters long and does not contain at least two alphabetic and one numeric or special character.

user's choice of password against certain criteria (e.g., length and inclusion of digits) before accepting it. If she's running Solaris 2.0, this type of checking is built in. She can, after the fact, run software that looks for obvious passwords or exhaustively tries to crack passwords on her system to ensure that they are secure.

The `passwd` command, which changes a password on the local system, does not enforce any standards in SunOS 4.1. Though it encourages passwords with six or more letters, it will accept a shorter password if a user persists. In Solaris 2.0, the password will not be accepted if it is not at least six characters long and does not contain at least two alphabetic and one numeric or special character. Additionally, the password must differ from the login name and any shifted or reversed versions of the login name. The password must also differ from the old password by at least three characters. Root, on the other hand, can set up passwords that do not meet these criteria and can modify the criteria.

The NIS versions of the `passwd` command, `yppasswd` for

first log in as themselves and then switch user to root. In this way, she will always know who is actually root at any time, and all superusers can be held accountable for changes they make and commands they issue. At the same time, Ms. Lambkins should be careful to make sure the root password will not be forgotten, especially on standalone hosts and hosts that do not trust other hosts on the network. In some situations, she might have to boot the host from the installation media to get around the problem of a forgotten root password.

Ms. Lambkins should also be sure to execute `/bin/su` when she, or other superusers, switches to the root login. By entering the full pathname rather than simply `su`, she avoids tripping upon a Trojan Horse (a program that masquerades as another to gain access) out to grab the root password and disappear, leaving Ms. Lambkins thinking she mistyped it. It is quite easy to write a program called `su` that prompts for a password, hiding the text while Ms. Lambkins types, and then writes the captured password to a file that Mr. Condon

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1 Double click on a variable to create a window that displays its value whenever the program stops.

2 Click on a variable to print its value.

3 Click on a green dot to set a breakpoint.

4 Click on the stop sign to clear the breakpoint.

5 The program is currently stopped here.

6 Click on a function name to display its source code.

7 Set a conditional breakpoint at the current line.

8 Click "next" to execute the next line of the program.

9 Click "go" to continue (or start the program).

Click "help" to learn the rest of MULTI.

Click "make" to compile and link the program.

Click "calls" to display a call stack window.

Click "halt" to stop execution of the program.

Click "edit" to edit the current function.

Click here to see the object this points to.

Double click here to see this array in a new window.

Move the mouse here and type in a new value.

It's worth learning **MULTI** to fix one bug.

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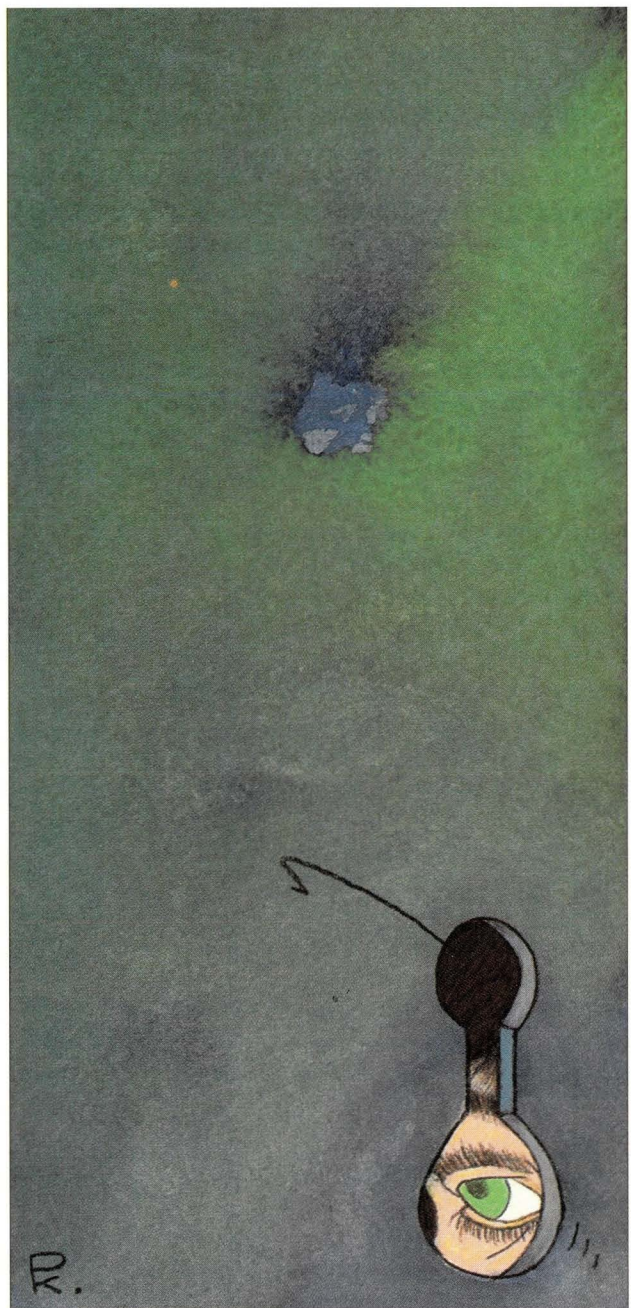
Account Security

BY S. LEE HENRY

The naive systems administrator, Ms. Lambkins, may not suspect that the wiley cracker, Mr. Condon, is targeting her systems. Even so, she should practice safe sysadmin and give Mr. Condon a run for his money. Let's run through a checklist of security gotchas and come up with some advice for her.

Security Policy

Importantly, a security policy needs to be established that emphasizes the significance of keeping passwords private. Ms. Lambkins should specify severe penalties for infractions of the security rules and clearly state that no one should be allowed to know anyone else's passwords, no exceptions. The policy should also address the purpose and proper use of the network and detail users' responsibilities in protecting their data from unauthorized access. This security policy should be explained and/or distributed to all users.



Good Passwords

We all know the rules about good passwords—never use your cat's name (MrLizard), a single word (catapult) or phrase (mypassword)—but still a large percentage of passwords used every day don't comply with these obvious restrictions. Consequently, one of the easiest ways for an attacker to get into Ms. Lambkins' files is by guessing, capturing or cracking a password on her system.

Old accounts, obvious passwords, shared accounts and guest accounts are all classics when it comes to invitations to break into users' accounts, yet these classic security holes provide common entries on far more systems than you would likely imagine.

Knowing another user's password gives Mr. Condon the ability to masquerade as this user, read and modify his files, and, depending on the user's privilege, disrupt processing on the network in minor or major ways. The problem is critically more serious if the obtained password is root's. With all

that by killing H.R. 5983, it will see an even bolder bill next year. Since IIA was an active participant in the negotiations over the compromise bill, I think that Rose will indeed introduce a stronger bill in the coming year.

I owe much of this information to James Love (love@essential.org) of the Taxpayer Assets Project, to whom I am most grateful.

PHIGS

ISO set up PHIGS as a three-dimensional graphics standard, and this has now developed into PHIGS PLUS. PHIGS, by the way, stands for Programmers Hierarchical Interactive Graphics System. Up until now, the only way you could access the reference documentation was through the X Consortium's release. Now O'Reilly & Associates, Sebastopol, CA, has brought out an immense volume that contains all the reference documentation edited and rewritten by Linda Kosko (*PHIGS Reference Manual: 3D Programming in X*; ISBN 0-937175-91-9; 1,116 pages; \$42.95). This is destined to be the standard reference for years to come. It is immense, unwieldy and extremely useful.

DB Wars?

Right between the elections and Thanksgiving, Borland, IBM, Novell and WordPerfect announced their plans to create an API that will provide access to both SQL and non-SQL databases from applications running under DOS, Windows, OS/2 and NetWare. This will clearly conflict with the SQL Access Group's Call-Level Interface.

Is this an attempt at enlarging database connectivity or the opening cannonball in an(other) API war? Is the content technical or political? I'd love to hear your thoughts and comments.

More Words

In the November 1992 *SunExpert*, I printed Geoff Collyer's UNIX Standards Lexicon. John DiMarco, the Computing Disciplines Facility Systems Manager at University of Toronto (jd@cdf.utoronto.ca), has sent me the following UNIX organization lexicon:

gnoose, n.: device to choke software profits

FSFizz, n.: gratis software additive

hUSLer, n.: fervent advocate of the phone company's UNIX

phOSFor, n.: promised UNIX, still faintly glowing

ACEtronaut, n.: high-flying advocate of the "right stuff"

NToriety, adj.: state of being widely

represented as the "death of UNIX" →

Peter H. Salus is the executive director of the Sun User Group. He has attended both ISO and P1003/P1201 meetings and expects remission of time in purgatory as a result. Email: peter@sug.org.

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At the time of this writing, Common Lisp is a draft proposed American National Standard (dpANS). Though it isn't an ANSI standard yet, this is a major milestone in the standardization process.

The X3 Secretariat is investigating the possibility of making these files available in electronic format, on disk as well as on CompuServe. If you have a need for either or both, please contact Dan Arnold at (202) 626-5747 (email address from CompuServe: 75300,2354, or from Internet or another source: 75300.2354@compuserve.com).

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POSIX 1224: X.400 API

According to Steve Trus (trus@duke.ncsl.nist.gov), the Chicago meeting was productive for the P1224 working group, and they are near the completion of the standardization of the P1224 and P1224.1 documents. This committee decided not to meet with the other POSIX groups in the Netherlands, but to meet November 16-20, 1992 at NIST in Gaithersburg, MD.

The first recirculation of the P1224 document began last May 20 and ended on June 19. The balloting pool consisted of 73 members. The balloting for the P1224 document closed with 81% of the ballots returned, and 78% of the eligible voters approved the document. The P1224.1 balloting period began May 6 and ended June 5. The balloting pool consisted of 50 members. The balloting for the P1224.1 document closed with 77% of the ballots returned, and 82% of the eligible voters approved the document.

A 10-day recirculation of the P1224 document was scheduled to begin October 4 and end October 14. A 30-day recirculation of the P1224 document was scheduled to begin October 10 and end November 9. I think that the progress of the P1224 working group has been exemplary. They hope to have the P1224 and P1224.1 standards complete early this year.

No WINDO, but Some Hope

On Tuesday, September 22, 1992, Charlie Rose (D-NC), chairman of the House Administration Committee, cosponsored H.R. 5983 with ranking minority member William Thomas (R-CA) and Pat Roberts (R-KS). The next day, the committee unanimously approved the bill, which is the "Government Printing Office (GPO) Electronic Information Access Enhancement Act of 1992."

Though the measure was a watered-down version of the GPO Gateway/WINDO bills (S. 2813, H.R. 2772), which would provide one-stop-shopping, on-line access to hundreds of federal information systems and databases, it died as

Congress went out of session before the elections in November.

The bill passed the House, then died in the Senate, due to a "hold" (threat of filibuster) from an unknown Republican. I expect a better bill next year. One senator has already announced that he will take the issue up early next year, and the House will likely favor a better (broader, better funded) bill. Last year's compromise was watered down to avoid a presidential veto and to avoid a last-minute hold. (The compromise was unsuccessful, anyway, largely because it was late in the session and because the commercial information providers don't want the GPO materials freely available—so much for my tax dollar going to the government's information resources.) For those of you who support the efforts of the Free Software Foundation, this points up several things, among them the unfortunate clout of lobby money, the present limits of citizen empowerment in the e-world, and the problems of partisan politics when it comes to a fully informed citizenry.

It (happily) points up that the government is taking small steps toward facilitating an on-line society. The original GPO/WINDO legislation would have funded the creation of an electronic GPO, in which anything that was published by the GPO would also be published electronically, on the Internet and via other communications technologies. (Imagine a society where everything "on the record" could be searched electronically; imagine a nation of citizen watchdogs, able to casually or forcefully oversee the workings of their government.) This laudable goal has, of course, been neutered by the the final version of the bill now going to the House, but it's still a step in the right direction.

H.R. 5983 would have required the Government Printing Office to provide public on-line access to

- the Federal Register,
- the Congressional Record,
- an electronic directory of Federal public information, stored electronically,
- other appropriate publications distributed by the Superintendent of Documents,
- and information under the control of other federal departments or agencies, when requested by the department or agency.

The Superintendent of Documents would have been required to undertake a feasibility study of further enhancing public access to federal electronic information, including assessing the feasibility of

- public access to existing federal information systems,
- the use of computer networks such as the Internet and NREN,
- and the development (with NIST and other agencies) of compatible standards for disseminating electronic information.

H.R. 5983 discarded the names WINDO or Gateway without a replacement. The new system was simply called "the system," a seemingly minor change, but one designed to give the service a lower profile.

There were other items discarded, but Rose's staff has reportedly told the Information Industry Association (IIA)

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Circle No. 14 on Inquiry Card



JOHN W. KELLEY JR.

by PETER H. SALUS

Telecommunications

The growth in data traffic (the Internet, ftp, EDI, fax, CAD/CAM, LAN, WAN, etc., etc.) over the past few years has been enormous. Just what the next few years have in store is a mystery. But it is more than merely obvious that the need to transmit vast quantities of high-speed data in bursts that are largely unpredictable is here.

ANSI's T1 committee handles telecommunications. T1S1 is currently involved with a proposal from Motorola on a frame relay standard.

Frame Relay

Frame relay transport is a method designed to accommodate bursty data. There are four features that characterize it:

- high transmission speed,
- low network delay,
- high connectivity and
- efficient use of bandwidth.

Handling packet transmissions, the frame relay protocol is intended to accommodate variable burst sizes and unpredictable traffic volumes.

I understand that the Consultative Committee on International Telephony and Telegraphy (CCITT) is also looking at the same protocol as a candidate for standardization, so there is a likelihood for this to be adopted by some organization, soon.

Frame relay is employed on FUNET (= Finnish Universities) by Juha Heinanen, who was one of the creators of the Finnish Internet. It's also mentioned by two of the contributors to Lynch and Rose (*Internet Systems Handbook*, Addison-Wesley, 1993, ISBN 0-201-56741-5, \$59.25). Vinton G. Cerf mentions frame relay in his section on "Future Evolution of the TCP/IP Protocols" (pages 105-106), and J. D. Case refers to frame relay as a new area of technology (page 515).

Jason Zions wrote me as follows:

"I wonder how frame relay will fare against ATM-based technologies. I can see frame relay being used in the short term to replace multiple T-1 or DS-3 links in current WANs. In the long term, though, there's something very seductive about using the same technology, ATM, in both the LAN and WAN environments. I see both frame relay and FDDI (including FDDI-II) losing to a single unified architecture based on ATM."

There is a small pamphlet on frame relay (*The Basics Book of Frame Relay*, published for Motorola University Press by Addison-Wesley, ISBN 0-201-56377-0, \$9.75). It is fairly readable but has little "hard" information. It is decidedly not a technical book.

Common Lisp

The public review period for Common Lisp ended just before U.S. Thanksgiving (November 26, 1992).

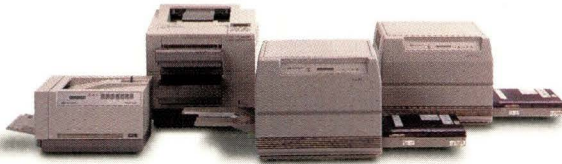
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The first line forces the script to be interpreted by WKSH, in “openlook” mode. Next, we do an Openlook Initialize (oi), setting up the top-level “application.” Many WKSH commands have long and short forms; we could have used OIInitialize instead. I am a bit nervous about all of these commands being added to the shell’s name space. The long forms are much less likely to clash with local commands, but they are quite a bit more tedious to type.

The first argument (T) is a bit tricky. It is the *name* of an environment variable for WKSH to fill with the application’s widget handle. The ability for built-in commands to stuff values into specified variables is new with WKSH. I would like to see this idea extended to scripts themselves; I have often had to work hard at passing data back from commands.

The second and third arguments are the application’s name and title. The title will appear at the top of the window. Finally, we pass in all of the script’s calling parameters. These would typically be X Window directives of one sort or another.

The third line (spanning two print lines in this column) tells WKSH to Create a Managed Widget (cmw). We first specify the widget’s handle (w), name (wc), class (staticText) and parent (T). Then we set the widget’s string resource to hello, world. Widgets can have lots of resources, but the WKSH programmer can ignore them as long as the default values are acceptable.

In line four, we ask WKSH to Realize Widget (rw) T. Finally, we drop into the WKSH Main Loop (ml) and wait for events. In a normal application, we would have created buttons, tied pieces of shell code to them, and waited around to field requests. In this example, all events are handled directly by WKSH.

What About Speed?

Many applications have no need for blazingly fast execution. On a typical UNIX workstation, short shell scripts are indistinguishable from compiled binaries and shell built-ins. After the normal window start-up latency has

been taken into account, the same principle applies to WKSH scripts. I wrote a 200-line prototype for a file system browser. It lists directories, displays files and does all sorts of nifty stuff. On my ELC, it runs as crisply as I could possibly desire. Like most X applications, it runs a bit slower over the net, but the speed is still quite acceptable.

Really complicated applications would no doubt bog down in the shell’s interpreter code. The traditional solution is to write C programs for the hard stuff. This causes process invocations, however, which can slow things down. Can we get the speed of C without paying the process start-up penalty?

Amazingly, we can, and the method adds greatly to WKSH’s value as a general-purpose programming tool. By building our C routines as dynamic shared objects, we can make them available for loading and execution by properly written programs. WKSH is just such a program, and it passes this capability on to us.

Adding Built-in Commands

Let’s say we need a trig function (e.g., sin) for some script. Remember, this needn’t be a windowing application: WKSH *is* ksh. Here’s a trivial example that shows how to add sin to WKSH as a built-in command. First, the C code:

```
#include <math.h>

int b_sin(argc, argv)
    int argc;
    char *argv[];
{
    double x;
    sscanf(argv[1], "%lf", &x);
    printf("%lf\n", sin(x));
}
```

This isn’t much different from a normal C program. Change its name to main, and it would compile and run just fine. Instead, we’re going to load and use it under WKSH.

```
[WKSH] cc -g -PIC -c t.c
[WKSH] ld -o t.so t.o -lm
[WKSH] libload t.so
[WKSH] cmdload sin
[WKSH] sin 3.141592654
-0.000000
[WKSH]
```

It seems a bit odd to talk about “adding built-in commands.” The essence of a “built-in” command, however, lies in the fact that the shell executes it directly, rather than interpreting it or spawning another process. The libload and cmdload commands actually modify the executing image of WKSH, adding hooks for the new function(s). When we tell WKSH to run sin, it executes b_sin. Period.

The routine above clearly needs some work. Some error-checking would be useful. The printf should be an alt-printf, directing output to the *command’s* (rather than WKSH’s) stdout. Nonetheless, the code above does work, and so does WKSH.

I haven’t covered all of WKSH, by any means. Real WKSH scripts use callback functions, convenience functions and variables, recursive widget commands and other advanced features. Some of these are necessary; others help WKSH scripts to be concise and readable. I hope, however, that I have persuaded you to give WKSH a try.

Ah, but How?

Sun doesn’t have a wonderful reputation for including up-to-date technology, particularly when external sources are involved. New AWK (nawk) took about five years to make it into SunOS. Standard ksh still isn’t in SunOS 4.X; Solaris 2.0 includes it, perhaps in trade for cc.

Consequently, I don’t know when Sun will ship WKSH. User input might help, however: Let Sun know you want it, and it might come along a bit faster. In the meanwhile, Acacia Computer Agency, (908) 548-6955, supports WKSH for both SunOS 4.X and Solaris 2.0. →

Richard Morin produces Prime Time Freeware, a semi-annual CD-ROM collection of redistributable, UNIX-related source code. Between releases, he consults, writes and teaches on UNIX topics. He may be reached at Canta Forda Computer Laboratory, P.O. Box 1488, Pacifica, CA 94044 or by email at rdm@cfc1.com.

nearly everyone else has gone with Motif. Once again, there are important issues involved. Like whether the \$50 check goes to OSF or USL. There are also technical issues, like whether pushpins are critical to user happiness. Pardon me while I scream.

Despite the confusion, X has taken over most of the workstation screens in the world and is working hard on solving interoperability problems for PCs. WKSH will hit most workstation releases in a year or two, and X will be there to meet it. I can start building my applications in WKSH, keeping an sh version for the few systems that won't have WKSH.

Which X?

The Wonderful World of Windowing and Widgets has brought us a host of virtual buttons, sliders, pushpins and so forth. These are controlled through assorted libraries, APIs, etc. Programmers need help with all this, and the publishers are more than eager. There are dozens of books on X programming alone, and many more covering its use, administration and proposed extensions. I estimate that X has added at least a foot of books to the average UNIX application programmer's shelves.

WKSH promises to parlay our hard-earned shell scripting knowledge into this brave new world of buttons, sliders and other widgets. Let's take a look at the X landscape, then at how WKSH fits into it. The basis of X is the X protocol, which allows a "client" program to interact (perhaps remotely) with an "X Server." The server displays characters and bit maps, and relays "events" back to its clients for handling.

The application programmer enters the picture by writing clients. Some clients need very fine control of the appearance or functionality of the window(s). The "Xlib" interface provides this, by way of 300+ C functions. Unless the programmer is into pain, s/he will avoid this level whenever possible.

The next level of abstraction is provided by the "X Toolkit (Xt) Intrinsics." This interface packages the raw Xlib functionality into assorted "widgets," such as buttons and scroll bars. Proprietary toolkits such as Motif and Open Look add customized wid-

gets and convenience functions. WKSH allows shell programmers to interact with X at this level using either Motif or Open Look widgets.

hello, world

A few lines of C code are all that is needed to output the traditional UNIX greeting. Putting it out in its own window is another matter. Using the nor-

mal X libraries, it is hard to accomplish this in under 100 lines. Here is a script that brings things back down to size:

```
#!/usr/bin/wksh -openlook
oi T an hello "$@"
cmw W wc staticText \
$T string:"hello, world"
rw $T
ml
```

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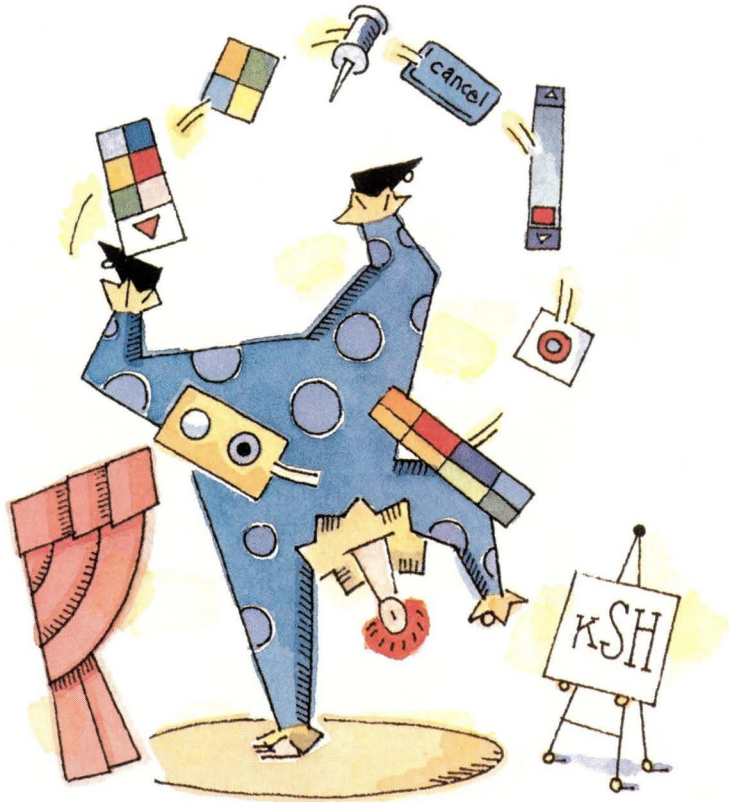
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Circle No. 8 on Inquiry Card



ROBIN JAREAUX

by **RICHARD MORIN**,
Technical Editor

The Windowing Korn Shell

UNIX has an unusually rich complement of user-mode tools. Raw SunOS 4.1.3, for example, has more than 500 commands a user can invoke from the command line. Local commands and aliases further enhance this count, and the shells allow commands to be combined in useful ways.

Unfortunately, UNIX still lacks certain useful pieces of “enabling technology.” It would be very nice, for instance, if every UNIX system had a basic DBMS. No fancy locking, user input modes or performance features are needed. Just a utility to allow users to interchange piles of data, knowing that the recipient will be able to extract needed information without needing to write code or buy extra software. But I digress.

This column (and its subject, WKSH) addresses a different problem. Let’s say I want to write an attractive and useful browser, installer or other user-inter-

face program. It should be event-driven, allowing the user to decide what to do when. No menus, either; just buttons, sliders, good stuff like that. And, by the way, it has to be platform-independent; my program has to work on lots of different UNIX machines.

Compiled languages lose instantly; I can’t require the user to perform (or even wait for) the needed compilation, linking, etc. Besides, complicated procedures like that break far too often. Shell scripts also lose, because they have no way of presenting the kind of user-driven interface we want to have. So I’m sunk, in terms of traditional UNIX tools.

Fortunately, as you have no doubt surmised, there is a way out. When it’s not suing people, USL actually does some very nice work. The current release (SVR4.2) contains a new scripting language, Windowing Korn Shell (WKSH). WKSH is upwardly compatible with regular Korn shell (`ksh`) but

adds X Window System access, along with a couple of other nifty features.

X Window

In “A Box Seat at the Window Wars” (*SunExpert*, February 1992, Page 42), I wrote that Sun users should ignore the fight between X11 and NeWS. Stick with SunView, I advised, until the smoke clears. Well, it’s been a few years, and smoke still surrounds us. Different smoke, to be sure, but no less confusing.

The X11/NeWS fight is largely over, or at least quiescent. If a few killer NeWS applications show up, we may see some resurgence of interest in NeWS. Otherwise, X holds the field. SunView is still usable, of course; I’m using it right now on my 3/60. My ELC runs OpenWindoze, however, letting me play with NeWS, X, etc.

The current battle lines are drawn between Motif and Open Look. Sun and USL continue to push Open Look;



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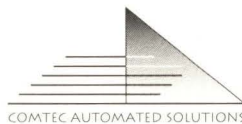
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Notice that the pattern match is done locally. In the example above, I have assumed that this generates two files: `file.1` and `file.README`.

The program asks whether you really want each file. You can see this on the listing above as a question like

```
mget file.1?
```

I have answered `y` to both questions and the files will be transferred. You stop the program from asking the question by saying `prompt` to the `ftp` program. This is useful if you want to ship several files and get on with something else while that is happening.

More Useful Commands

Sending a file from the local machine to the remote machine is just as easy as getting a file. You use the `put` command:

```
ftp> bin
200 Type set to I.
ftp> put putfile
200 PORT command successful.
150 Binary data connection for putfile
(192.88.50.1,2260).
226 Binary Transfer complete.
local: putfile remote: putfile
122 bytes sent in 0.0024 seconds
(49 Kbytes/s)
```

You can change the name of the destination file by giving an extra parameter to the `put` command. You can send more than one file by using the `mput` command, and again you need to turn off prompting if you don't want an "are you sure" question before every transfer.

If you need to move about the local file system, the `lcd` command is useful:

```
ftp> lcd ..
Local directory now /usr/export/home
ftp>
```

If you are unsure where you are on the remote system, the `pwd` command will print the current working directory.

After you have finished talking to the remote system, it's good manners to log out. You do this by using the `quit` command—or by typing `^D`. If you want to make a connection to a new site, you can use the `close` command to finish the current connection and then use `open` to create a new connection. ➔

Peter Collinson runs his own UNIX consultancy, dedicated to earning enough money to allow him to pursue his own interests; doing whatever, whenever, where ever... He writes, teaches, consults and programs using SunOS running on a SPARCstation 1+. He is the Usenix Standards Liaison. Email: pc@expert.com.

find that the latest ftp code from Berkeley will switch automatically into image mode at start-up time if it detects that the other end is a UNIX system.

If you are connected by a slow or unreliable link, then the hash command is useful. When a file is being transferred into your machine, the program will print a hash sign (#) every 8,192 bytes. It can be comforting to watch the data arrive like this.

It's occasionally useful to be able to delete remote files when you are moving files around. If I have an account on a remote machine, I often find myself logging to prepare some file for shipping perhaps using tar. I will fall back to my local machine to run the ftp command and need to delete the temporary file on the remote machine. This is easy; use the DEL command:

```
ftp> del putfile
250 DELE command successful.
```

The command takes the usual set of shell expansion characters and so can delete more than one file.

Moving More Than One File

If you want to get more than one file from a remote site, you use the mget command to execute multiple "gets," for example:

```
ftp> mget file1 file2
```

will get the two named files. You can use wild cards too. Here I am asking for all the files starting with the string file.

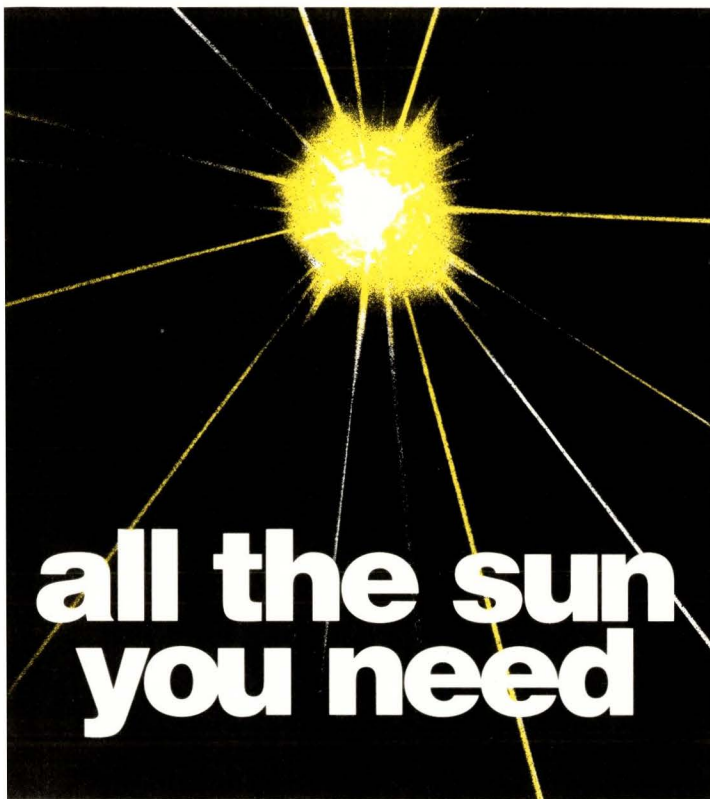
```
ftp> mget file.*
mget file.1? y
200 PORT command successful.
150 ASCII data connection for file.1
(192.88.50.1,2248) (1128 bytes).
226 ASCII Transfer complete.
local: file.1 remote: file.1
1158 bytes received in 0.83 seconds
(1.4 Kbytes/s)
mget file.README? y
200 PORT command successful.
150 ASCII data connection for file. README
(192.88.50.1,2249) (3125 bytes).
226 ASCII Transfer complete.
local: file.README remote: file.README
3208 bytes received in 2 seconds
(1.5 Kbytes/s)
```

Again, I have taken some liberties with line wrapping. The way this works is simple. First, the ftp program asks the remote end to send the list of files that can be seen in the current directory. Then the required pattern match is made using the match string, and this generates a list of files.

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using `zmodem` to get a remote file:

```
ftp> get README "|sz -b"
```

All the transfers shown so far are clearly marked as "ASCII." Machines represent text in many different ways. One of the aims of FTP is to ensure that a text file can be transferred from machine to machine and still be readable independent of differences between the originating and local architectures. It will automatically convert from the weird and wonderful coding that passes for a text file on the remote machine into a coding that your local machine understands. This is done by passing the file in and out of a canonical text representation.

FTP ensures that a text file can be transferred between machines and still be readable independent of differences between the originating and local architectures

For example, if the remote machine ends text lines with a carriage return followed by a line feed, then when the file is transferred, it will end up on your UNIX machine with lines ending only in newline (this is the ASCII line feed character on most, if not all, UNIX systems). In the examples above, the counts on the transfers show that the newlines from the remote UNIX system are translated into `<CR><LF>` pairs for shipping. The `ftp` program makes those `<CR><LF>` pairs into newlines as the output file is written.

This conversion is a good thing for text files, but things will get confused when we are shipping a binary file. We certainly don't want the data in an executable image interfered with. For this reason, I mostly ship files between UNIX systems using "image" mode. This guarantees that the contents of the file will not be inspected and possibly altered. To get into image mode you say

```
ftp> binary
200 Type set to I.
or
ftp> bin
200 Type set to I.
```

Files are now transferred as is. You generally need to use this mode for moving anything other than text files between systems. If you know that the other end is a UNIX system, then it's generally safe to assume that text files will transfer safely in image mode too. It's not clear that this assumption will hold true for all time, especially if systems using multi-byte characters become more widespread. However, you will

make UNIX users happy. They appear to be working in a familiar environment using familiar commands.

Incidentally, newer versions of the ftp program have added a new command nlist that outputs the simple list. The ls and dir commands are the same in these versions, giving the output from ls -l.

Moving Files

Having navigated yourself around the remote machine and found a likely looking file, then you will want to pull it back onto your system. This is easy. You use the get command:

```
ftp> get README
200 PORT command successful.
150 ASCII data connection for README
(192.88.50.3,1033) (75 bytes).
226 ASCII Transfer complete.
77 bytes received in 0.01 seconds
(7.5 Kbytes/s)

ftp>
```

I ask the remote FTP process to transfer the file README. It will be written in a file called README in the current directory. Should I want to place the file in a different place, I can say

```
ftp> get README COPYFILE
```

placing the data into COPYFILE. It's also useful to be able to

look at README files, and you can make the output be printed to standard output by using the destination "minus:"

```
ftp> get malloc.README -
200 PORT command successful.
150 Opening ASCII mode data connection for
malloc.README (261 bytes).
This is a alpha/pre-alpha version of the
new GNU malloc, and is intended for people
who want to play with it/look for bugs/etc.
and so on
```

The text starting "This" is the data from the file.

You can also put a UNIX command in double quotes after the get.

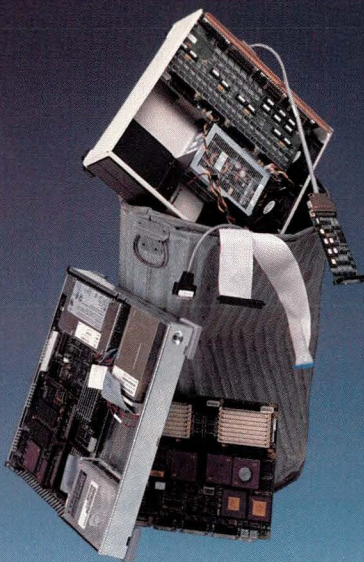
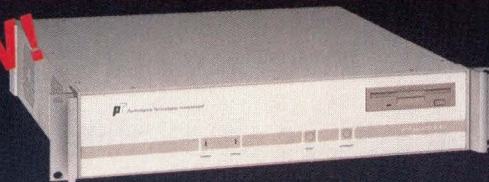
```
ftp> get README "|more"
```

gets the file and pipes the result through the more command. This displays the output on your screen in a way that is controllable by you. Sending the file to a local command has a great number of applications. For example, you can send the incoming file to a local printer. It becomes more interesting if you are using a phone link to call from a local machine into a system that is connected to the Internet. You can then have files placed directly on your local machine by "get"ing the file and sending it through the program used to ship files down the phone link. Here I am

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tions allow `ftp` as a synonym. Since `ftp` is easier to type, I always try it first. This means I only need to summon up the spelling for *anonymous* in rare circumstances.

You don't need a password, but it is conventional (and a courtesy) to supply your email address in response to the question. It should be *your* email address, not that supposedly belonging to Mr. Mickey Mouse or some other well-known person like "anonymous." The password information is logged so local system administrators can see who is grabbing what. I notice that `ftp.uu.net` complains if you don't supply something that looks like an email address.

In general, anonymous FTP doesn't allow access to the whole file system on the machine. On a UNIX system, you will have access to something that looks like the root of a file system, complete with a `bin` containing some commands, an `etc` with an abbreviated password file, a `dev` containing some devices, and so on.

The `ftp` daemon has executed a `chroot` system call to a public area of the file system on the machine. This moves the apparent root of the file system to begin at the top directory in the public area, so any new processes see a portion of the whole file system. You are now safely contained in a little playpen, accessing only the files that the system administrator wants you to see. Many people are sleeping safely in the knowledge that some random user is not trampling on the complete filestore of their machine but the greater community can access files on the machine in a controlled way.

Looking for Files

Having gained access to the machine, what can you do now? There are several commands that allow you to see what is available. The commands map onto a basic set of protocol primitives. I am describing the version of the `ftp` program that I find on my version of SunOS; details may differ.

You must not forget that you are using the FTP protocol and that it provides its own model of the file system. This model can be running on a different underlying architecture. It is the job of the FTP daemon at the remote site to hide this from you. The designers of your end have tried to make the commands familiar so you don't have to think too hard about what to type.

There are two commands that list file names: `ls` and `dir`.

```
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection
                                for file list.

lost+found
tmp
systems
vendor
info
index
news
and so on
```

The `ls` command maps onto a request in the protocol (NLIST) that asks for a list of all the available files to be

sent. UNIX implementations have generally responded to the request by sending an unsorted file list. The above example is from `ftp.uu.net`. Other systems can choose to do this in a different way. Here is a VMS machine (`ftp.spc.edu`):

```
ftp> ls
200 Port 192,91,199,2,9,19 Okay.
125 File status okay; about to
                                open data connection.

AAAREADME.TXT;6
ABSTRACTS_F92.LIS;2
BBOARD.DIR;1
BINARY.DIR;1
BOC-L.DIR;1 CKVKIT.COM;22
and so on
```

You can give arguments to the commands to list the contents of a particular directory. You can also use wild cards. The normal shell filename expansions are permitted, so:

```
ftp> ls [pq]*
```

will list all the files starting with "p" and "q."

If you want more information on the files, then you can tell the `ftp` program to get the output from `ls -l` on the remote machine. The `dir` command does this:

```
ftp> dir 200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 2965
drwxr-sr-x  2 0  0 512 Jul 26 19:39  .forward
-rw-r--r--  1 3 11 0   Jul 26 19:40  .hushlogin
-rw-r--r--  1 3 21 59  Jul 31 14:37  .kernrc
-rw-r--r--  1 3 21 0   Jul 26 19:41  .notar
lrwxrwxrwx  1 3 21 15  Jul 26 19:41  ClariNet
                                -> vendor/ClariNet
drwx--s--x  5 7 11 512 Jan 7 1992  admin
and so on
```

I have doctored the output somewhat to remove some white space so it will fit on the page. Here's similarly doctored output from a VMS machine:

```
ftp> dir
200 Port 192,91,199,2,9,20 Okay.
125 File status okay; about to open data connection.
US: [ANON] AAAREADME.TXT;6 3/3      24-OCT-1992 02:01
US: [ANON] ABS_F92.LIS;2   2101/2103 22-SEP-1992 00:58
US: [ANON] BBOARD.DIR;1   3/3      23-MAY-1992 23:26
and so on
```

Again you can give arguments to the `dir` command to select the files to be displayed.

I said above that the FTP protocol defines a model of a tree structured file system. The model includes the ability to move around the tree using `cd` commands and has the notion of the current working directory. This conspires to

This is the standard format for communication. Each message in the protocol is a code and some explanatory text. Both ends transmit commands and status information in this way.

The local program sees the "220" and knows it needs a user name. It asks you to supply that. Pressing return at this point means that the default is taken, and your login name is sent to the remote machine. The machine sends back "331" and some text. This decodes as "User name okay, need password." The local program asks for your password and transmits it. As usual, the text of the password is not echoed as it is entered. Beware that it does travel down the wire as plain text, so on some networks you should be somewhat circum-

The designers of your end have tried to make the commands familiar so you don't have to think too hard about what to type.

spect about using `ftp`. In response to the password, the remote machine returns "230," translating to "User logged in, proceed." Finally, the program prints a prompt showing that it's ready to take your commands.

This is a tedious process. You can avoid using the `open` command by supplying the name of the site on the command line:

```
% ftp local
Connected to local.
etc.
```

You don't have to disconnect if you make a mistake in typing your password or login name. You can reset things by using the `user` command:

```
% ftp local
Connected to local.
220 local FTP server (SunOS 4.1) ready.
Name (local:pc): pc
331 Password required for pc.
Password: type incorrect password
530 Login incorrect.
Login failed.
try again
ftp> user pc
331 Password required for pc.
Password: type correct password
230 User pc logged in.
ftp>
```

On most systems you can automate the login process further by inserting a line in a control file called `.netrc` on

your home directory. The line for local might be:

```
machine local login pc password don'tdoit
```

The login sequence quickly becomes completely automatic:

```
% ftp local
Connected to local.
220 local FTP server (SunOS 4.1) ready.
331 Password required for pc.
230 User pc logged in.
ftp>
```

If you connect to a machine regularly, this can take the pain out of the interaction. I do feel that you should never use the password option. It's never a good idea to write a password down, and it's even worse to put it in a known place on the machine. It's true that the system attempts to give you a false sense of security by refusing to work if the file mode is not `-rw-----`. To see this, try

```
% chmod 666 .netrc
% ftp local
Connected to local.
220 local FTP server (SunOS 4.1) ready.
Error - .netrc file not correct mode.
Remove password or correct mode.
221 Goodbye.
ftp> quit
```

Doing `% chmod 600 .netrc` will make things work. I said "a false sense of security" because the problem is crackers. What happens when somebody cracks your password and becomes you? Well, you have given that person the key to all your other accounts on several other machines. By becoming "you" on one machine, the cracker has free access to your accounts elsewhere by simply reading your `.netrc` file. Just don't put passwords into the `.netrc` file.

There are some situations that do not require you to have an account on a remote machine. You can use `ftp` as a tool to gain anonymous access to files on an archive server. Here, I am logging into `uunet` as an anonymous user:

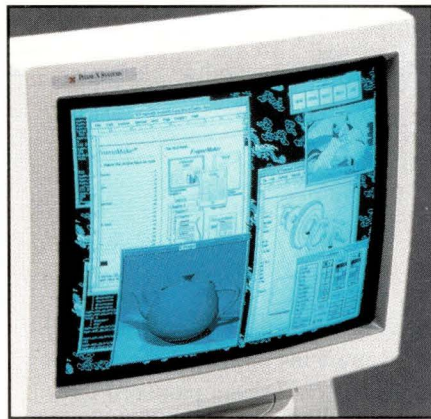
```
% ftp ftp.uu.net
Connected to ftp.uu.net.
220 ftp.UU.NET FTP server
      (Version...) ready
Name (ftp.eu.net:pc): ftp
331 Guest login ok, send e-mail address
      as password.
Password: email address entered
230 Guest login ok, access
      restrictions apply.
ftp>
```

I have wrapped the lines in this and several other examples. This is anonymous FTP, allowing access to files on a machine without the need of an actual user account. You are supposed to log in as `anonymous`, but many implementa-

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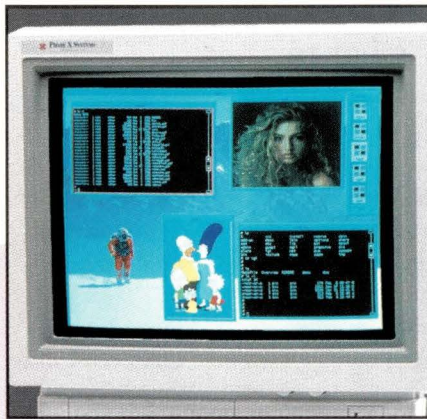
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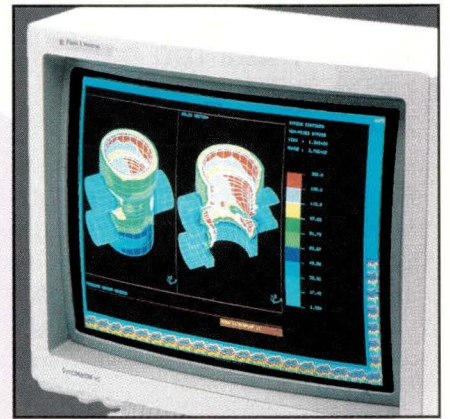
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But as the corporate mainframe is augmented or even, in some cases, replaced by SPARC-based servers, the need for mainframe-like services on those systems grows. And, as a result, companies that can provide that kind of service think there is a real opportunity for them, even though there are literally hundreds of smaller firms already vying for Sun service and support accounts. "It's a wonderful market," says Bull's Mahoney, even though

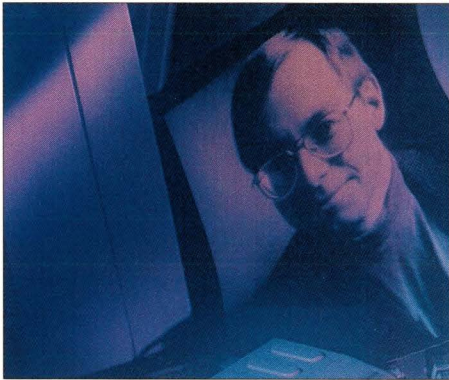
left for a week-long business trip. I, myself, was out at a press conference that morning. But, Mary Anne, the assistant ME, came in early and discovered that sometime, over the weekend, my workstation had gone stark raving bonkers. The fan was no longer loud. It was roaring. "Like a jumbo jet during takeoff," she said.

She ran for help and got it, but not before the workstation came down with a crash, took the network with it,

cessor as long as x̄m doesn't get lost.

We use this kind of string-and-a-prayer equipment because we're rough and we're tough and we're daring... and because it's cheap, and the lab gets all the good stuff. The rub, though, is that when it goes down, no one is going to help us but ourselves. There is no vendor to take it back to.

Fortunately, we do have a good relationship with a fourth party. They supply us with nothing but spare parts,



Strange new products are starting to appear in the service and support industries, for instance, remote systems administration.

he estimates that he has "over 870" distinct competitors. Still, he is optimistic because of this new customer: the very large organization that is not only national but which may even global, and which is anything but a single-vendor shop. "My niche is that I've got the money...to handle that kind of business."

The Part, Part 1

None of which has anything to do with my fan, or why I'm going to be late with my story. Let's see. It all started a few weeks ago when I noticed that the fan on my machine was starting to make all sorts of weird noises. It's never been exactly whisper-silent, but this was different. This was loud. This sounded like a logging truck, going over a speed bump, in reverse, uphill.

So I went to Doug, who is both my editor and the fellow who does most of the front-line technical stuff around here, and I said something along the lines of Gosh-My-System-Sounds-Awful. Then, he went and listened, and said something like Gosh-It-Does-Doesn't-It. But, since we were all busy and the air seemed to be circulating and my machine wasn't hot, we figured we'd deal with the problem later.

Then, the following Monday, Doug

and generally loused up everyone's day. By the time I got in, around noon, Spike (a fellow from Software Tool and Die, a software consultancy that occasionally gets Shanghaied into providing technical support for us) had cracked the box and looked inside. As I came in the door, he pulled the fan out by its roots. He shook it over my desk and out came a small mountain of black dust. "Well," Spike said, dropping the fan into the pile of dust (where it impacted with a muffled thud), "looks like you'll need a new one of these."

I agreed, grimly, and there then followed a terribly amusing period of about two days during which I attempted to find the right part. You see, we're self-maintainers. In fact, we're a little more than that. Most self-maintainers, if something breaks, can take it back to the vendor. We, however, use a combination of equipment we picked up and jury-rigged ourselves—it's our way of empathizing with the reader. Witness my 3/50 qua X terminal...actually, it says 3/60 on the front panel, but it's really a used 3/50 motherboard that's been sorta filed down to fit inside an empty 3/60 chassis that somebody found at a garage sale. It works well as a terminal and text pro-

and they don't exactly send them by whatever service it is that you're supposed to use "when it absolutely, positively has to be there overnight." But, they're friendly and helpful, and I figured, Hey! How much of a problem can it be to get a new fan? Gotta be a piece of cake, right? I called 'em up, and a very personable woman there took the part serial number (after two or three tries of me attempting to find it), said it would be in the mail just as soon as humanly possible, and...by the by, what was the expiration date on my Visa?

New Customer, New Vendor

I realize I still haven't finished telling you the thesis of this article I'm going to write, as soon as I get my computer back. Let's see. Where was I? Oh yes...*As a result of these changes in the service customer, service providers are themselves undergoing a radical and rapid evolution. They are, in some cases, pursuing entirely new business models, some of which are exotic in the extreme.*

I know that sounds a wee bit apocalyptic. But, there's evidence. First, there are already companies—like Bull HN—that are positioning themselves to be service, maintenance and support providers to these multinational giants.

In fact, you can get into some interesting semantic battles here. Is a firm that provides support to such large corporations (and which provides things like an equipment audit as often as boards) still really in the maintenance business? Or is it really some kind of outsourced MIS?

Second, strange new products are starting to appear in the service and support industries, for instance, remote systems administration. Traditionally, of course, systems administration isn't a TPM offering. It is traditionally the province of on-site system admins or of local consultants who will, for a fee, support one or more installations. Now, however, that's changing. "We provide remote system administration...and we can do it very cost-effectively, by modem," says Lars Garf, president of OPEN-Service Corp.

OPENService is a new company that offers a service to customers who are "new to UNIX...who want more than bug fixes. They're people who need real system-administration support." The way the company provides this is to put proprietary software on each node in a customer's network. The software is invisible to the user, but if it detects a problem, it emails OPEN-Service. The company then either contacts the user, or, just as likely, takes care of the problem remotely. In theory, "though of course we keep the customer informed of everything we do," the user might never even know that there had been a problem, or that it had been fixed.

The company is selling its service directly and through OEMs. Garf says, for example, that Computervision Services remarkets OPENService among its other products. Moreover, there are others interested in the same kind of market. Bull HN, for instance, says it too is interested in remote admin. "What you need is something, hardware or software or both, that would be resident at the customer's system and would be able to predict a problem. Not just report it, but predict it...and, in fact, we are engaged in research on a project called 'Blue Sky' for just such a product."

Third, and most dramatic of all,

TPMs and fourth parties are even exploring completely new relationships with their customers. Consider Apex Computer, which is one of the largest fourth-party providers in the country. Apex's customers—TPMs and the occasional sophisticated end user—support networks that include machines from any of a dozen different vendors. Its problem is how to gain the expertise (not to mention the parts) to successfully support so many different kinds of machines.

"We are partnering with the customers," says Clint Morse, the company's president. "We are taking the approach that we're going there together...we have customers that are willing to work with us to make it happen. That includes helping with the funding." In other words, when the customer sees a need to support a product outside Apex's normal expertise but still wishes Apex to do the service, then it may be asked to finance the necessary training. "They say, 'We'd like you here,' and we say, 'Fine, help us get there,'" says Morse.

But for many customers, it's a bargain. "It is so much more cost-effective for them," says Don Wolfe, the company's national account manager, "that they're actually eager to do so."

The Part, Part 2

Actually, I wouldn't be investing in a service provider at the moment. Because, you see, you remember the fan I sent away for? Well, it finally arrived a day or two later. Joyfully, with visions of getting my box back, I called up Spike and told him. He came down a moment later with his screwdriver and went to work.

I was sitting across the way from him at another desk. I remember I wasn't looking at him. I must have been reading something, perhaps a story galley. Anyway, in a second I heard Spike singing. It was sort of gruesome. Not that Spike sings badly (he doesn't). It was what he was singing. It was that song they do on *Sesame Street* a lot. You know. The one that goes, "One of these things is not like the other..."

The new fan, you see, didn't look like the old fan. The old fan had this little cage around it. The new one didn't. It

was a different shape, too.

I said something along the lines of "Oh shoot, darn, phooey"—or something like that, anyway—and phoned my fourth party. Then I had a long chat with another very pleasant individual (this one a man) who was knowledgeable, helpful, compassionate...and whose remarks boiled down basically to, "Oh...*that* fan. They don't make that fan any more."

I called up Spike. "Oh," he said. It took him a day, and part of a night, to modify the fan so that it would fit. That was a day, you understand, that he didn't spend doing the programming and consulting that he is actually supposed to be doing.

It says much about Spike's basically decent nature that he is now talking to me again. Though I've noticed he has this habit of snarling whenever I use the word "fan" around him. Can't imagine why.

'Come Fix It'

All of which leads up to my conclusion. And, yes, believe it or not, I'm actually going to have a conclusion. 'Course, I'm going to make the reader go through the whole bloody article before I reveal what I'm going to say. But, since you're the managing editor and all, I suppose I'll let you in on the secret early.

Did you notice, as I was doing all the above, that I didn't quote any users? It was all vendors. Now why, other than plain laziness, would I do that? Well, because I'm going to conclude that we're coming to an age when the end user is increasingly indifferent to service and support and maintenance. Oh, they'll still have it, and they'll even pay a premium for it, but the mechanics of who does it and what's done will become increasingly removed from the concerns of the individual whose fingers hit the keyboard. I've even coined a cute new term for it. "No Party Service."

Call up a systems administrator. Do it at random (I just pulled names off our subscriber list). And ask them about service. The answers are fascinating. "Most of the time," says Derak Bevis, systems administrator for Simon Waste Solutions (an advanced waste-

water treatment firm), "I don't deal with the down-and-dirty stuff. I just call the guy I bought it from and say 'Come fix it.'" And they do.

The repairman who does so may not work for the vendor who sold the product. He or she may actually be a TPM who has contracted with the vendor. Or, depending on where the problem is, that person might actually be from yet another company who subcontracts from the TPM. But Mr. Bevis doesn't care and doesn't need to care.

Other users? How about Drew Jenkins, vice president of development

at Sunrise Software International Inc., Middletown, RI, a company that offers such products as the EzX GUI development tool. "Basically, we do our own," he says, "or if we can't fix it, we go directly to the local sales office of the vendor for the repair."

He doesn't even bother with TPMs. "The expense of a service contract isn't worth it," he says. "The equipment, quite frankly, is pretty reliable. And when a piece of hardware does go down, it's cheaper just to pay for the repair."

Shall we keep going? How about

Steven Mason, vice president of Software Leverage Inc., a customer software developer based in Arlington, MA? "We do most everything ourselves," he says. "The only time we take it out of house is if the systems physically malfunction." The analogy he uses is the stereo. "If you buy a new speaker or something, you can plug in the cables yourself. If it burns up when you turn it on, that's when you take it back to vendor."

Do you see what's happening here? It used to be that all Sun sites were like ours, with one or two end users tasked

The Sun Selection?

The big question mark for many users is Sun Microsystems Inc.'s own service, support and maintenance programs. Traditionally, it has not chosen to field a large service organization in the same way that, for example, Digital Equipment Corp. has done. Instead, it provides service and support via a variety of programs and partnerships with third party maintenance (TPM) providers and fourth parties—a policy known as "Open Service."

However, a year ago, Sun began to hint that it would use Open Service to retake at least a portion of its own service aftermarket. A year later, it is still unclear whether it is attempting to do so, or desires to do so. "It seems that some days they do want the maintenance business, and other days, they don't," says Stephen Davis, president of US Computer Maintenance Inc., a TPM and systems integrator that specializes in mission-critical systems for the financial markets. "I can't work out what their real attitude is."

Some TPMs report never even seeing Sun in competition for their accounts. "I can remember hearing that Sun was going to get into the market," says Ray Corrales, president and general partner of RC Electronics, which may be the largest provider of service and support for disk drives in the country. "And I can remember thinking, 'Wow, how is this going to affect me?' But now, I've not seen them at all."

On the other hand, there are those who have seen Sun—from far too close for comfort. "The success of Sun's service offerings has radically changed the picture for third parties," says Thomas D. Willson, president of Polaris Services Inc. "I think they've stemmed the erosion. They've got some good programs."

What's going on? Sun seems to be pursuing a strategy that is in keeping with its history. It will fight for ser-

vice accounts that it perceives as being important. It will happily pass on those that are not. Either way, it will use third parties to provide the actual field service. In fact, in late 1992, Sun took steps to make the latter course all the more viable.

Up until 1992, the biggest complaint TPMs had about Sun was about its policies regarding operating systems. "Sun does not allow resellers to resell patch tapes and upgrades on systems they themselves didn't sell," says Polaris' Willson. "The reseller can pinpoint the problem, but then the customer has to call Sun."

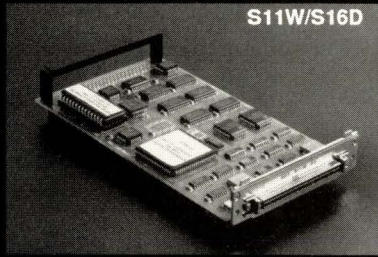
This year, however, Sun revealed a program under which TPMs could become Qualified Service Providers who can ship patch tapes. One of the first of these is Computervision Services. "We will be able to service everything. Hardware or software...including operating system upgrades," says David Bastien, Computervision Services' manager of business partnerships, "whether we sold it or not."

Meanwhile, if Sun is using TPMs to provide support to many of its customers, then so too is it a fourth party. Its Customer Assisted Repair Service (CARS) encourages users to do their own maintenance. "If something breaks, we attempt to determine what's wrong," says Earl Slater, a CARS user and senior distributed support analyst for Arizona Public Service Co., Phoenix, AZ. "Then, we call Sun's hot line and talk to a Sun engineer there. If he thinks our diagnosis is right, then they'll send us the necessary part."

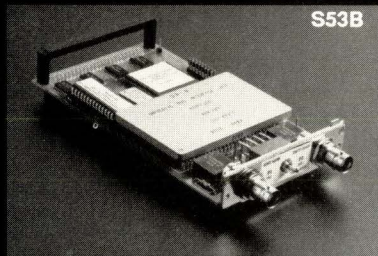
Slater has a TPM contract for mission-critical systems. But why did he pick CARS for his desktop systems? "Basically, these are pretty austere times for everyone," he says. "We were looking to save money."

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SERVICE AND SUPPORT

with the business of support, or, at least, with dealing with the support provider. Now, slowly but surely, as the hardware becomes increasingly reliable, responsibility for support has shifted up a notch, away from end users and even systems administrators. The new buyer for TPMs and fourth parties these days is either a select officer at a large company or, more often, the hardware vendor itself.

The hardware vendor? That's right. Like Sun, for instance, which does not have (and thus does not have to pay for) a large field service operation. "They [Sun] don't want a field service arm. They've have been smart not to have one," explains Apex's Morse. "It gives them tremendous flexibility."

So what does all this mean? Well, it means that "service, support and maintenance" will continue to be an issue for most end users. But, the end user will be increasingly indifferent to who provides them. Increasingly, it will appear to that end user that all three will come from either the vendor, or an in-house support staff—probably composed of the information systems staff that used to support the mainframe.

And this article, should I write it in, say, 10 years, will be of little interest to those end users. It will instead be read by a new crop of customers—those who resell service as a VAR, or those individuals within larger organizations who act as VARs within their companies. Oh, and one more group, by holdouts like ourselves, using an assortment of equipment that is covered by neither warranty nor good fortune.

So that's the article I'm going to write as soon as I get my box back. I'm sorry to make you have to wait for it. I'll promise I'll get to it just as soon as my system's up and running.

Just remember...please...this is not the article. It is just my notes. I'm sure that you wouldn't want all those readers out there to see just what fool this mortal be, eh? I mean, dang embarrassing, and all that. So you'll be careful not to let all this stuff accidentally go to the printer, right? Right?

I said, Right? Ah...hello? Hello? Is this thing on? —>

Companies Mentioned in this Article

Apex Computer
Overlake North, Bldg. A
4500 150th Ave. N.E.
Redmond, WA 98052
Circle 180

**Bell Atlantic Business
Systems Services**
50 East Swedesford Road
Frazer, PA 19355
Circle 181

Bull HN Information Systems
2 Wall St., Tech Park
BillERICA, MA 01821
Circle 182

Computervision Services
500 Old Connecticut Path
Framingham, MA 01701
Circle 183

Eastman Kodak Co.
Customer Equipment Service Division
343 State St.
Rochester, NY 14650
Circle 184

ERI
380 Smith St.
Farmingdale, NY 11735
Circle 185

Maintech
1133 Avenue of the Americas
New York, NY 10036
Circle 186

NCE Computer Group
9717 Pacific Heights Blvd.
San Diego, CA 92121
Circle 187

OpenService Corp.
540 N. Santa Cruz Ave.
Los Gatos, CA 95030
Circle 188

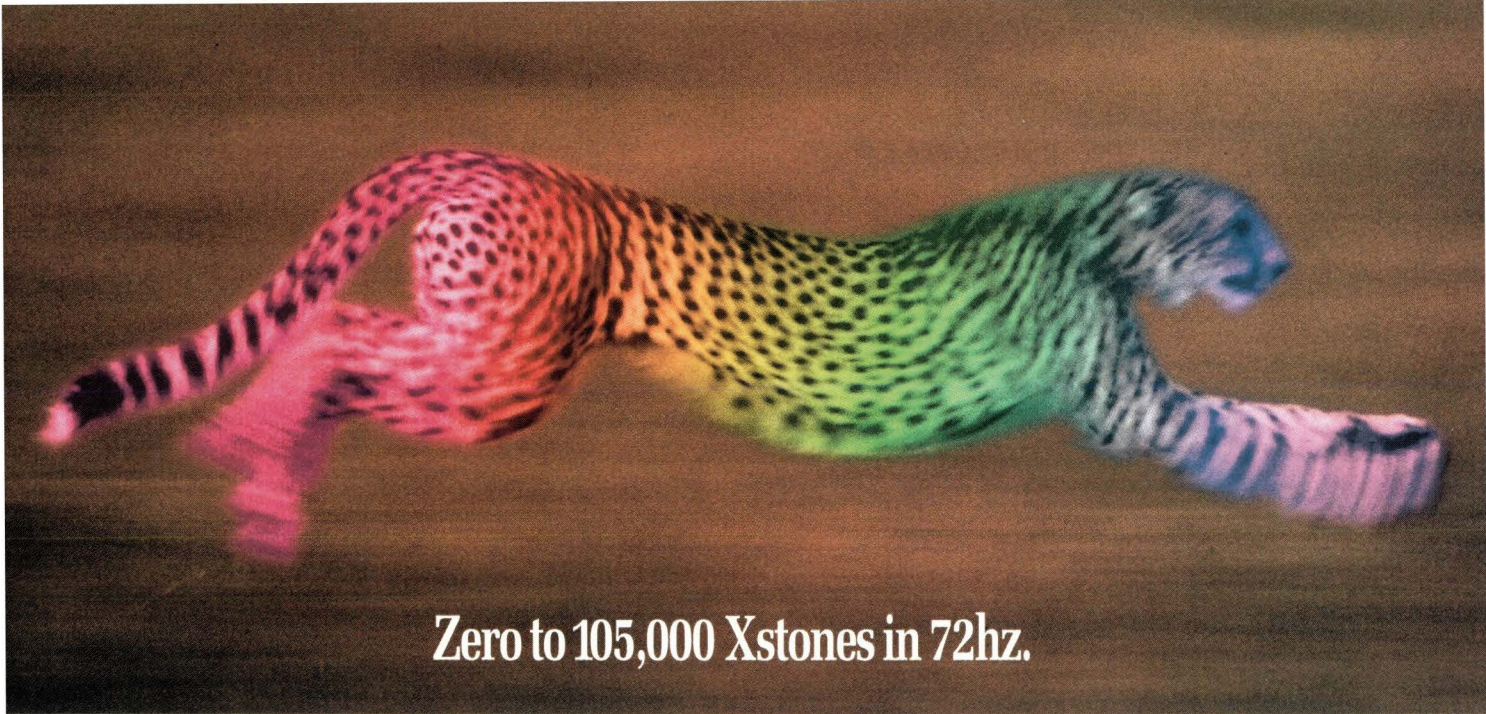
Polaris Service Inc.
399 River Road
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RC Electronics
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Huntington Beach, CA 92648
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**Sun Microsystems
Computer Corp.**
2550 Garcia Ave.
Mountain View, CA 94043
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Circle No. 47 on Inquiry Card



Data with Legs

by BARRY SHEIN, Technical Editor

This month brings us a movable data feast: a removable magneto-optical cartridge disk drive with a good performance story, and a V.32bis modem from a familiar name.



Unison Information Systems Ltd. claims speeds similar to fixed SCSI drives for its Opti/Max read/write MO 5¼-inch removable disk.

Opti/Max

The Opti/Max from Unison Information Systems Ltd. is a read/write magneto-optical (MO) 5¼-inch removable disk for use with Sun Microsystems Inc. workstations. The main feature of this particular drive is its speed: The manufacturer claims speeds similar to fixed SCSI drives. This is much better than most MO disks I have looked at. To investigate the disk's performance ourselves, we used the NFSstones benchmark, which generates a stream of disk operations that mimics a typical mix found in a workstation server environment. The NFSstones benchmark can be used on a local disk and generally is used locally in this manner to calibrate the speed of a disk configuration before doing NFS testing across a network. The results (best results of several runs) are shown in the Figure.

I would conclude from these results

that any difference in performance on this particular benchmark between the Opti/Max and a local disk is negligible, around 5%. When you consider that optical disks have a reputation for being several times slower than local fixed disks, this result looks very good. Opti/Max achieves its impressive performance by using a 32-MB cache to buffer reads and writes.

Usable disk capacity, after running `newfs` on a cartridge, was about 260 MB. That would be per side—you can flip these cartridges over—so a total of more than 500 MB per cartridge.

Another plus for the Opti/Max is that it uses the standard Sun SCSI driver; no kernel software installation is necessary. To install the disk, we just configured the SCSI unit number, powered down our Sun/IPC, plugged the Opti/Max into the SCSI chain, powered it all back up and we were ready to go. I inserted a cartridge, used Sun's format to label the cartridge (these cartridges rarely need formatting), ran `newfs` after entering an entry into `/etc/format.dat` provided by the Opti/Max manual, mounted the disk partition, and it all worked as

NFSstones Benchmark	Total Time (seconds)	NFSstones/second
Opti/Max	65	699
Local Fixed Disk	61	744

Figure. Surprisingly, the Opti/Max, with its 32-MB cache, is as fast as a local fixed disk.

one might hope.

Note that Unison does provide some software with the disk. These are almost all replacements for programs like `format`, `mount`, `umount`, etc., as well as some device information programs (these can read back statistics kept by the box: number of reads and writes, and so on).

The main difference between Sun's native versions of these commands, which do work with the Opti/Max, and the programs Unison provides is that the Unison utilities are smarter about the fact that the disk is physically removable. The door to the drive can be locked and unlocked under software control (as well as ejecting and loading and unloading the cartridge). The Unison `mount` command, for example, locks the drive door to prevent accidental removal of the cartridge while the operating system has it mounted. Otherwise the command just mounts the disk the same as the native `mount` command. Unison's `umount` command will also warn you if any other system has remote-mounted the cartridge via NFS. Another important feature of the `mount` command is automatic updating of the information in the Sun SCSI driver when a cartridge is changed.

Physically, this disk and its enclosure are surprisingly large. It comes in its own case and is roughly the size of a small desktop laser printer. It's clear that the actual drive mechanism is of a typical size, mounted roughly in the center of the enclosure, but apparently there's more in this box to accomplish the caching and so forth.

One question worth considering is this: Why might you need a removable

cartridge disk drive? And why would you need a fast one (this speed comes at some premium—you can buy less-expensive 5¼-inch MOs)?

A typical application for a drive like this would be to store files of records that are large, records you do not want to keep on-line (either for space or security reasons), but which must be accessible quickly; a tape just won't do in a situation like this. My own busi-

Opti/Max

Company
Unison Information Systems Ltd.
21 Walsh Way
Framingham, MA 01701

Phone
(508) 879-3200

Fax
(508) 879-0772

Best Feature
Very fast removable magneto-optical cartridge drive. The speed is comparable to a local fixed disk.

Worst Feature
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**MultiTech Systems
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well-built V.32bis
modem that supports
UUCP spoofing.**

ness has such an application, our accounting information. I'd rather not keep old accounting information on-line just waiting for some cracker to get into, but when a customer needs back records (e.g., for tax purposes) you don't want to wait an hour while a tape spins, perhaps first clearing enough space to restore files to disk. A medium like the Opti/Max would be a nice method for archiving this information off-line, a kind of super-floppy (our accounting information is typically 20 to 40 MB/month; regular floppies won't do). Admittedly in our situation we are rarely in that much of a rush, one minute versus five minutes wouldn't make much difference to us (most of our requests are via electronic mail). But it's not hard to imagine applications that would be more sensitive to speed (e.g., telephone support, where you don't want to keep someone waiting even five minutes). If you access a large percentage of a cartridge side when a request arises, then 200 MB can take a long time to read or write on a slow drive.

All in all, the Opti/Max from Unison is a solid product, fast, easy to install and use, and it fits a clear application niche. If you need a removable cartridge drive and need to move your data around fast, the Opti/Max is worth looking into.

At press time, Unison was preparing to announce jukebox versions of the Opti/Max with storage capacities rang-

ing from 10.4 to 100 GB.

The jukebox will allow cartridges to be configured as one or more virtual disks in sizes up to 100 GB. Pricing for the Jukebox Series begins at \$15,000 for a 10.4-GB version.

MultiModem-II

The MultiTech Systems Inc. MultiModem-II, Model MT1432, is one of the new breed of very-high-performance modems that are becoming ubiquitous in this industry. (How did we ever live without them?) This particular modem supports V.32bis (a 14.4-Kb/s standard) as well as all lower speeds, from 9,600 (V.32) down to 300 b/s. But wait, there's more, much more: V.42 error correction, V.42bis and MNP/5 data compression, callback security, remote configuration, two-wire leased-line support (as well as public voice system), fax (CCITT Group 3), password protection, port speeds to 57.6 Kb/s, full AT command set, Application System/400 mode, and if you act right now we will throw in the steak knives and vegetable peeler...oops, sorry, I guess I got a little carried away there.

The MultiModem worked well both with our Sun (Kermit and tip) and a Macintosh using Zterm and White Knight. The MultiTech supports UUCP spoofing pioneered by Telebit. This feature, when enabled, lets the modem perform ACKs for UUCP packets directly rather than waiting for the local host, thus improving throughput. Several features are accessible through DIP switches in the side of the modem as well as through AT commands. The modem also supports MultiTech's proprietary command set if you need that.

Unfortunately, the software MultiTech sent us to use the fax capabilities was all for DOS and not Suns, and we don't have any DOS

systems here. Worse, there is not really any hint in the manuals about how you might write your own fax software or adapt another package, which is what I would have done—there are some pretty good freeware fax packages around. So I can't report on this feature.

In summary, this seems like a very good, well-built and well-designed modem. I informally tried some transfers (e.g., on a Mac and on a Sun using the latest Kermit with sliding windows), and transfers and interaction seemed fast and smooth. MultiTech has been around for years and has always been one of the favorite choices of the UNIX community. If I were to consider purchasing one of these modems, I would certainly want the full story on the fax capabilities: software if they have any and in either case full documentation on how to interface to the fax features of the modem. ↔

MultiModem-II Model MT1432

Company

MultiTech Systems Inc.
2205 Woodale Drive
Mounds View, MN 55112

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Full featured, solidly built V.32bis modem.

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DAL: A Better SQL?

The issue of how to access corporate data from the desktop has been with us ever since the introduction of personal computers. The systems on which companies maintain their corporate data are not the systems that run most desktop applications. Even a “corporate” operating system with the desktop presence of UNIX does not offer the range of shrink-wrapped applications familiar to most desktop users. The problem is compounded by the fact that, even on the same host, no clear standards exist to provide interoperability among different database management systems. Even SQL is not truly standard.

by **PAUL G. KAMP**, Pacer Software Inc.

**Meet Data Access Language,
the first SQL dialect
that is hardware-,
OS- and DBMS-independent.**

To overcome differences in operating systems, application data formats and database management systems, an end user has had few options. One is to rekey everything. Another is to write an application that accepts corporate data from a mainframe, dumps it into a file on a PC and reformats it for input to a desktop application. But what happens when the user wants to move the data to a different application, or wants to access data on a different operating system or in a different database?

Now there is a solution—in the form of a new SQL dialect called DAL, for Data Access Language. DAL is part of Apple Computer Inc.'s Vital integration framework. It is also the first SQL dialect (or database query language of any type, for that matter) that is completely hardware, operating system and DBMS independent. For users the benefits are many, including the efficiency of not having to learn or write different SQL statements just because data happens to reside in different places. Another major benefit is that, when companies want to number-crunch corporate data, they can move it off expensive and scarce mainframes to more plentiful, less expensive and more compute-intensive UNIX workstations.

DAL Technology

The DAL run-time environment has control of all services that exist in the path between the application and the

database manager, as shown in the diagram below. That includes not only the client and the server, but also the management of the particular communication link that connects them. In the case of the Pacer Software Inc. server, for example, that would be either an async or TCP/IP link. Regardless of whether specific features are provided by any particular database management system, DAL presents a common set of features to the application. Common means that the features supporting data access are the same, and behave consistently, regardless of where data resides.

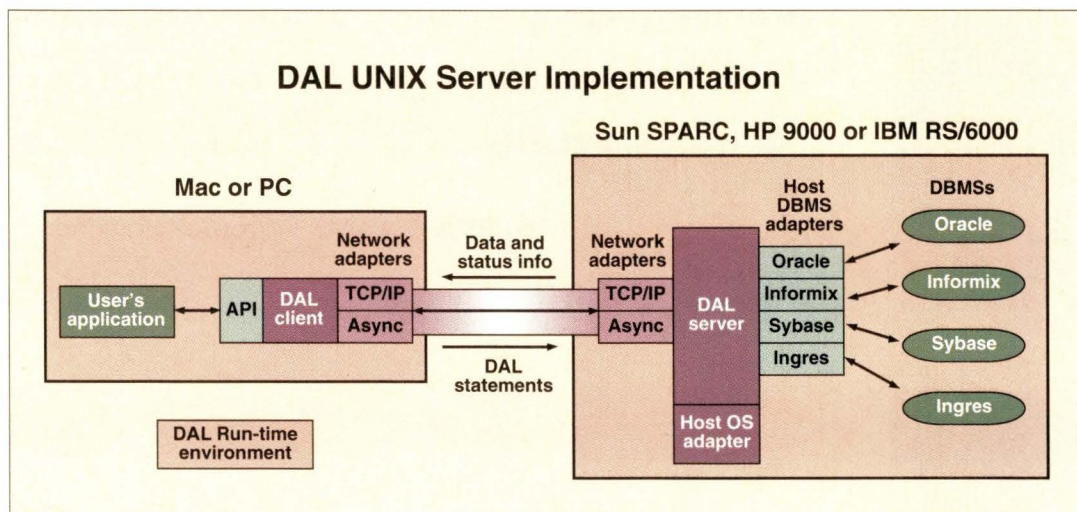
It is DAL's run-time environment, for example, that does the translation between the data representations employed on various hardware platforms, operating systems and database managers. DAL provides a common data dictionary with the names, data types, relationships, structure and organization of entities within each database. Each application sees only the representation (e.g., floating point, decimal) that it expects and in the proper byte order, whether for SPARC, VAX, PC or some other machine. The environment also receives and executes DAL commands from the application, informs the application about the status of command execution, and interacts with the appropriate database managers on behalf of the application.

There are three major advantages of providing a run-time environment in

addition to a common language specification. The first is that different database managers behave differently, and a common run-time environment can mask those differences. The second is that, besides merely reconciling a mix of database management features, DAL can extend features or can even provide new ones that may have been entirely missing in an underlying database manager. Finally, the presence of a run-time environment allows developers to offload processing chores from the application and move them to DAL. This lifts the burden of data access from the shoulders of the application, allowing it to concentrate on the specific tasks it was created to perform.

Rows and Columns

DAL extends the capabilities of database management systems by providing a common data dictionary and concurrent access to heterogeneous databases. These are also examples of how DAL extends the standard ANSI SQL definition. Other examples include support for nonrelational databases. Such nonrelational databases include hierarchical databases and sequential data sets, such as those found in COBOL and PL/1 file definitions. They also include database systems that are really combinations of file systems, data dictionaries and query languages. An example would be VAX/Rdb. Another SQL extension is support for repeating columns and



The DAL run-time environment controls all services between the application and the database manager.

Apple: Sowing Seeds of Industry Support

DAL is already built into the Macintosh System 7.0 and works with many Macintosh applications without reprogramming by the end-user organization. Servers capable of accessing corporate data and passing it to the desktop are available for database management systems running under UNIX, VMS and most popular mainframe operating systems. In addition, DOS and Windows versions of the DAL desktop (or client) environment have recently been implemented. In all, DAL provides desktop applications with access to 12 relational database systems running on 12 major computer platforms.

Further industry support for DAL was recently demonstrated by the July announcement from Microsoft Corp. that it would distribute and support an Apple Computer Inc.-built DAL client for its Windows environment. The announcement was part of a joint Microsoft-Apple initiative to link DAL and the Microsoft Open Database Connectivity (ODBC) specification. ODBC is an application programming interface that allows separate applications to interoperate in the Windows environment. An ODBC/DAL client will translate ODBC calls and information into DAL functions and requests to enable ODBC applications access to DAL servers.

Not Known for UNIX Databases

Though not a company normally associated with either databases or UNIX, Apple is now making its presence felt in both areas. Like IBM Corp. did with SQL in the 1970s, Apple in the 1990s is sponsoring DAL as an in-

dustrywide standard. The difference this time is that the corporate sponsor is both encouraging, and rigorously maintaining the quality of, third-party support for the standard. The hoped-for result will be customers who can acquire DAL technology and applications from many vendors, but who never have to cope with vendor-specific interpretations. The bottom line: Unlike traditional SQL, there will never be more than one DAL dialect.

Apple is backing its efforts to win industry support for DAL with both a marketing and a technology strategy. To market DAL, Apple is essentially franchising specific vendors to develop key pieces of the technology for particular combinations of operating systems, database managers and hardware. Those key pieces consist of clients, servers and the tool kits to build them. On the client side, DAL provides mechanisms to build SQL query or update statements and deliver a request across the network to the appropriate host or server system. On the server side, DAL interprets the request for the specific database managers, assembles the data, and transports the results back across the network to the client's application.

Pacer Software Inc., of Westboro, MA, for example, is authorized by Apple to bring DAL to the major UNIX platforms. Pacer markets a UNIX server for Sun SPARC, HP 9000 and IBM RISC System/6000 workstations that supports common language access to Oracle-, Informix-, Sybase- and Ingres-managed databases. Blyth Software (Foster City, CA), meanwhile, makes a DAL client tool kit for UNIX, in

addition to selling DOS and Windows clients.

Apple's multivendor franchising strategy is to select the companies that have expertise with a specific platform or database manager and authorize them to bring DAL technology to those markets. The opportunity to represent an industrywide standard in a defined market space gives authorized vendors an incentive to comply with a uniform language specification. Other vendors selling DAL servers include Digital Equipment Corp. (for Rdb), Data General Corp. and Tandem Computers Inc. Vendors of database management systems who have implemented DAL servers include Computer Associates International Inc. (on IBM, DEC VAX, Hewlett-Packard Co. and NCR Corp.) and Novell Inc. (for NetWare SQL). Apple makes a DAL server for A/UX.

Besides encouraging compliance with the standard among many technology suppliers, the multivendor strategy also stimulates the growth of a broad market in which to sell third-party software applications. This strategy has already been successful in bringing DAL-compliant applications to market and shows signs that it will continue to be so. To date, more than 20 vendors have introduced applications that use DAL, including Lotus Development Corp. 1-2-3 for Macintosh, Microsoft Excel, Wingz from Informix Software Inc., and Full Impact from Borland International Inc. DAL gives users within-the-application access to data from remote databases, just as easily as if the data were actually managed locally by the application itself.

groups, such as those commonly found in COBOL file definitions. Whether the underlying database is relational or employs one of these other data models, only one data model is presented to the application.

DAL's data model is a table of rows and columns. Each row is a record that contains information about some item or person, such as a customer, employee or inventory stock item. Each column consists of individual data values



DAL presents an intuitive, relational and uniform internal database structure to applications.

pertaining to the person or item, such as quantity or salary. Tables may have relationships in which a table belongs to a table group. For example, an employees table may be part of a departments table, which may be part of a corporate table. Each table is unique within the group of which it is a member.

Relationships between items in one table and items in another are defined by links, each of which specifies a one-to-many relationship between a single row of the parent table and one or more rows of the child table. Links might indicate, for example, that certain members of an employee table belong to a specific member of a department table. The same table may be both a parent and a child to another table, depending on which items are considered. For example, an employee table may be the parent of a department table if the employee is a manager, or the child if the employee is not a manager. What's important, however, is that DAL always presents an intuitive, relational and uniform internal database structure to applications—and that applications always employ a common syntax to access that structure.

The Universal Language

SQL extension did not stop with the data model. Extensions were also made to the language syntax itself, especially in two key areas: data access and program control. In the data access area, for example, DAL added a DESCRIBE mechanism, providing access to system catalog information, such as number of rows and columns in a table, the current owner of a database and the brand of a database.

DAL developers access this type of information with simple statements, such as DESCRIBE TABLES or DESCRIBE OPEN DATABASES.

"We felt that DAL needed to provide a uniform way to access information about the data and information maintained by the system in the DBMS catalog," states Randy Hietter, DAL Program Manager at Apple. "Many database systems don't give you access

program control, has been the addition of C-like verbs for variable declarations, conditional branching, iteration and procedure definitions. These extensions give the run-time environment a processing capability beyond simple data access, which allows it to offload processing from the application. The programmer has a choice about where to do processing—in the application on the client or by DAL on the server. Procedures, for example, can be precompiled and loaded on the server at session initialization to support a number of client applications. Says Apple's Hietter: "If you look at most developers of DAL applications—in-house developers at large corporations that have gone with DAL for custom systems—they rely heavily on procedures."

Programming with DAL is easy. The syntax looks like English. A simple data-retrieval program, for example, might look like the Figure below.

DAL consists of statements that developers embed within C, Pascal and HyperCard applications that are executed by the DAL run-time environment. Each statement describes a specific action, such as the retrieval of a data item. Statements start with a verb that identifies the type of statement and

Figure. DAL Syntax

```
open rdp dbms;
open database "accounting" as user "joe";
select dept nr, budget, actual from expenses into x; fetch next of X;
if (budget > actual)
    print "Dept", dept_nr, "over budget by", (actual - budget);
```

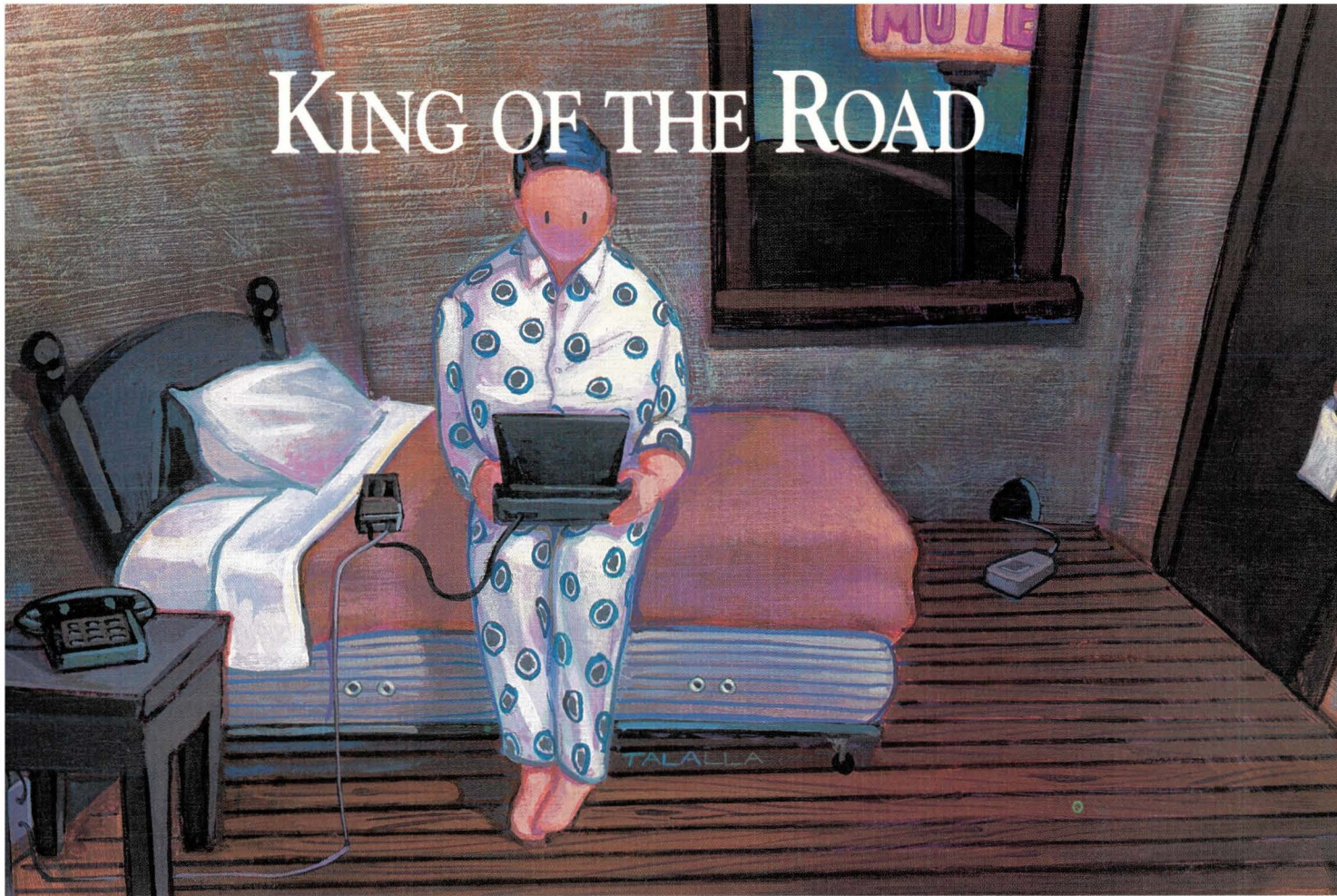
to system catalog information through a DESCRIBE mechanism. In Ingres, for example, you have to issue a HELP command with a variety of parameters or qualifiers. In DB2, it's a different mechanism. In certain instances you have to interrogate a particular view to get that information. The point is that the way you get catalog information varies by DBMS, and that's what DAL insulates the programmer from."

The other major language extension,

the action to be taken, and they may contain one or more clauses. Statements are combined into fundamental program units, called fragments, that correspond to the individual tasks required to perform some operation.

A DAL program is the sum of one or more fragments. Statements and fragments are usually executed sequentially, although applications are usually written so that non-DAL operations are performed between fragments.

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DATA MANAGEMENT

There are four DAL statement types: *Session Control*. Also called APIs, these statements handle interactions between the application and the run-time environment. Includes sending fragments to DAL for processing, initiating processing and retrieving results after processing has completed.

Program Control. Handle program flow, such as looping and branching.

Data Manipulation. Open and close databases, fetch data items and execute DBMS-specific commands. These statements also include the DESCRIBE functions.

Output Control. Generate the output messages that are delivered to the application by the APIs. These messages contain the results of DAL processing.

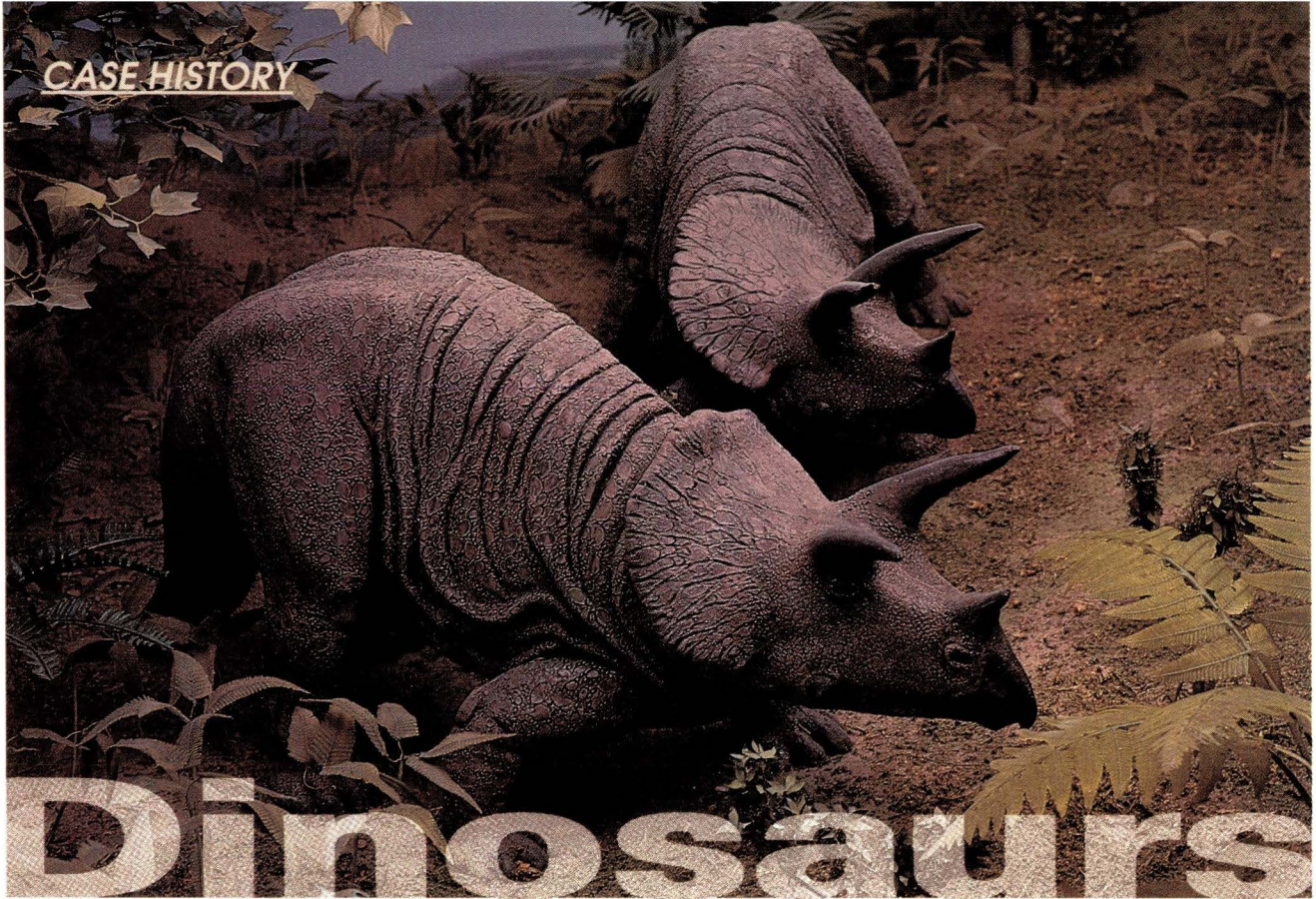
A typical sequence of statements goes like this: First the application will issue an API to send a fragment to the run-time environment, followed by another API to start execution of the fragment's process. The application may also issue other APIs to check on DAL processing status. When the fragment's process has completed, it will write data to a DAL output buffer using an output control statement (usually a PRINT). The application can then retrieve the data with another API. This easy management of remote processing is one of the things that most attracts developers to DAL.

Whether DAL becomes the universal data access language remains to be seen. Already the standard is available on most major computing platforms, operating systems and database management systems. There is no reason to believe, therefore, that DAL would not also interoperate with any other "universal SQL" solutions that may emerge. Now that users are free to select their DBMS of choice, they are not likely to give that freedom up soon. →

Paul Kamp is the director of server marketing for Pacer Software Inc. When not marketing products, he also serves as Pacer's in-house counsel. He can be reached at Pacer, 1900 West Park Drive, Suite 280, Westboro, MA 01581 or by email at pgk@pacersoft.com.

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CASE HISTORY



Have Their Day in the Sun

It was a small tragedy, and long ago...but tragic it remained. A tiny creature, stirring and half formed in the shell of a large oblong egg much like that of a bird, ceased to live. Perhaps the blame lay with the weather, or a predator or just some unkindness of fate. But, for whatever reason, the tiny heart ceased to beat, the developing muscles and bones grew still, the half-formed brain no longer carried the beginnings of animal awareness...

by MICHAEL JAY TUCKER, Executive Editor

“I guess the little boy in me was fascinated by fossils...while the man in me was interested in solving a frustrating problem.” So says Glenn F. Daleo, CT supervisor at the Children’s Hospital of San Diego. Daleo, Peter and Sylvia Berens of Sun VAR and peripherals vendor Apunix Computer Services, the Children’s Hospital of San Diego, the Natural History Museum of San Diego, Mitsubishi Professional Electronics, Cemax Inc., Parallax Graphics Inc., Sun Microsystems Computer Corp. and a small army of unpaid volunteers recently joined forces to combine the problem-solving power of Sun workstations with a fascination for fossils.

In a remarkable combination of skill and talent, an inventive band of technologists has managed to bring creatures of a very distant past to children whose present is all too close.

In the process, they've brought a new technology to paleontology, a new tool to medical research, and, not least, brightened the lives of countless children, including some whose lives desperately need brightening.

Specifically, the group came together to use medical CAT scanner technology to peer inside fossils—for example, fossil dinosaur eggs, which can't be physically opened to reveal the contents. That sort of thing had been done before, but usually with expensive industrial scanners. Medical scanners, which are more common, have been tried, but frequently with limited gains. "People have done CAT scans [with medical equipment] on fossils before," explains Sylvia Berens, vice president of Apunix, and an early project volunteer. "But the results had been pretty awful."

That was because, says Daleo, medical CAT scans are designed to look at something that's alive. A CAT scanner can see bones and other hard structures, but it expects to find them within living tissue. "The radiation [of the X-ray] scatters," he says. "It hits the fossil, and it bounces. It's like taking a freight train and running it into a wall. It splatters everywhere."

As a result, scientists who've wanted to do CAT scans of fossils have had to either go to a nonmedical industrial scanner or try to modify existing medical scanners—a strategy unpopular with the medical personnel who use them on a daily basis to save lives.

...by another accident of fate—perhaps more kind, perhaps not—the remains of the unborn being were denied the usual end of the dead in that time and place. No scavenger appeared to clear it away. The natural processes of decay were forestalled. Flood or storm concealed the unbroken egg in dark earth...

Daleo became interested in the problem of fossils when he heard of it at a medical trade show. "This fascinated the heck out of me," he says. "I'd never done any fossils." He approached the San Diego Natural History Museum in search of fossils, which had its own reasons for being interested in CAT scanning fossils. "Collecting fossils can be tedious business," explains Tom Demere, chairman of the department of paleontology at the museum. "But not nearly as tedious as preparing them once they're found."

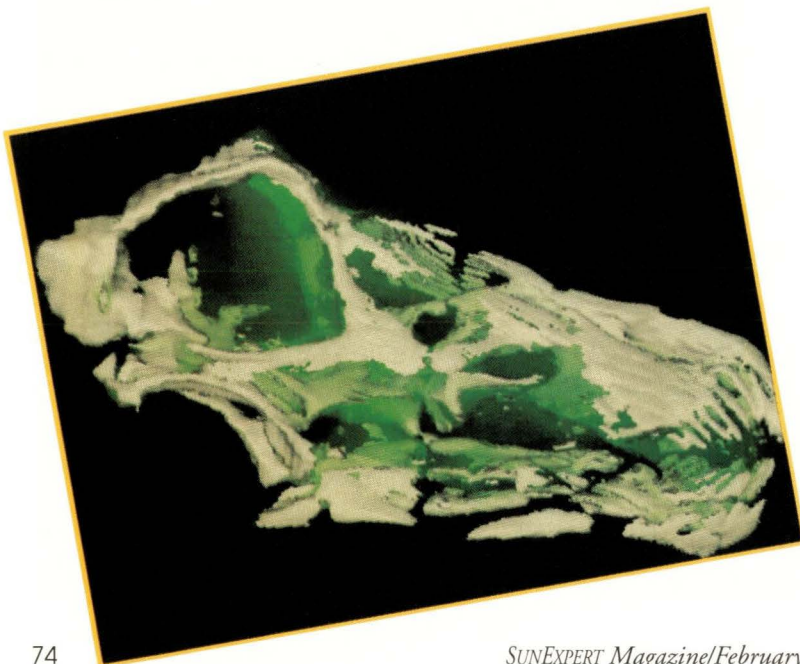
Fossils usually come encrusted in rock, after all. And to get them out, people are reduced to performing hard physical labor with delicate tools. "It's time-consuming and therefore expensive," says Demere. "And, sometimes, it is destructive." To examine a fossil skull, for example, it may be necessary to cut open its brain case. "It's always been our major pipe dream to be able to look

inside these things without spending three months preparing them."

Demere does research on marine mammals, and some of the first fossils Daleo scanned were ancient walrus skulls. However, the museum happened to be about to launch a major show of dinosaur eggs, egg fragments and juvenile remains—some of the rarest of all dinosaur traces. "Eggs get buried by sediments," explains Dr. Robert Sullivan, a paleo-herpetologist in the museum's department of herpetology. "Sometimes they get buried by the dinosaurs themselves, then, for some reason, they remain so. We really don't know why. Perhaps the site was abandoned. Perhaps there was some catastrophe." But most don't survive long enough to become fossils. They are eaten, or crushed, or just rot away.

To find a printer to output the results, Daleo contacted Apunix, which was working with Mitsubishi to bring that company's printers to the Sun market. Then, to deal with the problem of scanning fossils, Daleo decided to use a most unusual tactic. Before, researchers had attempted to modify medical scanners to fit the fossils. "I took the opposite approach," he says. "I decided to make the fossil act more like a body."

Apunix's Sylvia Berens explains: "Basically, what he does is create a body around the fossils of, well, wet towels. And he was able to get a good CAT scan." With the technique, the



A Diplodocus skull as it appears in a CAT scan. Combining imaging technologies on the Sun workstation with modern medical scanners, paleontologists are able to see the insides of fossils that would otherwise be impossible to analyze without tedious or even destructive preparation.

fossil is carefully wrapped in a plastic bag, and then wet cloth is wrapped around. As far as the scanner is concerned, it looks like a body. Says Daleo, "It [the scanner] thinks its looking through skin, organs, things like that."

Then, to turn the CAT scans into 3D images on the hospital's Sun workstation ("Sun has helped a lot on this," says Daleo), the group turned to Cemax for its imaging software. To turn those images into videos that could be taken out of the hospital and displayed, they went to Parallax graphics for a video board. "They tried scan converters, but that didn't work," says Sylvia Berens. "So that's when we got the Parallax board...and Peter [Berens] wrote some software."

...in heat, pressure and an infinity of silence, the small being was to obtain a form of immortality, its image and the place where it lay becoming rock, the organic molecules leaching away, their place taken by silicon and stone...

There are several groups of researchers in the world working on new methods of using medical scanners for fossils. But, what Daleo calls his "wet rag" method seems to be one of the more successful. Working at night, when patients were asleep and hospital scanners would otherwise be idle, the group soon produced 3D images of many different kinds of fossils.

The verdict of the CAT scans of dinosaur eggs has yet to come in. But scans of skulls have been rewarding. "In terms of skulls, the technique was superb," says Dr. Sullivan. "We've been able to see internal bones that are just not visible otherwise...because there's rock surrounding them."

In the process, though, the project has yielded more than just information on a specific set of fossils. It has also provided a tool for paleontologists. "Now, any poor museum with no budget can walk into a hospital and say, 'Hey, give me a few hours of scanner time. It won't cost you a dime,'"

says Daleo. Where before, he explains, CAT scanning fossils was the province of a tiny elite with either the money or the prestige to command an industrial scanner, now any scientist with the chutzpah to talk his or her way into a hospital can do it.

But, in addition, the medical side of the operation sees a gain too. "Medical people do research with bones all the time," says Daleo. At the San Diego hospital, researchers have already found uses for the technique in dental work and in research on the bones of the middle ear.

...the egg, unbroken and featureless, had lain there in layers of soft rock for uncounted ages. Entire species had appeared, grown to prominence and dwindled to extinction in the time since the day it was last in sunlight. Now, though, there were events...sounds...the ring of a shovel blade on rock...voices...a cry of discovery...

There is another benefit as well, less tangible, but no less important. "The payback for the Museum was that they had to put on a free show for the kids at the hospital," explains Daleo. The images produced by the effort, plus much more provided by the museum itself, were brought to the hospital and presented to the children, in some cases as a private show. "The most isolated kids that we have, bone marrow transplants, had a second show for themselves," says Daleo.

Subsequently, the CAT scan videos were moved to the museum, where they became part of the larger show on dinosaur eggs and juvenile remains. "Our purpose was to gather dinosaur eggs from all over the world," says Dr. Sullivan. "It proved to be a very successful exhibit, if I do say so myself."

And the relationship between the hospital and the museum continues, with cooperation both ways and a series of shows and presentations for

the patients. "Kids who have been traumatically hurt—who are dying—have their own window into the past," says Daleo.

...finely edged tools chipped away at the encasing rock, and suddenly, there was a flood of voices and movement and curious forces...and then, a moment of whispers, and gloved hands lifted it from sand and fragments...bearing the egg away after it been there for longer than humanity has lived...the egg, and the creature within it, which had not lived to see the light, which resided now in a private darkness of rock...but which now would be carried gently away...to be illuminated at last, by a light more piercing than any which may be perceived by living eye. ->

Companies Mentioned in this Article

Apunix Computer Services
5575 Ruffin Road, Suite 110
San Diego, CA 92123
Circle 143

Cemax Inc.
46750 Fremont Blvd.
Fremont, CA 94538
Circle 144

Mitsubishi Professional Electronics
800 Cottontail Lane
Somerset, NJ 08873
Circle 145

Parallax Graphics Inc.
2500 Condensa St.
Santa Clara, CA 95051
Circle 146

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 at the end of the magazine.

Product Melds Databases

A product that allows users to manage and combine multiple databases has been introduced by UniSQL. Called UniSQL/M Multidatabase System, the product unifies the schema of several popular relational and object-oriented databases into a single system that is accessible through the company's own query language.

Currently, the product supports Ingres, Oracle, Sybase and the company's own object-oriented DBMS, UniSQL/X. Future versions of the product will support IBM's DB2, IMS, VSAM and so on. It currently runs on Sun SPARCstations and compatibles. There will be a RISC System/6000 version in the near future. Pricing begins at \$3,995.

UniSQL Inc.
9390 Research II
Suite 220
Austin, TX 78759-6544
Circle 101

DECnet Connectivity for Solaris

Software that allows systems running Solaris to act as DECnet nodes has been introduced by Thursby Software Systems. Called TSSnet, the product makes a Solaris system act as a DECnet Phase IV node, while retaining other networking protocols. It also provides Solaris systems network terminal and printer support under DEC's network protocol, LAT. Moreover, it allows DECwindows and other X clients to run under the Solaris X Window server.

TSSnet gives the user access to DEC's Network Information and Control Exchange (NICE) protocol suite. This allows Sun and other Solaris systems to be managed with DEC's own network management facilities, such as NMCC/



New Bernoulli with Multiple Disks

A Bernoulli drive that supports up to four different removable disk capacities has been announced by Iomega. The Bernoulli MultiDisk 150 has a storage capacity of up to 150 MB, or up to 300 MB with optional compression software. Moreover, it can support disks of several different sizes—35 MB, 65 MB, 105 MB and 150 MB. The company says this gives users the ability to buy only the disk sizes their applications need, so that, for example, multimedia applications would fit on the 150-MB disk while smaller word processing applications would fit comfortably on the 35-MB disk.

Iomega says the drive can match hard drives in terms of speed, with an effective access time of 18 msec and a 5-MB/s transfer rate. An external subsystem with one drive for workstations would be \$1,225. There is also a version with two drives for \$2,499.

Iomega Corp.
1821 West 4000 South
Roy, Utah 84067
Circle 100

DECnet Monitor and NMCC/VAX ETHERnim. Planned for shipment early this year, TSSnet's pricing ranges from \$1,295 to \$3,995.

Thursby Software Systems Inc.
5840 W. Interstate 20, Suite 100
Arlington, TX 76017
Circle 102

Security and Antivirus Software

Software that protects UNIX systems from a variety of system security threats has been brought to market by Woodside Technologies. Called Fortress, the program is said to provide

the ability to investigate and monitor such risks as Trojan horses, worms, viruses and weak passwords. Moreover, the product runs under the Open Look GUI and will be available shortly under Motif as well.

Fortress comes in four components. The first of these is a Trojan Horse detector, which searches the user's path, the entire system or any specified system to locate duplicate copies of UNIX commands. The second is a Worm-Proof, which is supposed to detect and eliminate weak security entry points—such as areas where the login permission may be too lenient.

The third is the File-Inoculator, which protects against virus and unauthorized or accidental file modification. Last is the Pass-Word Cracker, which tests all the passwords to discover those that may be too easy to guess for an intruder. Pricing begins at \$495.

Woodside Technologies Inc.
474 Potrero Ave.
Sunnyvale, CA 94086
Circle 103

PEX from Tek

A RISC-based PEX terminal has been introduced by Tektronix. Called the XP338P, the product can run 2D and 3D graphics in multiple windows,



as well as distributed 3D graphics over a network, via the PEX protocol. The product, which is based on the 40-MHz MIPs R3000, has been benchmarked by Tektronix at a rate of 105,000 X-stones. Furthermore, the company says it clocks at more than 100,000 3D vectors, 10,000 flat-shaded triangles and 5,000 Gouraud-shaded triangles per second. In addition to the R3000, the XP338P uses a 40-MHz Texas Instruments Inc. TMS34020 processor. It comes standard with 8 MB of memory and has two SIMM slots for expansion up to 32 MB. It has a 19-inch color Panasonic display with 1,280-by-1,024 resolution, .28mm dot pitch, 72-Hz refresh rate, invar shadow mask and OCLI antiglare coating.

The XP338P is based on X11R5 and PEX protocol Version 5.1. In addition to standard PEX features, it also supports fill-area (polygon) primitives, hidden line hidden surface removal via z-buffering and 24-bit software dithering, as well as enhanced 3D rendering functionality and immediate mode picking. Pricing begins at \$6,495.

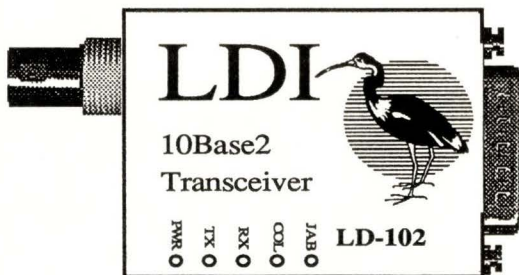
The PEX product can be ordered with a Sun Optimization Kit, which includes a full implementation of Sun's Open Look window manager client and support for native Sun scalable fonts. NFS boot capabilities and a Sun/UNIX keyboard are also available.

Tektronix Inc.
Wilsonville Industrial Park
P.O. Box 1000
Wilsonville, OR 970760-1000
Circle 104

SPARC 10 with SBus-to-VME Link

A SPARCstation 10-compatible workstation that can support both SBus and VME boards has been introduced by Solflower. The SF 410 contains the SPARCengine 10 CPU from Sun Microsystems in an enclosure 16 inches long, 16 inches wide and 6 1/4 inches high. This size gives it the ability to support three SBus slots, two MBus slots and an industry-standard VME backplane for up to three 6U VME boards. There is also room for two 3 1/2-inch SCSI disks, one 3 1/2-inch

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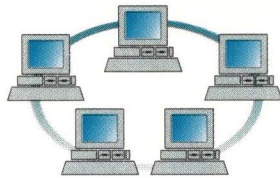
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PVCS is far more convenient to use than SCCS ever was, and it works transparently across OS boundaries. For features, performance, reliability and convenience, there's no comparison - PVCS is the best configuration management product on the market."

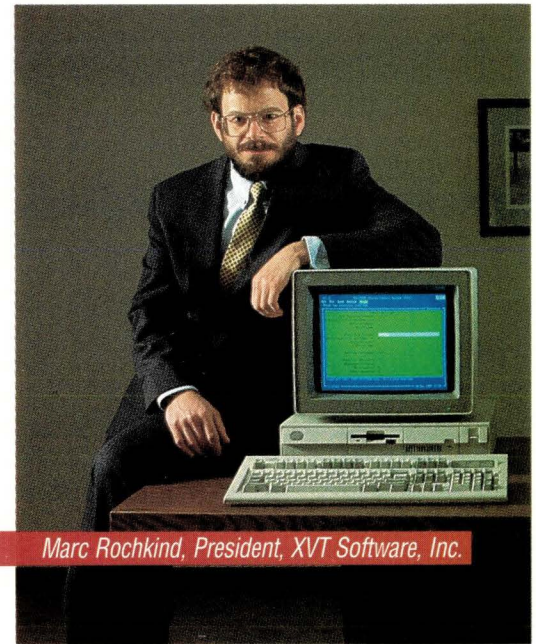
- Marc Rochkind

PVCS Version Manager 5.0 provides complete control of versions of your software and its elements, including binary files. Previous configurations are easily recovered at any time. Parallel development is made safe and productive because conflicting changes are detected and prevented or saved as a parallel development branch. You always know who made a change, when and why it was made, and what was changed. In addition, PVCS Configuration Builder can embed "footprints" containing historic information into compiled code and act conditionally on the information when it uses the code. Footprints in executable code can be read with an included utility. This greatly simplifies bug tracking.

Other new features include:

- Definable promotion models.
- Multilocking and fine-grained lock techniques for better work group access.
- SCCS and RCS archive importing.
- Extensive reporting capabilities.

The PVCS family includes the PVCS Developer's Toolkit that not only makes it easy to connect PVCS functionality to whatever programming environment you use, but also opens the door to much needed application features in commercial applications.



Marc Rochkind, President, XVT Software, Inc.

PVCS Configuration Builder is highly compatible with UNIX MAKE. The macro names are the same and the search path logic is identical. Most UNIX MAKE scripts will run without modification.

PVCS provides the reliability and functionality that developers like Marc Rochkind need to produce the demanding applications of today.

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floppy and one full height 5¼-inch disk, tape or optical drive.

The product comes with all the logic necessary to support SBus and VME boards in the same systems. It has a device driver that deals with virtual address translation, interrupt handling and related issues. Pricing begins at \$25,995 for 32 MB of memory, 19-inch gray-scale monitor, 424-MB internal SCSI disk, 1.44-MB floppy disk drive, keyboard, mouse pad and a Right to Use license for Solaris.

Solflower Computer Inc.

2362 Qume Drive, Suite A

San Jose, CA 95131

Circle 105

Color Graphics Accelerator

Super X, a high-resolution color graphics accelerator for Sun and RISC System/6000 workstations, is now available from Tech-Source. The product is an X Window accelerator capable of driving very high-resolution monitors, such as the Sony's 2,048-by-2,048 DDM280. The company says

this makes a SPARCstation or an RS/6000 particularly useful in such applications as Air Traffic Control and Imaging.

The product uses its own high-speed asynchronous bus, called DeltaBus, which in turn attaches to the host systems via an adapter. Currently, there are adapters for SBus systems and RS/6000 Micro Channel systems. Pricing begins at \$19,000.

Tech-Source Inc.

442 S. North Lake Blvd., Suite 1008

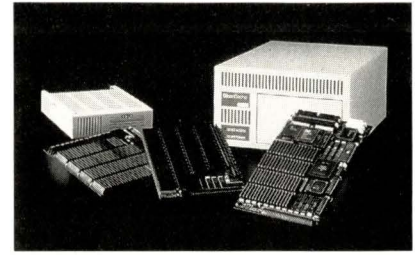
Altamonte Springs, FL 32701

Circle 106

Cache Device for SCSI

A dedicated caching device for Sun and other workstations has been shown by ATTO Technology. The SiliconCache attaches to a host via a SCSI port and provides up to 512 MB of cache memory. Configurations are available in 32-MB increments. The company says that the SiliconCache can shrink disk-access times to under 0.03 milliseconds.

ATTO says that the product can



work with any host system, so long as there is a SCSI port available, and that it requires no system memory or software drivers. Pricing begins at \$7,995.

ATTO Technology Inc.

Baird Research Park

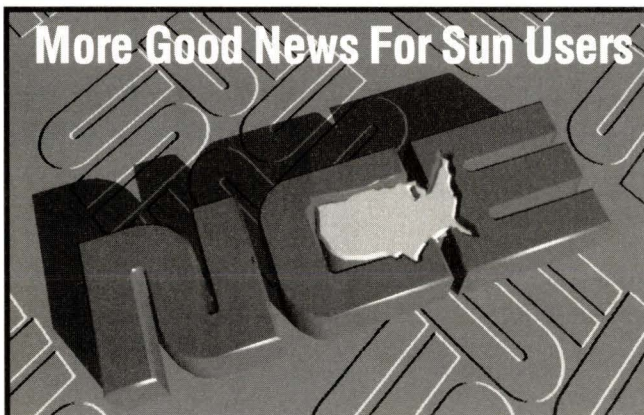
1576 Sweet Home Road

Amherst, NY 14228

Circle 107

Motif-to-Open Look Translator

A product that automatically turns Motif applications into Open Look applications has been released by National Information Systems. Called Accent ToolKit, the product supports both Motif 1.1 and OpenWindows 3.0. A developer can turn a Motif



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NEW PRODUCTS

application running under Motif on a Sun workstation into a Open Look program by compiling it and linking it with the tool kit. Moreover, support for one GUI or the other can be switched at run time with an argument passed on the shell command line that launches the application.

Pricing on the product depends on the buyer. For ISVs, the cost is \$2,500 per application. Educational institutions, meanwhile, may purchase the product for \$950 per development server per site. Organizations that develop applications for internal users may buy the product for \$12,500 per development server per site. Executables linked with ToolKit do not require royalties.

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San Jose, CA 95117-1852

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Large Format Plotter

A plotter that can produce 400-by-400-dpi plots on up to E-size plain paper in less than a minute has been introduced by Japan Digital Lab-

oratory. The JDL 4000E Engineering Document Plotter uses LED electrophotographic technology to output to a large variety of plain paper, vellum and film. Image controls available include rotation, nesting, mirror, scaling, copy and overlay. Line controls include 127 widths and 20 gray scales.

The JDL 4000E provides Automatic Interface Selection for simplified installations. It supports SCSI, parallel, serial and other interfaces. There is also an Ethernet option. Pricing begins at \$38,900.

Japan Digital Laboratory Co. Ltd.

4770 Calle Quetzal

Camarillo, CA 93012

Circle 109

More Storage from Delta

Delta Microsystems has introduced its latest midrange 8mm tape jukebox subsystem. The 60TJ, announced at the Sun User Group Expo last month, includes two 5-GB tape drives, 60 cartridges and provides up to 300 GB of uncompressed storage—up to 1,500 GB with data compression.

The 60TJ is packaged with device

driver software and also offers BudTool automatic backup and retrieval software.

A standard SCSI-2 interface is used for compatibility with all UNIX workstations. Pricing is dependent on configuration.

Delta Microsystems Inc.

111 Lindberg Ave.

Livermore, CA 94550

Circle 110

Correction

The December 1992 issue of *SunExpert*, Page 82, should have reported that the Magic Inkwell PhotoEditor product from ISTR Inc. was available both as software and as part of a package with a Marner SPARClike workstation from Marner International Inc.

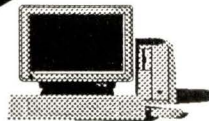
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8501: Well, I wouldn't go that far. But DP managers sure love it. It tells you if there's enough unused tape in a cartridge to complete your backup. It lets you know if the tape is in good condition. And it even reminds you when it's time to install a cleaning cartridge.

Sun Enquirer: That's terrific! But fill us in on some basics. What's your speed and capacity?

8501: I can hold five gigs on a standard 8mm cartridge and my sustained data transfer is up to 500 kilobytes per second.

Sun Enquirer: How about your average seek time?

8501: In high-speed search mode I can find any file on a tape

that contains 5,000 megabytes in about 60 seconds.

Sun Enquirer: That's fast! But I think our readers would really like to know if you're still doing work with some of the top CPUs in the business?

8501: You better believe it! I'm compatible with all kinds of SCSI-based systems. Not to drop names, but some of my best friends are VAXes, Sun SPARCstations and servers, IBM PCs and RS/6000s, HP/Apollons, and Macs.

Sun Enquirer: Boy, you really do get around! Is it hard to get along with so many different hosts?

8501: Not really. You see, the engineers at TTI designed me with 12 little switches on my back panel. By changing the settings I can speak almost any language.

Sun Enquirer: That must really come in handy in a multi-host environment. Do those switches do anything else?

8501: Of course! Besides setting the emulation, they change my SCSI address and let the user choose options like fast file search, short file mark enable and more!

Sun Enquirer: I suppose those switches also help you get along with 2.3 gigabyte 8mm drives?

8501: You got it. I can read tapes that were written by 2.3 gigabyte drives and write tapes in EXB-8200 mode, so they can be read by any 2.3 gigabyte drive.

Sun Enquirer: Mr. 8501, thank you for talking with us today. If folks want to learn more about you, what should they do?

8501: Either call (714) 693-1133 or drop me a line at TTI. I take all my calls and I always answer my mail. Well, gotta' go, but I hope I'll be talkin' to you soon!



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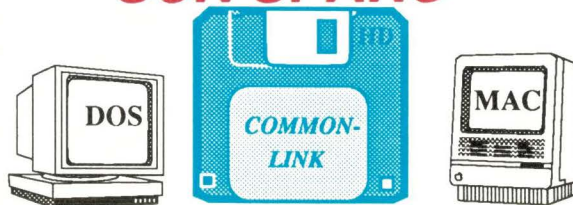
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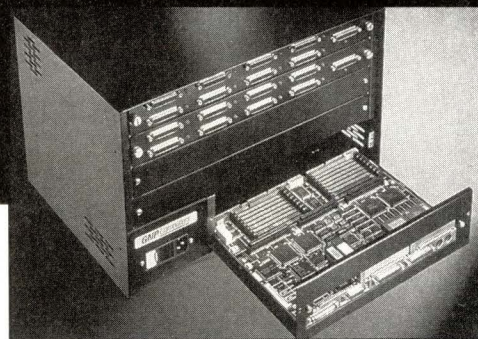
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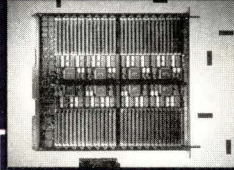
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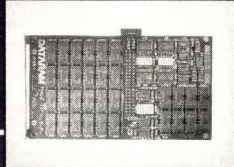
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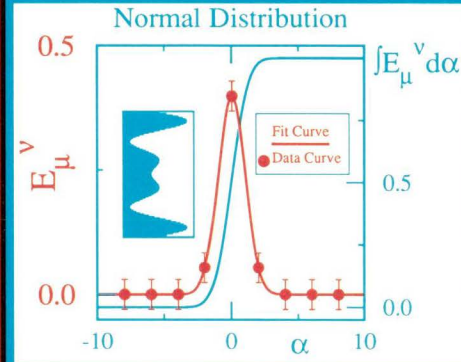


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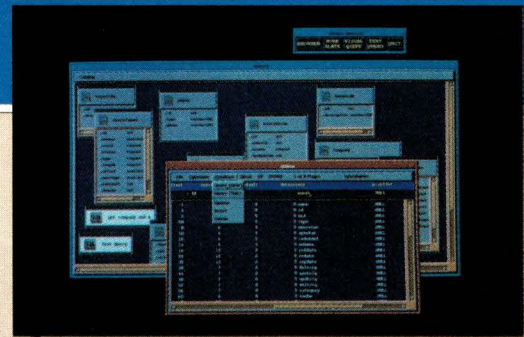
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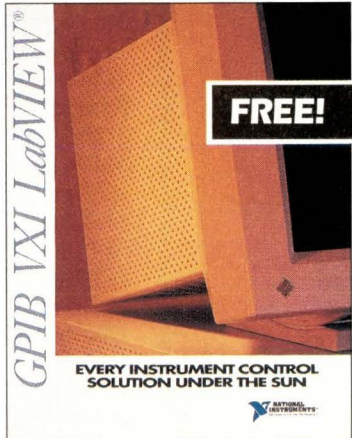
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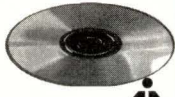
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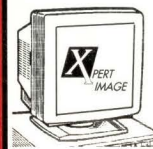
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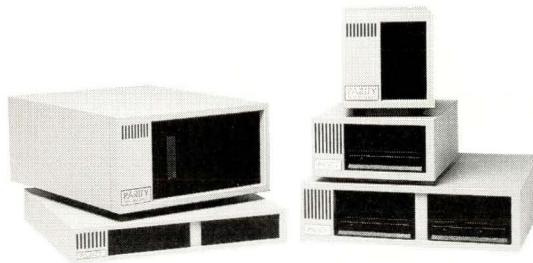
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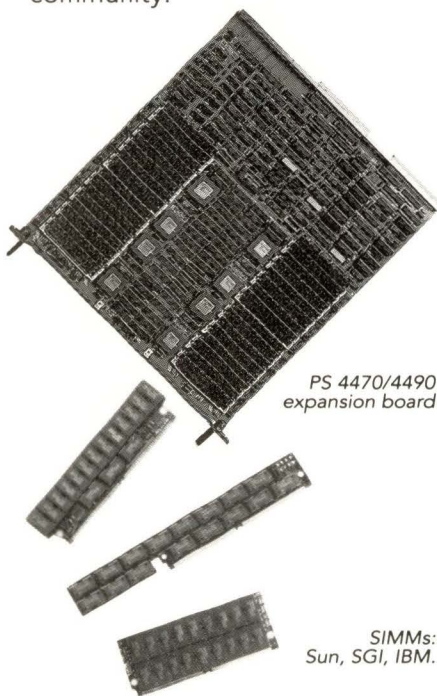
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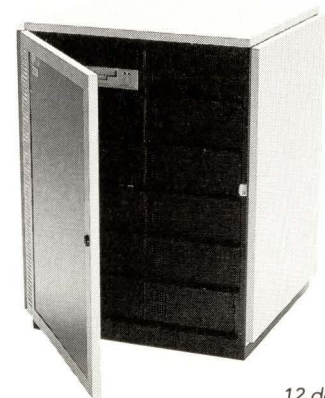
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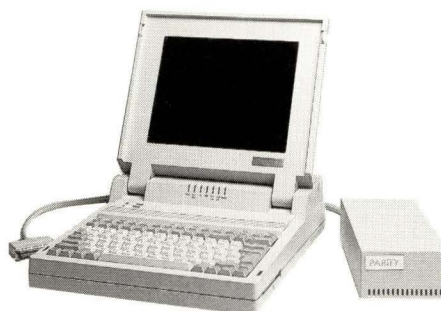
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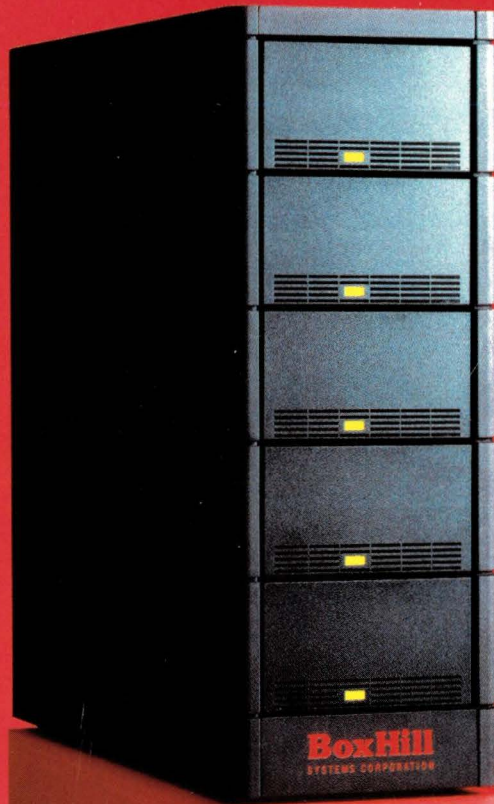
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