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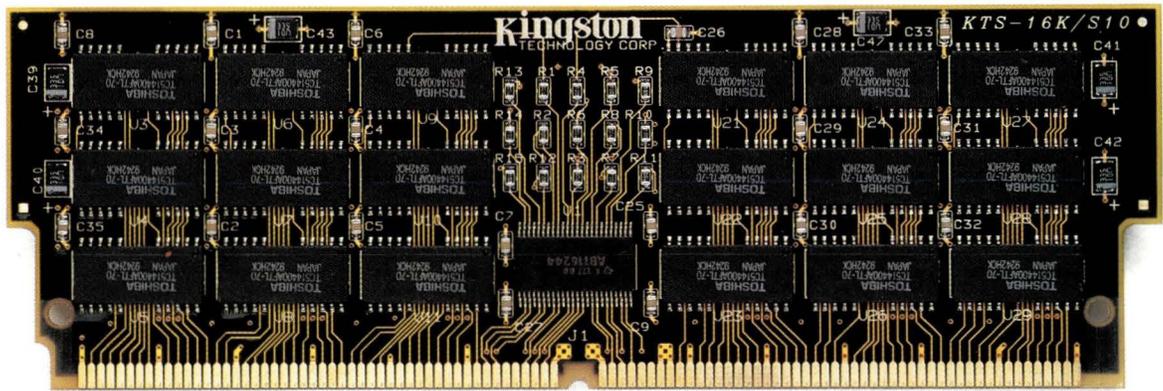


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1.

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2.

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3.

How do you spell xylophone?

4.

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Cover by Dave Spencer Studio



DynaTrap

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

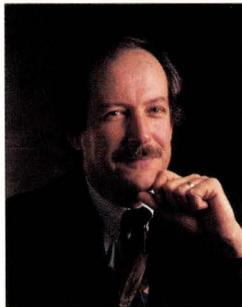
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Editorial

The Packet, Please

"Members will now record their votes via electronic device." That should ring a bell if you watch gavel-to-gavel how your legislators spend your time and money. Well, some of the attendees of SunWorld Expo '94,



held in mid-June at the Moscone Center in San Francisco, might have felt like U.S. representatives and senators because they were asked to record their votes by electronic device. It was all part of an event sponsored by *SunExpert* and the Sun User Group. The aim of the voting was to recognize the most innovative new products on the show floor. And what better judges than the people who labor in the vineyards, who pick and choose products for themselves and for the companies they represent?

Show attendees voted for one winner in each of four categories—peripherals, applications software, network software and system and utility software. A winner and a runner-up were named in each class. *SunExpert* would like to take the time to congratulate the winners and thank the dozens of vendors who subjected themselves to this level of scrutiny.

The best peripheral award went to Sun Microsystems Computer Corp. for the SPARCstorage Array, Sun's fibre channel (25-MB/s) RAID. The runner-up was JVC for the Accelerator, a SCSI plug-and-play write-caching system for network servers.

Attendees voted Andataco's Liken 2.0 the best applications software. It's a Macintosh emulator that features full support for AppleShare clients. The runner-up was Black and White Software for UIM/Xmove, a graphics development package that extends UIM/X, the company's user interface builder.

Hummingbird's eXceed 4 for Windows, a PC-to-UNIX/X Window integration package, was named most innovative network software. Andataco's RTH software was voted runner-up. Robotic Tape Handler is driverless tape autoloader software that works with the company's 8mm and 4mm tape systems.

Last but not least, the most innovative system and utility award went to SunSoft for SunPro Workshop for C, C++ or FORTRAN. Each Workshop is a suite of development tools, including optimizing compiler, SPARCworks tools for browsing, debugging and tuning, TeamWare code management tools and iMPact for developing multithreaded apps. OpenObjects took second place for its Look! C++ productivity tool, which generates an animation of any C++ program.

Again, thanks to all the participating vendors and congratulations to the award winners.

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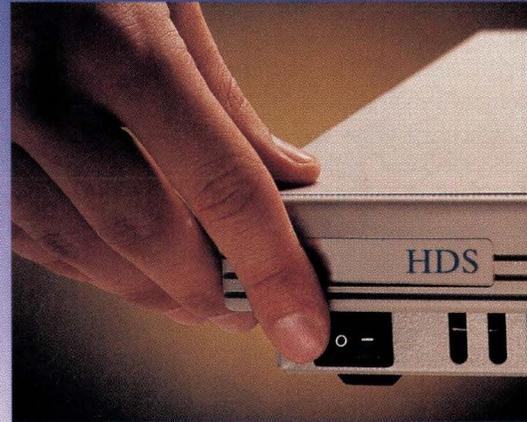
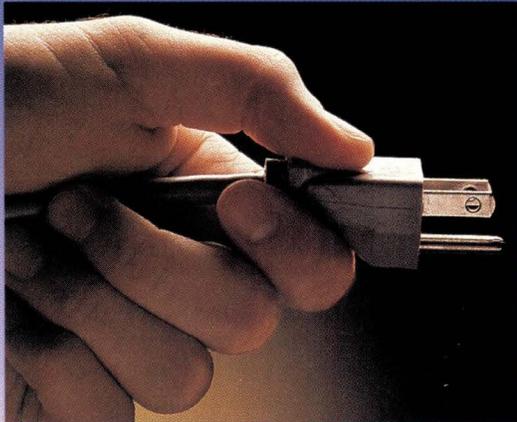
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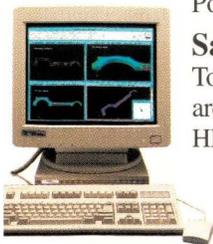
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NEWS

Sun Enhances Its X Terminal

Sun Microsystems Computer Corp. has announced sweeping software enhancements to its X terminal product, the SPARCclassic X. The machine will now come with Display PostScript, which will allow users to exploit PostScript-based applications. The Display PostScript capacity will come at no cost and require 8 MB of memory.

Users will also be able to switch between the Open Look and Motif window managers. The terminals will support a local parallel port printer and have an assortment of new network administration features, such as SNMP.

Sun's relationship with X terminals has generally been strained. The company has long regarded the terminals as a waste of desktop space better filled with a real workstation. When Sun—alone among the major workstation vendors—declined to bring out an X terminal of its own, it helped make the fortunes of many third-party X terminal suppliers who were eager to fill the void. Indeed, this year HP introduced a line of X terminals, the Aptrex, which are configured to be nothing but X displays for Sun-based networks.

Even when Sun introduced the SPARCclassic X terminal last year, it didn't satisfy the critics, who argued that the machine was really a "dumbed-down" workstation. In fact, the SPARCclassic X terminals were so much like the SPARCclassic workstations that they could be upgraded into a stand-alone system with minimal effort. Sun, in fact, sold a kit that let end users do it for themselves.



The SPARCclassic X is based on the microSPARC, operating at 50 MHz. It comes with 4 to 96 MB of main memory and 6 KB of cache and supports 8-bit color. The product offers 1.54 to 2.33 Xmark scores, and 29,900 to 102,600 Xstones. The terminal's pricing starts at \$2,445 with 4 MB of memory and a 14-inch color screen, or \$2,395 each for a dozen.

BSDI for SPARC?

Many Sun users love the feel of Berkeley UNIX. Those aficionados who can't afford the price of Sun Microsystems' source code license and feel betrayed by Sun's determination to push them to System V-based Solaris 2.x will soon have another choice, thanks to the efforts of Berkeley Software Design Inc.

Founded by members of the original Berkeley UNIX team, BSDI is best known for its port of Berkeley UNIX to Intel Corp. 386/486 personal computers. The operating system, sold on CD-ROM, comes with full source code and, unlike various "free" versions of UNIX currently available, is supported by the company that sells it.

Now BSDI is expanding its horizons and aiming straight for a potentially lucrative market—Sun's disgruntled customers—with a port of its Berkeley UNIX operating system to Sun's SPARC hardware. A beta release of the operating system will be available for

After years of resisting the trend toward X terminals, Sun Microsystems introduced the SPARCclassic X terminal in August 1993. The SPARCclassic X can be turned into a workstation with minor modifications.

workstations based on the Sun 4C processor, used in the SPARCstation 1 and 2, "by Thanksgiving," says Chris Torek, a member of BSDI's technical staff. A version that runs on Sun's newer 4M processor, used in the company's SPARCstation 5, 10 and 20 workstations, should be available by the end of the year, he said.

BSDI's operating system is similar to SunOS 4.1, since both are based on the Berkeley BSD 4.3/4.4 UNIX developed by the Computer Science Research Group at the University of California at Berkeley. The primary difference, Torek said, is that "we don't have shared libraries yet. On the other hand, we won't force people to migrate to Solaris 2."

Compatibility with existing programs won't be a problem either, says Torek, since BSDI's SPARC operating system should run most SunOS binaries. "If they use Sun shared libraries, then you will need to copy over your shared libraries. If they are statically linked, it will work unless you use some Sun system call we don't have."

Pricing has not yet been fixed, but

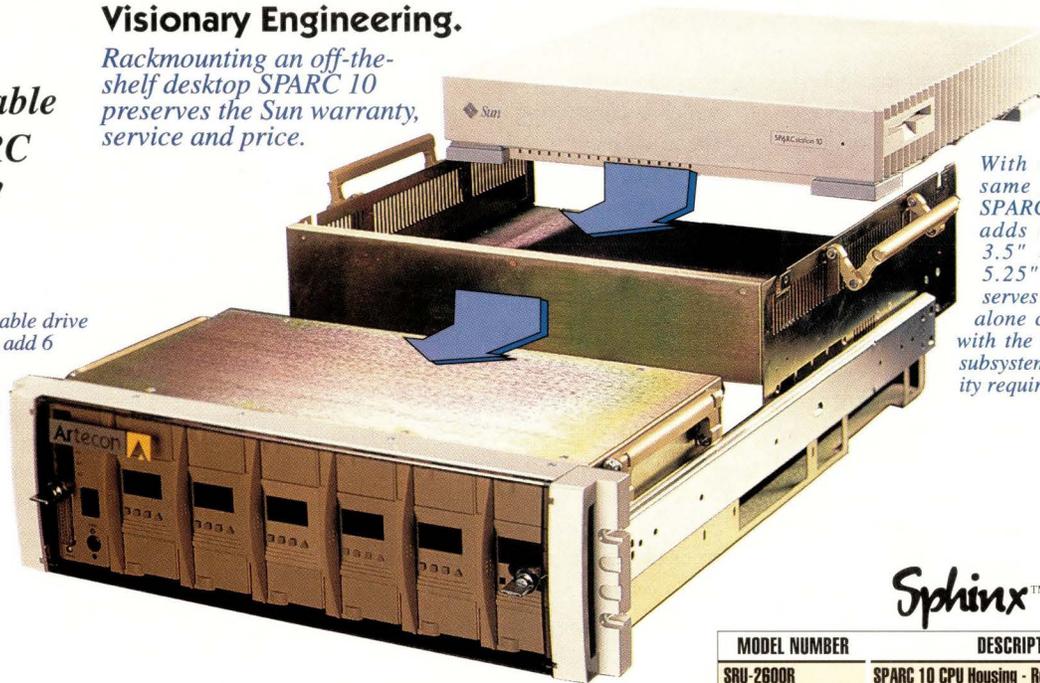
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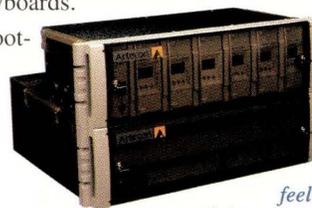
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sources with the company say the SPARC operating system should be priced in line with the company's Intel offering—\$545 on CD-ROM for full binaries and \$1,045 for binaries and complete source. University site licenses are \$2,000 per year.—*slg*

Who Will Wear the i860 Crown?

Sun Microsystems Computer Corp. and SPARC workstation users have traditionally turned to specialized co-processors for demanding numerical and vector processing functions. One of the chips they've used is the i860 from Intel Corp. Such companies as CSP Inc., Billerica, MA, Mercury Computer Systems Inc., Chelmsford, MA, and Sky Computers Inc., also in Chelmsford, have built an industry out of providing i860-based boards to systems integrators. Sky and CSPI, in fact, actually had end-user products in the form of number-crunching i860 chassis that fit under a SPARCstation.

However, the i860 may not be long for this world. "We are not actively marketing it," says an Intel spokeswoman. "We will supply the chip," she continues, but its evolution is over. While there will be a steady supply of chips for the foreseeable future, there will be no faster, cooler, more energy-efficient versions taking their place.

Digital signal processing chips, like this SHARC from Analog Devices, are contenders for the number-crunching space once occupied by the Intel i860. DSP chips' traditional strengths have been high speeds and small size, but they can be maddeningly difficult to program.



It's not clear why Intel has made this choice. There is certainly a market for the i860. "Ourselves, and our competitors, are growing at 50% a year," says Doug Williams, director of marketing for Sky. "What happened is that the i860 got into a variety of large government programs." Those programs are consuming i860s by the thousands.

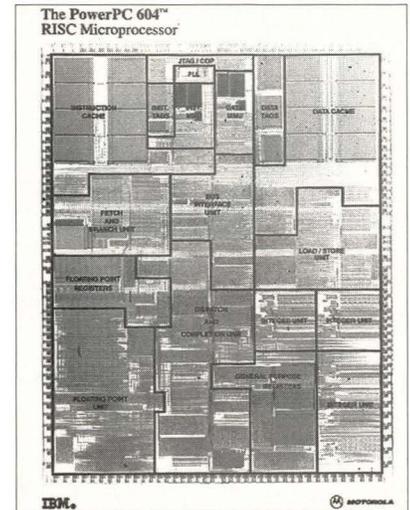
On the other hand, that's small potatoes compared with the PC market, which is consuming X86 processors by the millions, if not the billions. Rumor has it that Intel has put almost all its resources into Pentium and its derivatives, leaving the i860 to wither on the vine.

What, then, will take the i860's place in the hearts and on the desks of workstation users? "It is my belief that there will never be another chip like it," says Lee Fisher, director of marketing at CSPI. "There is no replacement for the i860, and there never will be," especially since the chip combines features of both a standard RISC chip and a vector processor. It isn't clear, however, that there's a large enough market to support such hybrids. "There will be more specialized chips and more generalized chips, but nothing like the i860," he says.

Mercury Computer Systems' product planning manager, Barry Isenstein, agrees. "The i860 was beautiful because it fit right in the middle," he says. The chip has the FFT performance of a digital signal processor and is only slightly larger and more power-hungry than a DSP. On the other hand, it is similar to a general-purpose processor and so is easier to program than a DSP.

"It does fill a unique role," adds Isenstein. "And I don't see any vendor filling it. There is nobody sitting there in the middle saying, 'Well, I'll add enough RISC to give me robust processing and I'll sacrifice a little on the density but I'll give you full DSP-like vector performance.'"

Co-processing vendors are taking three paths to fill the i860's place. The first is multiple i860s. Sky, CSPI and Mercury all have, or will have shortly, multiple i860-based products. "One of the things we've done to extend the life of the i860 is to develop the XL archi-



General-purpose processors, like IBM's PowerPC, are another option for systems integrators seeking an alternative to the i860. With special hardware and software assists, these can be made to perform as if they were dedicated vector processors, but they tend to be large and demanding of system resources.

ecture," says CSPI's Fisher. "We take two i860s and tie them together so that one is the co-processor to the other. It works ideally for large vectors."

The second course is to develop product based on DSPs, and almost all of the co-processor companies already have DSP offerings. Mercury, for instance, has recently introduced boards based on the newly introduced Super Harvard Architecture Computer (SHARC) DSP from Analog Devices Inc., Norwood, MA. "If you are looking at floating-point performance, I'd say it was about the only choice," says Isenstein. "You're looking at the SHARC, or [Texas Instruments'] C40, which is getting long in the tooth. Then there are other benefits that SHARC brings along. There's a large amount of SRAM built into it, for instance."

Other vendors are much more positive on TI, which has long been a dominant name in DSP. While the C40 DSP won few kudos from the critics, TI's recently introduced C80 has gained positive attention. "It is a fantastic chip," says Howard Cohen, an application sales engineer with Analogic, Peabody, MA, which sells

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several TI-based products. "It is five processors in one." The C80 contains both multiple DSP units and a RISC-like unit.

There are many other sources of DSPs. AT&T has long been a supplier of the chips. Motorola entered the market some years ago, and its 56K line of DSPs have likewise gained a following.

The third option to replace the i860 is general-purpose processors. "What you'll see in the future is people offering the more general-purpose processors but finding ways to provide acceleration," says Sky's Williams. "Architectures like the PowerPC and the Alpha are beginning to get the raw clockspeed performance that we can use to get beyond the i860."

Williams thinks that general-purpose processors may be the future for many of Sky's products. "Our challenge is to take the more commercially available processors and design the rest of the system around them, to make the RISC processor act like a vector processor."

Mercury is taking a similar course and has recently announced product based on the PowerPC. "Our criteria was three things," says Isenstein. "First, we wanted a chip with reasonable density that would work in the VME environment. Second, we wanted to maximize performance per CPU, which rules out all the SPARC stuff, by the way. And, third, we wanted a really popular chip"—popular enough not to be phased out at some unexpected moment. "The i860 was a lesson learned in that regard."

RAID Advisory Board Certification Program

To support its goal of fostering the understanding and use of RAID and related technologies, the RAID Advisory Board has established two key programs to counter user confusion, misinformation and apprehension about RAID.

The first program involves education via seminars and publications like the *RAIDbook* and *RAIDprimer*. These two guides define RAID levels.

The second program is the RAID Advisory Board Certification Program

(RCP). The RCP provides for identifying RAID products that meet criteria established by the RAID Advisory Board. Companies may petition the RAID Advisory Board for licensed use of the logo and the legend that explains the RAID level.

Companies whose products have been tested in accordance with criteria established by the RAID Advisory Board pass an independent audit of the test process. Those whose products conform to one of the RAID level definitions endorsed and published in the *RAIDbook* and *RAIDprimer* may petition the RAB for licensed use of the logo and legend.

Companies using this logo and legend system include EMC Corp., Hitachi America Ltd., Sanyo-Icon and Storage Dimension.—*mm*

More GL for Suns, and a GLiNT in the Eye

3DLabs Inc., a San Jose, CA-based firm, has announced the GLiNT chip, a GL accelerator. The company says that, using the GLiNT, a Sun workstation could support GL-based graphics applications at performance levels near those of dedicated graphics machines.

GL is the graphics library of Silicon Graphics Inc., Mountain View, CA, the workstation and server vendor whose name has become almost synonymous with 3D graphics. Most high-end graphics packages are based on GL, and therefore cannot be run on Suns. To get around this, several companies have attempted to put GL, or OpenGL (the version SGI has decoupled from its hardware) onto SPARC, with varying degrees of success.

3DLabs, or rather DuPont Pixel Corp., was one of these. The company, which had been founded as BenchMark Technologies and then purchased by DuPont in the mid-1980s, had as its product line a set of Intel Corp. i860-based boards and an emulation of SGI's GL. With these tools, Sun users could put SGI-style graphics on their systems. For a time, 3DLab's products were virtually the only means of achieving that feat.

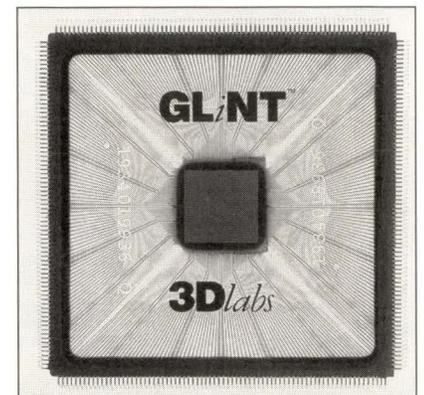
By 1990, however, Sun had its own graphics library, XGL. While XGL

never achieved the industry acceptance of GL, it was a convenient platform for graphics software developers to build on. Austin-based Portable Graphics Inc., for example, developed NPGL, a rival GL implementation that addressed XGL rather than the hardware or operating system (see "A PEX on Both Your Houses?" *SunExpert*, July 1993, Page 49). Portable Graphics has since taken its NPGL to additional platforms, including Hewlett-Packard Co. and IBM, where the product likewise addresses native graphics libraries rather than the hardware.

DuPont responded by developing a version of OpenGL that would run directly on the Sun platform. For a time, the company considered using an i860 as a co-processor to provide acceleration, but decided against it, particularly in light of Intel's disinterest in the chip. Instead, DuPont began developing a GL accelerator, the GLiNT chip. "We were getting pretty good performance out of the i860," says Neil Trevett, 3DLabs' vice president of marketing. "But we wanted to go up to the next level. The i860's bottleneck was its rendering power. We started doing the GLiNT as a rendering chip."

The GLiNT, or more precisely, the GLiNT 300SX, is a 64-bit device with a 112-bit pixel data path to memory and a PCI interface. The chip provides

The GLiNT chip from 3DLabs, formerly DuPont Pixel, is GL in silicon. 3D says that, using the GLiNT, a Sun workstation or even a PC could support GL-based graphics applications at performance levels near those of Silicon Graphics workstations.

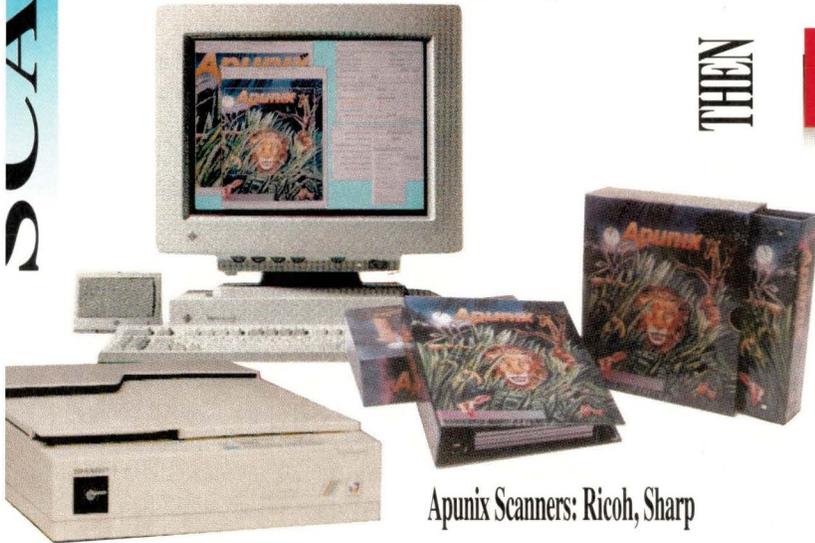


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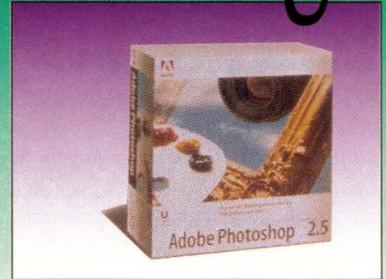
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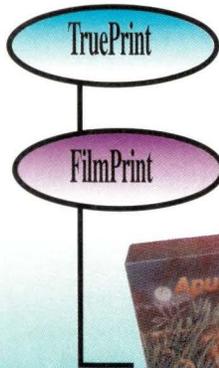


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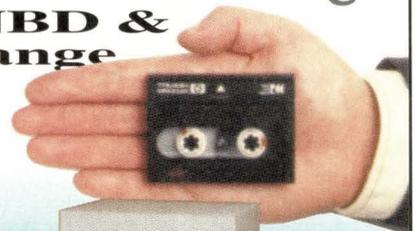


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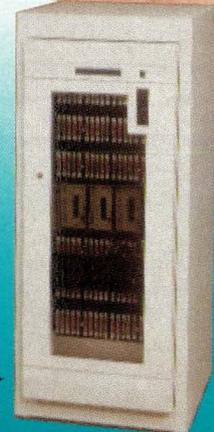
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3D, 2D and GUI accelerators for OpenGL as well as HOOPs, PEX, IGL and Intel's 3DR library. It provides 2.5 giga-operations and 300,000 Gouraud-shaded, depth-buffered triangles per second.

Shortly after the GLiNT's introduction, the division began to spin off. "As we did our market research, we realized there was a bigger market for an implementation of OpenGL in silicon than in software," says Trevett. The division managers, many of whom had also been its founders, bought out the existing management.

The company now envisions its first customers being board-level vendors. However, notes Trevett, "we are getting interest from workstation vendors who don't want to spin their own silicon to get 3D."

3DLabs' major market opportunity may no longer be in Suns, as was once the case. While it is perfectly possible to produce SBus boards using the GLiNT, 3DLabs' real market may be with PCs. Microsoft Corp. has announced that OpenGL will be the graphics standard for Windows NT. It is to PC vendors, and PC board makers, that the company will sell chips in real volume.

Meanwhile, the OpenGL implementation that 3DLabs was developing prior to the spin-off has been licensed to Template Graphics. "We had a number of products that were in beta stage, one of them was the OpenGL for Sun—and that's a direct port. So we searched the industry for a partner that could take over those products," says Trevett.

Template Graphics, however, is known for its PEX orientation. PEX, the PHIGS Extension to X, is the 3D graphics standard that has sometimes been perceived as the open-system

alternative to GL. Does Template's licensing of a GL product raise questions about PEX's long-term viability? Trevett suspects it may. "The PEX vs. GL wars are over," he says.

Template's president and COO, Terry Baker, disagrees. He regards the acquisition of OpenGL as a means of broadening his company's product line to include two different standards, each of which has a very different market. "Software developers have different needs," he says. "There is still support for PEX. GL, meanwhile, is becoming the standard for multimedia and animation, whereas PHIGS and PEX have been strong in CAE."

Internet Enlivens Usenix Conference

Security and availability were the two main problems haunting the terminal room at June's Usenix conference in Boston.

While connections to the Internet have gone from being a curiosity to a matter of course at many computer conferences, this summer's Usenix conference showed impressive advances in the state-of-the-art Conference Internet Connectivity (CIC).

Supported by equipment vendors, the show's terminal room featured more than 30 NCD X terminals on a single local-area network. All were gatewayed over a 1.5-MB/s T1 connection to the Altnet backbone. A separate local-area network allowed laptop-equipped conference-goers to jack in directly. The two networks were physically and logically isolated to prevent packet-sniffer programs on laptops from scooping up passwords typed on the X terminals.

Nevertheless, said Gretchen Philips, the Usenix terminal room coordinator, "Security in the terminal room is basi-

cally zero, and you should change your password after you leave."

Despite the poor chair-to-terminal ratio that forced people to stand while reading their email, the line of waiting Internet addicts frequently ran out the door of the third-floor conference room.

Netnews readers desperate for a late-night fix could access the Internet without charge from their hotel rooms, thanks to a terminal server and a bank of seven modems connected directly to the hotel's telephone system. The system was the brainchild of *SunExpert* Senior Technical Editor Barry Shein. Another five modems allowed users seated at the X terminals to place modem calls to computers not on the Internet—provided they placed the calls with their own telephone credit cards.

"I'm checking my mail, just trying to keep in contact with what is going on in my life," said one conference attendee, Scott Venckus, a systems administrator from the University of Tennessee. On a good day, Venckus said, he gets 80 email messages; on a bad day, he can get more than 150.

"[These] people are as addicted to email as I am," he said, waving his hands around the room. Venckus' main reason for reading his email was to help stranded users back in his home state: "When you can dash off a quick answer and solve somebody's problem in 30 seconds, it makes everybody's life easier," he said, while the Usenix conference carried on without him.—slg

Commercially Supported Mosaic

Mosaic, a graphical browser on the Internet, has been available at no charge to end users. Mosaic gives users point-and-click access to the World Wide Web (WWW), an Internet information retrieval system with more than 2,300 graphical multimedia databases of "hyperlinked" documents. But no charge for this great service also means no documentation and no support to speak of.

A commercially enhanced version of Mosaic will soon be available, however, thanks to cooperation from the National Center for Supercomputing

Internet Data File

Annual rate of growth for Gopher traffic	99.7%
Annual rate of growth for WWW traffic	341,634%
Number of countries reachable by electronic mail	137*
Number of countries not reachable by electronic mail	99*

* approximate

Source: The National Writers' Union Newsletter. Original information compiled by Win Treese.

Applications (NCSA) at the University of Illinois/Champaign-Urbana, the original developers of Mosaic, and Spyglass Inc. of Savoy, IL, a technology partner and multimillion-dollar investor with NCSA. NCSA has given licensing rights to Spyglass as well as 11 other companies that will develop and distribute the product in different ways. Joseph Hardin, associate director of NCSA's software program, is pleased by the relationship with Spyglass and says, "Spyglass gives us the cross-platform development, global distribution and ongoing financial resources we need to take the Mosaic environment to the next level."

Mosaic, in its "raw" form, will continue to be available to end users through the university at no charge. Spyglass, the most aggressive participant in the licensing agreements, will focus on developing a commercially enhanced version of Mosaic that other companies will incorporate into their products for distribution to their customers. Spyglass' president, Douglas Colbeth, cites Digital Equipment Corp. as an example of a large-volume

buyer that will incorporate the commercial version of Mosaic in its consumer systems. He explains that companies today would rather not hire entire staffs to follow ever-changing advancements, upgrades, standards requirements and general support of Mosaic. It's more economical for them to purchase that service from an outside vendor. Spyglass will sell their versions only to companies that require volumes of 10,000 units or more. Since Mosaic will be bundled with these products, pricing is not available but will be charged on a per-unit basis.

Tim Krauskopf, co-founder of Spyglass, says, "We're committed to evolving Mosaic so it becomes a robust, commercial tool with complete documentation, technical support and advanced features." Current enhancements to Spyglass' version include improved installation, on-line documentation, added forms capabilities, multiple windows support and improved performance. Future plans for the product will include enhanced security, options for additional security such as authentication and credit card

validation. Work continues in areas like sound and speech recognition.

Spyglass' Mosaic supports Windows, Macintosh and UNIX. New users are joining the Internet at a rate of 2 million per month, but only a fraction of the Internet's potential has been tapped due to lack of available tools.

—mm

Tatung to Show PowerPC that Runs Solaris

Tatung Co. of Taipei has announced a prototype system based on the PowerPC 601 microprocessor. Called the TPC-5510, the system will support a variety of operating systems, including Windows NT, IBM Corp.'s AIX, OS/2 and Sun Microsystems' Solaris.

Long-term readers will recall that less than three years ago, Tatung was widely heralded as a SPARC user. The company had a line of SPARClikes and a large investment in Mars Microsystems Inc., which had developed a SPARC-based system in a PC chassis. However, Tatung's experiences in the SPARClike market were never

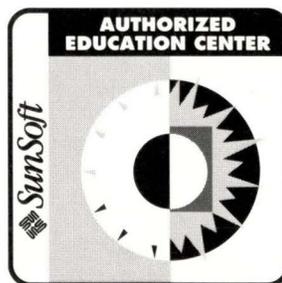
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completely happy. Now the company has both SPARC and PowerPC-based products. Whether the two product lines will compete remains unclear.

HDS Shows X Terminal with Drive

As Macintosh and Windows emulation on Suns becomes more commonplace, X terminal users are finding themselves left out of the action. The problem isn't the quality of the emulation or graphics, but the lack of a floppy disk drive—a device that's almost a necessity in the personal computer world for everything from software updates to moving files between computers.

The solution is X terminals with built-in floppy disk drives. Human Designed Systems Inc., King of Prussia, PA, has introduced a new series of X terminals for exactly that need. Called the ViewStation Ultra Series, these terminals support an optional 3½-inch disk drive that features integrated support for Insignia Solutions Inc.'s SoftWindows and Apple Computer Inc.'s Macintosh

Application Environment. Powered by Intel's i960 RISC microprocessor, the terminals also feature support for multimedia audio, video and PostScript, effectively re-creating the entire SunOS or Solaris experience at a fraction of the price.

In addition to basic X terminal features, the ViewStation Ultra can also run local processes, such as the OSF/Motif or OpenLook window managers, Digital Equipment Corp. VT320 and IBM 3270 terminal emulators, clocks, calculators and screen savers. The terminals also feature a PCMCIA "credit card" slot for future upgrades.

Pricing starts at \$1,799 for the 14-inch Ultra 14C with 8 MB of memory and a screen resolution of 1,024 by 768. Top of the line is the Ultra 19CT with 8 MB of RAM and 1,280 by 1,024/1,152 by 900 resolution, for \$3,599.—slg

Spin-Off Is New Distributor

John Cornelius, formerly the technical director of San Diego-based Andataco, has founded Lighthouse

Technology, a new distributor of SPARC-based workstations and after-market products. The Carlsbad, CA, firm will sell SPARClikes from Aries Research Inc., disk drives from Seagate Technology Inc., tape backup systems from Exabyte Corp. and controllers from Antares Microsystems Inc. and Ingres Corp. The company has also said it will also carry X terminals, modems and networking products.

"We do the standard peripheral stuff," says Cornelius. "Disk, tape and so on. And the Aries workstations." He notes that he went with Aries for technical reasons: "They have some interesting products," he says. "They are coming out with a really interesting server product, for instance. We like it. It's priced right, and it has all the right features."

Cornelius envisions his company selling to the traditional product mix of workstations, as well as the newer business-oriented buyers that Sun has tried so hard to interest in open systems. "So far, most of our sales have been in the research community. We don't think it will stay that way. Let's face it,

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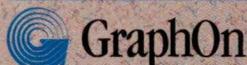
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Pretty Good Privacy Becomes Pretty Legal

This spring, Pretty Good Privacy, the underground program that has become an Internet standard for people wishing to send and receive encrypted electronic mail, made good.

PGP is a sophisticated encryption system that performs military-quality data encryption. It runs on UNIX and DOS computers. Based on the RSA and IDEA encryption algorithms, messages encrypted with PGP can be sent by electronic mail through public networks without being read by prying eyes.

Nevertheless, for the three years since PGP's release, prospective users have faced a quandary: While the program was made freely available as public-domain software, it violated key patents in the RSA encryption algorithm held by Public Key Partners, a Redwood City, CA-based company.

Now, PGP's author, Phil Zimmermann, has modified PGP's encryption engine to make use of RSAREF, a competing data encryption package distributed by RSA Data Security, a company with close ties to Public Key Partners. The modification, present in PGP Version 2.6 and higher, allows people to use PGP inside the United States for noncommercial purposes without fear of a costly patent infringement lawsuit. The modified program is being distributed by the Massachusetts Institute of Technology.

Under the terms of an agreement between MIT, Zimmermann and Public Key Partners, PGP Version 2.6 will contain a time bomb of sorts. Before September 1, 1994, PGP 2.6 will freely interoperate with PGP Versions 2.0-2.5. After that date, Version 2.6 will still read old files and messages but will start encrypting using a slightly different protocol. The purpose of this modification is to force users of PGP's earlier versions to upgrade their software to the version that does not infringe upon PKP's patents.

Noncommercial users inside the United States can get a copy of PGP for Sun, other UNIX and DOS environments by ftping to the computer net-dist.mit.edu and following the directions. The MIT FTP server has been specially modified so that it will not download copies of PGP to non-U.S. addresses—a necessary requirement, since PGP may not be exported outside the United States without violating U.S. laws regulating arms trading.

Like the version available from MIT, the commercial version of PGP distributed by Viacrypt Products in Phoenix, AZ, is run from the command line, has no graphical user interface and is not integrated with Sun's MailTool or any other graphical mail-reading program. These and other enhancements are under consideration, says Paul Uhlhorn, Viacrypt's director of marketing.

Companies that wish to use PGP for commercial purposes can get a licensed, commercially supported version of the program from Viacrypt. The company sells a version of PGP for SunOS 4.1.x, IBM RS/6000 AIX and HP/9000 700/800 UX and SCO 386/486. Cost is \$149.98 for a single-user license, \$449.98 for five users.—s/g

Sources for the two versions of PGP are as follows:

non-commercial PGP:
% ftp net-dist.mit.edu
ftp> get README

commercial PGP:
Viacrypt Products
2104 West Peoria Ave.
Phoenix, AZ 85029
602-944-0773

workstations are everywhere now—insurance, publishing, finance. They're in every conceivable business.”

Lighthouse is also in discussions with SunSoft, says Cornelius, about remarketing Sun's own software products. In fact, he notes, “We've been looking at the PowerPC version of Solaris. That's kind of exciting. That could be an interesting market for us.”

Sun Says All Major Accounting Packages Available on SPARC

Not that long ago, Suns were purely technical boxes. But Sun has labored to put its machines into commercial accounts, and it is a measure of Sun's success in this venture that almost all of the major UNIX-based accounting packages are now available on Solaris.

The company announced that RDBMS-based accounting packages have recently been ported to Suns, or else have been there all along. Software now available to Sun-using MIS professionals includes Open Accounting Systems from CODA Inc., Dynamics C/S from Great Plains Software, IMRS' suite of financial management applications, Lawson Software's client/server financial applications, PeopleSoft Financial from PeopleSoft Inc., the Universal OLAS products from Quality Software Inc. and SQL Financial International Inc.'s ledger and accounts products.

CA Buys ASK

Computer Associates International Inc., based in Islandia, NY, has entered into an agreement to acquire The ASK Group Inc. CA will purchase all outstanding shares of ASK at \$13.25 per share. ASK's two largest shareholders, Electronic Data Systems Corp. and Hewlett-Packard Co., have already agreed to sell their stock to CA.

The ASK Group has had its troubles. ASK purchased Ingres Corp. and then attempted to integrate the database company into its own organization. Critics have said that ASK went about its task overzealously, laying off Ingres staffers in favor of its own regardless of whether or not the workers performed a vital function. The company's defenders say that ASK was simply

caught in a credit crunch shortly after an expensive acquisition.

In April, ASK announced its financial results for its fiscal third quarter, which ended March 31. The company reported a loss of \$68.9 million, or \$2.95 per share. That compares to a \$674,000 loss, or three cents per share, for the same period a year ago.

DEC and Alpha Target Hollywood

After many false starts, Digital Equipment Corp.'s Alpha is starting to gain some wins—in Hollywood, for example.

One of the the big names in video is Grass Valley Group Inc., Grass Valley, CA, a subsidiary of Tektronix Co. At March's National Association of Broadcasters (NAB) convention, Grass Valley was on hand to display the newest version of its video tools—specifically, the TypeDecko broadcast quality character generator.

Traditionally, such a package would run on a dedicated system. More recently, TypeDecko has appeared on Silicon Graphics Inc. systems. But Grass Valley chose instead to host the product on a DEC Alpha-based PC running Windows NT.

This could be a sign of things to come. SGI is the vendor of systems and software to Hollywood. However, in recent months, there have been murmurs of discontent in media circles. "What we're hearing," said one individual involved with the market who asked not to be identified, "is that people are starting to be a bit worried about being tied so closely to GL." GL is SGI's graphics library. "And I don't care if you do put 'Open' in front and call it 'OpenGL.' A proprietary graphics library is a proprietary graphics library."

This Just In...

• In a major MIS win, *Sun Microsystems* and *Amdahl Corp.*, Sunnyvale, CA, have been picked by Charles Schwab and Co. Inc., the discount brokerage, to provide all of the company's support systems. Sun says that over the next few years it will supply Schwab with 5,000 workstations and 100 servers, while Amdahl will act

as a systems integrator and provide service and support.

• In a similar move, *Nuppon Steel Corp. (NSC)*, Tokyo, has announced its intent to use the services of *Nihon Sun Microsystems K.K.* Nihon Sun will provide NSC with assistance during the company's downsizing effort.

• For another commercial win, turn to *ERI*, the Hauppauge, NY-based integrator and consultancy that has long sold to Wall Street. ERI has announced that it has been awarded a \$1.5 million contract to build a trading floor computer network for Mutual Life of Canada's derivatives product company, TMG, based in Greenwich, CT.

• *Lachman Technology Inc.*, the vendor of storage management and networking technology based in Naperville, IL, has been acquired by Legent Corp., Herndon, VA. Lachman's shareholders will receive 500,000 shares of Legent's stock as part of the transaction.

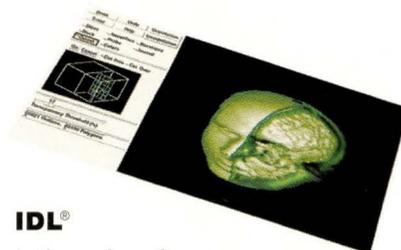
• *Compuware Corp.*, Farmington Hills, MI, has acquired *Uniface Holding, B.V.*, Amsterdam, the parent company of Alameda, CA-based Uniface Corp. Uniface's product is the Uniface 4GL and development environment. Compuware is a vendor of IS-oriented software and development tools.

• *Tadpole Technology Inc.*, Austin, TX, is becoming the de facto design center for RISC-based laptops. In addition to having its own SPARC-based products and providing IBM with that company's PowerPC machines, Tadpole has announced an agreement with Digital Equipment Corp. to develop an Alpha-based device.

Correction

In the June issue of *SunExpert* ("Tapping Client/Server Tools," Page 50), we referred to the president and founder of Cambridge, MA-based Integrated Computer Solutions Inc. as Peter Wilson. In fact, Peter Winston is president of ICS. *SunExpert* regrets the error.

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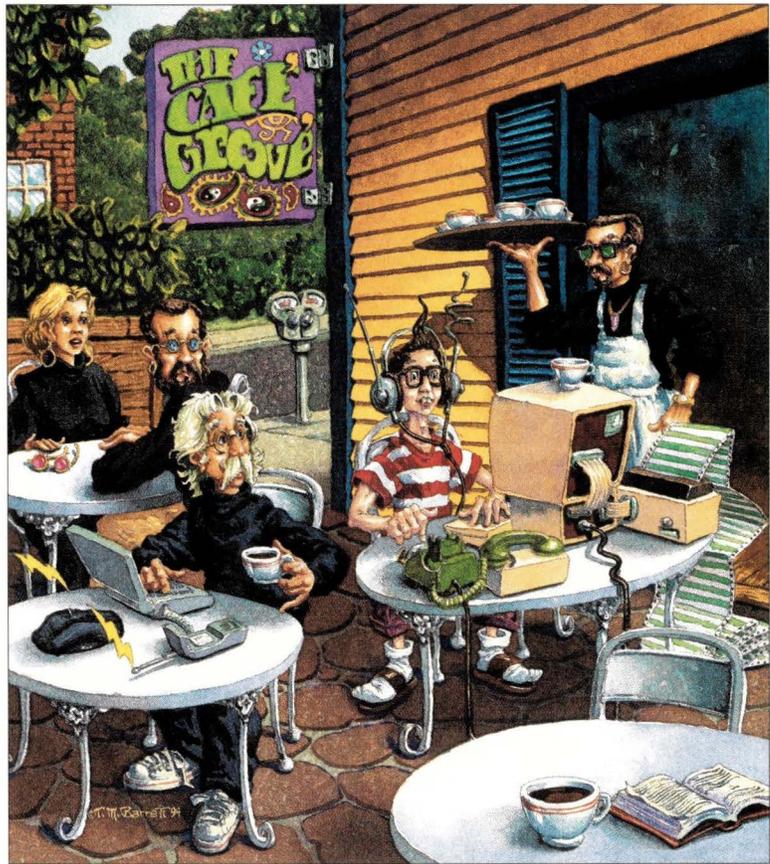
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Mr. Protocol Fails to Have an Adventure

by MICHAEL O'BRIEN

"Is that a 486?"

—Patron who looked like a gang member, in a Venice, CA, coffeehouse

"I wonder if they have more than one customer yet?"

—Anon., musing about RAM Mobile Data

"Poop!"

—Heartfelt comment on motel PBXs

Q: Oh no. More radios. More antennas. And in a coffeehouse yet! I'm tired of this!

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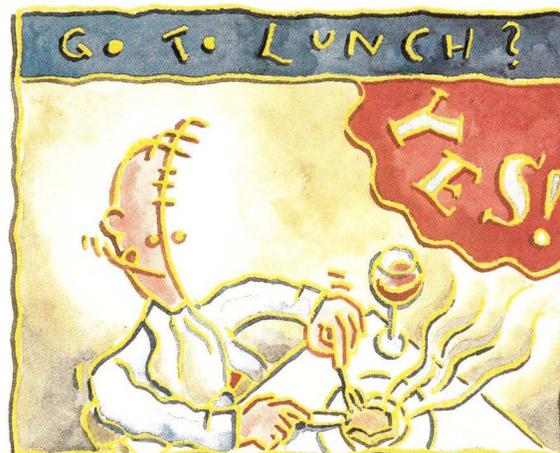
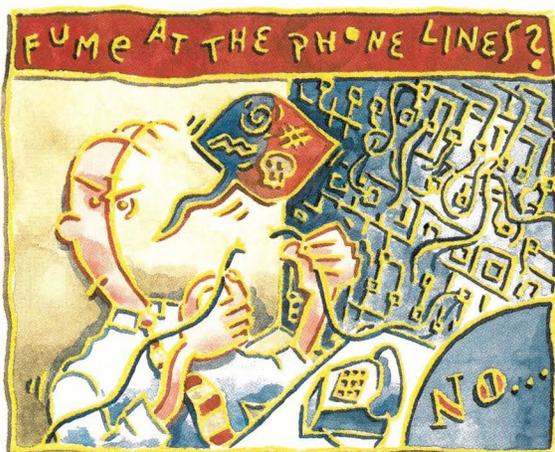
A: Right now. That's what all the radios and antennas are for. We're taking a look at a new service called RadioMail. It's designed to let you sit in the ambiance of a nice coffeehouse and pester the living daylights out of everyone you know on the net. Mr. Protocol highly recommends this as an entertaining and edifying pastime! And as another famous meddler once remarked, "You should always do what you're good at."

The problem of taking the show on

the road has always been a vexing one where computers are concerned. In the early days, computers couldn't be taken on the road because the roads weren't wide enough. Early computers had a military flavor to them, and anyone familiar with the U.S. Army knows that they'll take whatever they want, wherever they want, as long as the roads are wide enough. They weren't. Therefore Eniac, Brainiac, Multivac and the rest of them sat in their rooms the whole time and didn't get to go anywhere.

Times, naturally enough, have changed. Laptops nowadays are small enough that they may, it seems, go places on their own, without any help from their owners, unless they are nailed down and guarded. This has led to a whole raft of services that, unlike

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the gargantuan but distressingly vague National Information Infrastructure, are actually beginning to come to market. People on the move seem to know what they want.

What they want is radio spectrum space. Boy howdy do they want it.

The success of the cellular telephone market is undeniable, by most conceivable measures. In fact, the cellular market is small, compared with the number of noncellular telephones—the ones connected by good old-fashioned telephone wire. But even a small part of this market is enough to make money for everyone in sight.

Mobile telephones are an old technology. They were so rare that most people could never hope to see one, though, because of the coverage. There were only a few dozen channels to cover even the largest city. Buying such a phone, then, became a losing proposition from the start. The channels were so busy that you couldn't hope to find one. In fact, the later models had auto-scanning features that would cause them to rapidly step through all available channels until they found a free one, and then grab it. At that, you might wait a long time, even in the evening, to come up with a free channel for your call.

Cellular coverage solved this problem by dividing the coverage area up into small cells. There are still only a few dozen available radio channels, but the channels used in one cell can be reused in other cells far enough away that they do not interfere with the first cell. The size of cells is chosen by the expected average population of cell phones in the cell. A cell way out in the middle of the desert, on the road between hither and yon, might have a relatively huge coverage area, while a massively busy freeway interchange might have a cell all to itself (in fact, the intersection of I-10 and I-405 in Los Angeles is covered by its own cell).

The problem is that as the number of cellular phones increases, the number of channels in a cell cannot, and there is a practical lower limit to the size of a cell. Cutting the average radius of a cell in half means increasing the number of towers in the area fourfold. This is expensive.

Mind you, cellular phone rates have not dropped. If anything, they have increased. This is due to two major factors: 1) To get around the inherent limitations, cellular phone companies must invest in entirely new technologies, and then go out and reinstall their entire system; 2) The "security" involved in cellular telephones is so laughable that a huge percentage of all airtime goes to servicing calls from fraudulently programmed phones.

This has led to attempts at improvement, naturally enough.



RadioMail lets you turn your laptop into an Internet mailbox, without wires.

One such improvement in cellular technology is the use of digital communications. Extra perks include the use of spread spectrum technology. These techniques allow the use of fewer towers to service more customers, and the use of digital cryptographic techniques works to eliminate fraud.

Another theory says that telephones should be used for talking, and if you have data, use a data network. This offloads the cellular network, true, but it means that you must now allocate more spectrum to carry the data. This leads to big behind-the-scenes trouble.

The Never-Ending Spectrum Illusion

It has long amazed Mr. Protocol how the business section of the newspaper blithely reports that the Federal Communications Commission is planning to allocate spectrum for a new service, and leaves the story at that. The impression is that the FCC

commissioners jointly administer a great big sack that they bought in a pawnshop from a big jolly fellow who wears red a lot, and they pull a never-ending supply of spectrum out of the bag, more or less on demand. 'Tain't so, McGee. All of the existing spectrum has already been allocated. The FCC allocates spectrum by taking it away from somebody else who thought they had it. That's why television sets start with Channel 2. TV spectrum was allocated before the first sets were sold, but in between the allocation and

the actual startup of the market, Channel 1 was parceled out to government, ham radio and mobile communications. Exit Channel 1.

Just so, the FCC started up a new data service on 895 through about 906 MHz by taking the space away from whoever already had it. Services like Motorola's Ardis and RAM Mobile Data now use that spectrum to move

computer data.

The raiding party is still out. The FCC has turned large amounts of government-reserved spectrum space over to the National Telecommunications and Information Administration (NTIA), with a mandate to reallocate the hot potato. NTIA has recommended that space in the 2-GHz range be reallocated to the new Personal Communications Services, which don't exist yet, but which promise to give everyone on earth a personal phone number that they can use anywhere.

Unfortunately, that spectrum space has a secondary user: the amateur radio community. Too bad! Bye-bye.

Mr. Protocol doesn't know all the people who might use RAM Mobile Data to send computer data over the radio. In fact he knows of only one. It's run by an admitted acquaintance, Geoff Goodfellow, and is called RadioMail Inc. Mr. Protocol has recently had a chance to play with this toy.

What does it do, you say? Mr. Protocol is glad you asked.

It solves the coffeehouse problem. On that account alone, Mr. Goodfellow deserves the Nobel Prize in Socialization.

The problem is this: Suppose you like the atmosphere of a coffeehouse, so you want to go and sip coffee or tea or whatever, and hang out and watch people. Now, this is not something to be attempted by amateurs. The problems involved with sitting in a coffeehouse, doing absolutely nothing but watching the world pass by, are so hideously difficult and manifold that many people are discouraged after only one or two attempts. Neophytes are obvious. They drink their coffee too fast, so they have nothing but an empty cup, and they fidget, and squirm, and look all about, and in general do A-number-one impersonations of fish out of water.

Your true habitués have left such trivia behind years ago. They can nurse a single cuppa all evening long. They sit languorously, barely moving, but so artfully draped upon their chair that they seem part of the decor. All of this is accomplished with the seeming effortlessness attainable only by true artists. It is a beautiful thing to watch. (N.B.: This does not work at Starbuck's. It is impossible to look languorous in an upscale chain store.)

Enter RadioMail. Suddenly, the neophyte coffeehouse dweller has something to occupy him or herself. Now, it's possible to sit in the coffeehouse, enjoy the ambiance, sip coffee...and pester the bejeezus out of everyone you know on the net.

RadioMail lets you turn your laptop into an Internet mailbox, without wires.

The concept behind RadioMail is simple. So simple that it almost has a problem. In some ways, it has a very low "Wow" factor. You plug it in and it works. It doesn't let you do anything you couldn't do before; it just allows you to take the show on the road.

The RadioMail service uses existing laptop and palmtop computers. PCs, Macs, HP-95 or -100 palmtops all work. You install the software. You unpack the radio modem. You hook it up. You send Internet mail and get replies. Wow.



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The "Wow" comes later. It comes when you're sitting in a coffeehouse. Or in a motel room in a town that was a spot on the map until that day. You have your same Internet mail box. No dialup required. It's a little bit of home on the road.

And it just works.

The radio modem looks a little like an old-style pocket cellular phone. It even has a little window. But it doesn't have a button pad, and it doesn't have an earpiece or a microphone. Instead it has an RJ-11 phone jack on it, and it comes with a cable that hooks it to the serial port on your computer.

The guts of the software are mostly invisible to the user, as they should be. It presents a user interface that will be familiar to users of Eudora: an inbox, a command menu composed of single letters, and a fill-in-the-form style of message composition. When you press the "Send" key, which is a function key on PCs at least, your message is on its way. The RadioMail software running in your laptop will break the message up into RAM packet-sized chunks,

encapsulate the chunks in a proprietary RadioMail protocol, encapsulate *those* packets in RAM packets, and ship them to the radio modem, packet by packet.

RAM Mobile Data, which is set up as a multitier packet-switch network, will pass each chunk on to the machines at RadioMail. There, the RAM packets will be picked apart, and the RadioMail packets reassembled into your message, which is then injected into the Internet.

Actually, the Internet is only one possible destination. RadioMail Inc. has made it a point to tie into just about every nationwide radio service in existence, so that messages can be sent to Skypage pagers, for example. Messages can also be sent to any fax machine. And, for the terminally understimulated, wire service summaries may be requested from the RadioMail system.

RAM Mobile Data, although a packet-switch system, is a relatively low-speed affair, running at 2,400 baud. As such, it does not lend itself to interactive use. I asked Mr.

Goodfellow whether he ever tried this, and his response was, "That's not what it was designed to do. In the words of a former president, 'We could do it, but it would be wrong.'"

Southwest Stress Test

As a sort of stress test, Mr. Protocol took the RadioMail setup on the road through three states. He can safely say that RadioMail is an urban system. Iridium this isn't.

So far, the city count is: Los Angeles, Albuquerque, Santa Fe, El Paso, Tucson—yes; Flagstaff, Farmington, Taos—no; Carlsbad, NM—hell no.

In fact, this was a fascinating exercise

The size of cells is chosen by the expected average population of cell phones in the cell.

in duality. Mr. Protocol's traveling companion (no, not me, I wouldn't take a trip with that...well, never mind) was using a Macintosh PowerBook to keep in touch with the troops back home via SLIP connection. In cities large enough to merit attention from RAM Mobile Data, the motels were also fancy enough to have their own PBXs. These PBXs would invariably generate their own dial tone, which sounded nothing whatsoever like the dial tone from a real telephone central office, either to Mr. Protocol, his companion or his companion's modem.

The modem, deciding that there was no dial tone to be had, refused to dial. Without the modem manual, it couldn't be talked out of its behavior. Mr. Protocol, not caring diddly about the telephone system, would just open his laptop, hook up the radio modem, and smile, smile, smile. Maybe this is why he isn't traveling with that particular companion any more.

Of course, in the smaller towns, the motels did not have PBXs and dial tone worked fine, SLIP worked fine, and Mr. P. was out in the cold with no radio towers in sight. It all evened out.

Mr. Protocol likes to watch the pack-

ets whiz by. This is possible with the GE/Ericsson modem; communications between the modem and the PC, as well as between the modem and RAM Mobile Data, are indicated in real time. The results are edifying. Packets go out relatively quickly, even at 2,400 baud. There is then at least a five-second delay before the ACK for the packet comes back from RAM. It's this sort of delay that pretty much sinks any hope of using the system interactively. This is definitely a batch-type system.

Once the message is transmitted, it reaches the other end with creditable speed, usually on the order of 15 seconds or so for reasonably well-connected Internet destinations.

RadioMail has an upper limit on the size message it will handle. Incoming messages that exceed this limit, which seems to be about 10 KB, are unceremoniously truncated in midline. However, there is no limit on the amount

of traffic that will be handled. Splitting long files up into several shorter messages will work. RadioMail bills at a flat rate, independent of traffic volume. This can be a Major Good Deal, because RAM Mobile Data most decidedly does *not* bill RadioMail at a flat rate: RAM charges by the packet, and at a stiff rate, too. They think like a phone company, not like an Internet provider. RadioMail recognizes that the Internet community exhibits stiff resistance to usage-sensitive pricing.

The RadioMail system is fairly rigid. There is no such thing as `.forward`; there's no such thing as `receivemail`; there are no such tools as `grep` or the `MH pick` command. The messages are stored as files, but no mention is made in the user's manual of this fact, nor is the message format documented. There is a command to save a message to an external file, implying that the internal files should perhaps not be messed with.

On the other hand, it is not necessary for the modem to be connected and operational. The RadioMail software can, like Eudora, be used in a disconnected state to compose mail for later transmission. The queue drains quickly

or slowly depending on how busy RAM Mobile Data happens to be when you finally get connected to it, and depending on how good the signal is where you happen to be. As is often the case at these frequencies, moving the modem even a foot or two can dramatically improve or degrade signal quality.

No doubt to Mr. Goodfellow's delight, RadioMail just works. It's so easy to use it almost lacks sex appeal. Mr. Protocol knows of a number of eternal travelers who have perforce become midnight experts with clip leads and pay phones. These folks might be very glad indeed to dump the clip leads, as well as the phone, in favor of a simple modem with no wires. The question is, are there enough of them? Mr. Protocol will be watching with interest.

At this writing, a \$395 initial investment covers modem, software and service activation, if purchased with a one-year contract at \$89/month flat rate. -->

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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FAX (415) 286-7801
Internet: info@radiomail.net

On the Internet

by **PETER COLLINSON**
Hillside Systems



GREG HALLY

Well, I have been “on the Internet” for about a month. Cool, as they say. Actually, I have been one machine away from full Internet connectivity for about four or five years. I have had a cheap and slow leased line to my nearest connection point. Phone lines from each of our offices end up in the same building, owned by the phone company. So the line has “two ends,” both local.

The Serial Line IP (SLIP) connection on the leased line ran at 19.2 Kb/s, and I really wanted to control what went over that link and when. So I had decided not to have a full connection to the Internet. SLIP at 19.2 Kb/s is fine for a single user but can be slow when the link is used for more than one simultaneous function. When I set this up, I only had some early SLIP software that did not prioritize packets depending on the connection type. If you started an FTP transfer, then the line became unusable for any other purposes. Recently, I was using Van Jacobson’s CSLIP code with compression and protocol prioritization. This was a serious improvement; things flowed faster.

Being one hop away was OK. I have an account on the machine on the other end of my SLIP connection, a

machine owned by EUnet GB. When at Hillside I just hopped onto that machine when I wanted to access something on the Internet. If I was away from home, then I logged into the EUnet GB machine from the world and called down the line to my machine.

Mail was handled by using store-and-forward on the EUnet GB machine. I sent mail up the line using SMTP, and the mail was forwarded for me. Inbound mail arrived on a EUnet GB machine and was sent down the wire using UUCP onto my machine. The protocol pair was used to get around a problem with the Domain Name Service (DNS).

These days, the DNS controls where mail is sent. A machine sending mail to you will interrogate your name server to find the Internet address that corresponds to your site. Your nameserver will contain a record (called the MX record) that says “send mail for *site* to here,” where “here” is the IP address of your mail machine. The machine sending mail will connect to the IP address and will use SMTP to move the mail.

If you are not on the Internet, then a mail forwarder site will act as your nameserver and will indicate its willingness to accept and relay mail destined for you. For example, my

real mail address is `pc@hillside.co.uk`, but there is no machine called that in the Domain Name Service. There is an MX record that points at my mail forwarder. A mail system sending mail to me will look up the MX record for `hillside.co.uk` in the DNS and send the mail to `ben.britain.eu.net`.

How does `ben.britain.eu.net` get the mail to me? The DNS doesn't allow private names to exist in the name space. If `ben` says "send mail for `hillside` here," then `ben` has trouble sending the mail out again over SMTP because it cannot obtain an IP address of the destination machine from the DNS. There are several ways around this. For example, if you use NIS, there is a provision for having local names, or perhaps you can hack the mail system to route the mail directly.

The easiest solution is to make the mailer use UUCP to send mail to the remote site. Then the DNS is not used to find an IP address for the site. The mail system will do a translation from the domain name to the UUCP name and send the mail. This solution is used by a number of network providers.

So, UUCP is used to send mail to my machine. However, I can send mail up the SLIP line using SMTP because the remote mailer is forgiving when it gets mail from a site whose IP address it cannot find.

Connecting to the Net

As I said, this reasonably happy state has existed for a number of years. But things always change. First, EUnet GB is moving because it has run out of space for people at its current premises. In fact, by the time you read this, it will have moved. My SLIP connection depends on baseband modems, and the speed at which they work depends on distance. I was unwilling to believe that the office move would leave me with a line working at the same speed.

Second, I wanted to be on the Internet directly so that I could offer FTP and other services to the customers of another enterprise that I run. I also wanted to run things a little more quickly.

Finally, I was getting a little disenchanted with running SLIP from my Sun. Using a machine as your IP gateway tends to lock you into one version of the operating system. It also meant that the operation of my network was dependent on the functioning of a machine that is used for many activities. I really wanted something that plugged into my local Ethernet. This will work independently of any software and systems.

I discussed things with EUnet GB, and we came to the conclusion that I should use ISDN as the carrier. To ensure that the ISDN functioned like a full IP connection, both ends would dial, if there was work. The hardware that I use at my site is a Telebit NetBlazer PN driving a CITAM modem that dials into an EUnet GB NetBlazer. Installing this was reasonably easy; it did just plug in and go. There were a few teething troubles, but Telebit support proved extremely helpful.

Newer versions of the NetBlazer systems come with a working version of TCL, John Ousterhout's scripting language. With TCL, you can create programs that monitor the NetBlazer and change its behavior. This is great. You can bend the default working of the system to your needs.

Here's a somewhat long "for example." The standard NetBlazer system will make a connection and take it down after some user-defined delay from the last active packet. It will do all the good things to keep any TCP connections happy when the line is removed. The basic idea is that the ISDN connection should be dropped if it is idle for some period.

This is fine and tries to minimize the phone bill. However, in the United Kingdom, ISDN is charged the same as a regular voice line. This is done in terms of units. Between 8 a.m. and 6 p.m. weekdays, we get 80 seconds for a unit. Outside those times, a unit is 220 seconds. Dropping the line at some fixed point after the last packet doesn't make the best use of these units. I want to drop the line only at the end of a dialed unit so I use what I have already paid for.

I wanted to be on the Internet directly so that I could offer FTP and other services directly to my customers.

I sat down and wrote some TCL code that sits in the NetBlazer controlling the connection. It looks for a call to start and then takes the line down close to the end of the next unit, if the connection has been idle for 40 seconds. This was not too hard. Telebit has provided a reasonably full implementation of TCL. It is easy to use the hooks that are NetBlazer commands to interrogate and control the device.

The effect of the script was obvious from the statistics collection that I have been doing. Most calls at peak times dropped back into the 80-second single unit band. Most automatic calls are just a few seconds, and it is these that really cost the money because they happen frequently.

Name Serving

As I became "Internetted," I had to think about changing several aspects of my system's operation. I did not have to get a recognized IP address because some years back I had obtained a Class C address from the NIC. This made it easier to talk IP to another host that was "fully connected." I did have to apply to get the reverse mapping, the IP address-to-domain name translation, installed in the tables at the NIC. This took two or three days.

I was going to be able to get to the outside world easily, and so I needed to run a local DNS server to provide me with a way of translating names into IP addresses. I decided not to provide names for my domain from my system but to leave the primary source of my address information where it was, on the EUnet GB machine. There's a cost reason for this: I don't have to support people calling in over the ISDN just for a name lookup. Also, the ISDN connection may not be available, so using another machine connected to the Internet with leased lines is a more reliable source of names for my domain. My DNS runs as a secondary from the name server on the EUnet

GB machines. My DNS server wakes up and looks for update information regularly, but that's OK.

Before I could start a DNS server, I had to reorganize my local machine-naming scheme. It was no longer possible to call my Sun by the name of my domain. My domain is hillside.co.uk, and my Sun had worn that name since I installed it. I now have three machines and a gateway living on a local Ethernet and I wanted to give the outside world access to them all. My Sun became *craggy*, my BSD/386 machine *wooded*, the DOS box *slope* and the NetBlazer *grassy*. However, this meant that I needed to continue to make the newly named *craggy* receive and send mail as if it were hillside.co.uk. More on this a little later.

Having renamed the machines, I started to commission the DNS. I closely examined the excellent *DNS and Bind* book for helpful hints and found a wealth of them. (As usual, see the end of the article for book specs.) It turns out that I needed to run NIS on the Sun. The name server lookup code fails if the NIS is not running. Even though I have but a single Sun box, I need to run NIS to support the name server. I was somewhat flabbergasted.

DNS and Bind came to my rescue. I have two options. I can obtain some routines that replace the code used to look up the name server in the C library and run a publicly available version of the DNS server, *named*. Or I can run NIS but supply it with only a map for a hosts file that contains nothing.

I decided to go with Sun's code and run an empty NIS. Messing with C libraries seemed a little dangerous. Would the code work on SunOS 4.1.3_U1? Probably. Anyway, life was too short to plunder the network for a version of *named*. I built the NIS tables, started the two daemons that you need to run, and things began to work.

Later, I altered this setup. NIS provides you with the ability to run a local private name space. The NIS lookup is done and the DNS is consulted only if that fails. I put the standard localhost entry into the NIS hosts map. Also, I found that it was beneficial to put the *services* map into NIS when I commissioned the DOS box *slope* to talk to the Internet using PC-NFS. You need then to run the third NIS daemon to serve NIS maps to the PC.

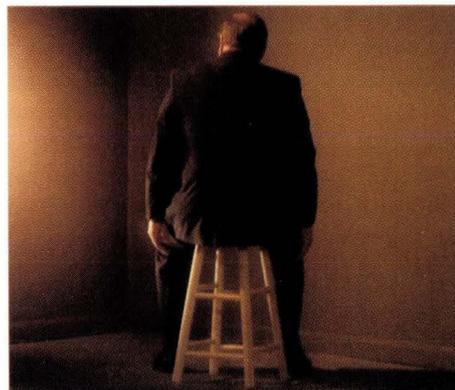
Mail

Having got the DNS working, I turned my attention to mail. Should I change the MX record in EUnet GB's name server to point at my machine so everyone in the world who wanted to send me mail would do that by talking directly to my machine? I decided no.

Mail is generally a 2-KB file and comes down the line in a very short time, much shorter than my minimum unit length of 80 seconds. It's more cost-effective to batch the mail using UUCP at the EUnet GB end and for their machine to poll mine regularly if there is some work. The *cron* program makes UUCP look for work every 12 minutes, so the effect is one of a continuous service. I poll their machine once an hour as a fail-safe mechanism.

I could have used the same arguments to justify using UUCP for outgoing mail, but I decided against that. I still use SMTP to send mail to EUnet GB's machines on

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demand. Batching the SMTP mail is a waste of time. Mail usually initiates a DNS lookup that can result in going off-site. Once the ISDN line is up, let's send the mail. So I have not really changed the way that mail is dealt with.

I did have one further problem. I needed to make sendmail hide all my machines behind the name hillside.co.uk. Well, as I mentioned in April, I have just read the book *sendmail* and decided I should try the new version, sendmail 8. This comes with some very simple-to-use m4 macros that enable you to create the sendmail.cf file with zero pain. This is a good thing because I have never come to grips with the inner workings of the sendmail.cf control file. Here's my "machine definition file," hillside.mc:

```
# pull in the standard macro definitions
# and say that we are a Sun running 4.1
include('../m4/cf.m4')
OSTYPE(sunos4.1)
# set up a couple of tables
# see the text below for some details on these
FEATURE(mailertable,
          dbm /etc/smtables/mailertable)
FEATURE(domaintable,
          dbm /etc/smtables/domaintable)
# Establish my domain
Cw hillside.co.uk
# pass all offsite mail to my mail forwarder
define('SMART_HOST', britain.eu.net)
# Sign all mail as coming from hillside.co.uk
MASQUERADE_AS('hillside.co.uk')
# except for these users
EXPOSED_USER('postmaster hostmaster webmaster')
# use two mailers
MAILER(local)
MAILER(smtp)
```

My setup is extremely simple, and so the m4 macros work well for me. You throw this file through m4 and you get a working sendmail.cf file. Couldn't be simpler. I did spend some time with *sendmail* understanding what they generated.

I don't need to tell sendmail about the UUCP mailer, because I use it only for inbound mail. I have two external files that are tables. Tables contain pairs of values, the keyword to look up and the value to return when that keyword is found. You can use various methods to speed up this lookup, and I chose to use dbm because that was already available on my Sun.

The mailertable allows me to choose where mail will be delivered depending on the destination host. So, for example, I know that both of my UNIX machines can use ESMTP, Extended SMTP, and I put that knowledge into the table. I also have a couple of sites that I talk to frequently, so I ensure that mail is sent directly to them. The table looks something like this:

```
.hillside.co.uk      esmtp:%1.hillside.co.uk
frequent.com        smtp:frequent.com
```

The other table, domaintable, allows me to use short-form names for sites and have the mailer expand them to fully qualified names. So for example, I often talk to people at the University of Kent and want to say

```
mail someone@ukc
```

The domaintable contains the entry

```
ukc ukc.ac.uk
```

so the mail is sent to someone@ukc.ac.uk.

All this went in reasonably easily, and I am happy with the result.

Time

Once this was all in place, I started to look at other services. I had grown used to having my machine clocks running in sync with the correct time using NTP, the network time protocol. Before ISDN went in, I was running xntpd on both the UNIX boxes and reaching out to the time servers supported by EUnet GB.

Although accessing these servers imposes a negligible network load, they are polled frequently and in a way that I couldn't control. This service is a good thing to have, but it's not worth bringing the line up especially to support it. I am happy to have these packets on the network, if they were sent when the line was up and not at other times.

I tested the idea of using the packet filtering in the NetBlazer. When the line was down, NTP packets from my network reaching to the world were black-holed. When the line came up, they were let through to the destination server. I implemented this with a TCL script. It nearly worked, and my local server seemed happy to have a link to a remote machine silently disappear. However, I found that the remote server tended to keep the ISDN line up by sending updates.

I have settled for a script that calls ntpdate to synchronize the clock with a bunch of servers every hour, when I poll the remote machine for UUCP work. In between updates, the clocks on the machines free run. I don't poll for UUCP work when I am asleep, so this is run at 31 minutes past the hour from 7 a.m. to 1 a.m. It seems to work. The scheme does have the disadvantage that I cannot run an NTP server that synchronizes clocks on my local network.

There seems to be an area for someone to do some work here. Please send me an NTP mechanism that works over intermittent connections. Next Friday?

Possibly the right place for the NTP server is in the NetBlazer. I have encouraged some Telebit folks to think about this. I understand that one problem is one of space on the system.

Things were now all working, my system was supporting my basic needs of email and the ability to log in or ftp to remote systems.

Accounting

The NetBlazer has the facility for logging using the syslog protocol. You can make the system write logging informa-

tion to one of your hosts. I have it set up to use the local1 facility on my Sun. The syslog daemon is configured to write the data in /var/adm/netblazer. I rotate this every day, stripping the contents down to the lines that contain timing information and store the data for the day in a file (named year/month/day, i.e., the file 1994/5/2 is data for May 2).

I have a number of scripts and programs that deal with this data. One analyzes inbound and outbound calls and tells me how much money I have spent this month. This is slightly frightening.

One prints a histogram of call length. This was interesting when I was attempting to establish optimum call lengths for the system.

Finally, I have written a quick plot program in C. It displays a circle that is a 24-hour clock, and then draws a line from the edge of the circle to the center for every second that the line is connected during the day. I have visual means of looking at the connection pattern during the day and comparing it with previous days. This has proved very useful in looking at usage patterns, spotting events like named calling out for new data during the night.

Caveats

Coming from the land of the BBC, where advertising is not allowed, I feel that perhaps I should "declare some interests" with respect to this article.

I am a director of EUnet GB, providing technical input at board level and technical assistance with the systems that are used. There are a number of other Internet providers in the United Kingdom. I am also responsible for distributing BSD/386 in Europe. I have no connection with Telebit or their products. I have no connection with Controlware, the manufacturer of the CITAM modem.

Further reading

For information on setting up the DNS, see *DNS and Bind* by Paul Ablitz and Cricket Liu, published by O'Reilly & Associates Inc. ISBN 1-56592-010-A. The definitive book on sendmail is *sendmail*, by Bryan Costales with Eric Allman & Neil Rickert. It's published by O'Reilly & Associates Inc. and is ISBN 1-56592-056-2. In my sendmail article in April, I misspelled Bryan's first name. He emailed me with immaculate restraint pointing this out. Sorry, Bryan.

I am running a World Wide Web server that you can look at. Its address is <http://www.hillside.co.uk/>. The server contains a number of files that encompass my activities at Hillside. For example, there's a list of *SunExpert* article titles. →

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

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Circle No. 8 on Inquiry Card



ROBIN JAREAUX

by **RICHARD MORIN**
Technical Editor

Can the Spam!

It's here! And it's incredible! It's the biggest, best, most exciting and potentially the most profitable new trend in decades of direct response marketing! Frankly, I've never seen anything like this new breakthrough in the 25 years I've been involved in response marketing! I'm talking about the new boom in on-line electronic marketing!!

Several dozen books have been published about the Internet; hundreds of articles have been written about the upcoming "Infobahn." Consequently, it isn't too surprising that the small-town flavor of the Internet is now being threatened by money-hungry hucksters.

The quotation above comes from a 16-page multicolor handout I received at a recent convention. I don't know how many others received the handout, but I'm sure I didn't get the only copy. I'm equally certain that others are making similar pitches.

Expect, therefore, to start receiving piles of cruff in your email, netnews groups and so forth. It's here! And it's incredible! It's the biggest, worst, most disgusting and potentially most annoying new trend in decades of Internet abuse.

Turning down the sarcasm a notch, let's look at what we can expect to see happen and what, if anything, we can do about it. Unfortunately, our options are limited.

Options

Netiquette, which should be the first line of defense, is relatively powerless against boors. Manners are a largely self-imposed set of constraints. If the sender doesn't care about the recipient's feelings and isn't worried about getting a bad reputation, she or he is free to abuse the Net as desired.

The NSFNET and certain regional networks have acceptable use policies (AUPs) that define who can use

their bandwidth, for what purposes and so on. Some suggest that these AUPs should be enforced against rampant hucksters. Unfortunately, there are several problems with this idea. First and foremost, the imposition of government regulation is likely to be more of a problem than the occasional Spam-o-gram. (Spamming, by the way, derives its name from a Monty Python skit in which the word "Spam" is repeated ad nauseum.)

The strategy also suffers because of the diverse nature of the Internet. It is often hard to know whether a given message has traversed AUP-controlled networks. If senders aren't on AUP-controlled networks, they may have no way of controlling or even knowing whether an outgoing message will cross into AUP space.

Finally, there is the question of administrative practicality. The NSF has enough to do without trying to become a police force (let alone a judi-

cial system) for the Internet. So, the AUP solution is a nonstarter.

Others have suggested (and even implemented) techno-fixes. These range from reverse Spamming (jamming the miscreant's mailbox, fax machine and so on with junk replies) to automatic cancellation of Spam-o-grams. Let's look at a few of these.

Reverse Spamming is very easy to implement. Since many Netters are so inclined to generate nastygrams at the slightest provocation, reverse Spamming is almost assured to occur. A bit of net.discussion and shazam, a million pieces of email descend on the miscreant's mailbox.

This is likely to gain the miscreant's attention; "file system full" for the mail spool partition tends to do that. On the other hand, other users on the system might also be damaged, so it isn't a totally focused attack. And, if the Spammer posts from a dummy account, the return mail can easily be routed to /dev/null.

The fax approach seems a bit more useful. Received faxes take up large amounts of paper and/or disk space, and they tend to be fairly focused in their attack. Finally, with the advent of free fax service on the Internet, they may not even be particularly expensive or time-consuming to send.

Moving from retribution toward control, we have notions of automatic cancellation and/or filtering. In the first, the Spam detector (human or automated) fires off a cancellation message. This chases the Spam-o-gram around the Usenet, deleting it from news spool areas wherever possible.

This doesn't reduce the bandwidth taken up by the Spam-o-gram. In fact, it adds bandwidth by sending out a second message. On the other hand, it reduces the storage impact of the Spam-o-gram, and it might help to discourage miscreants from further efforts.

Unfortunately, this tactic has the drawback of being a tad fascist. That is, who gave the Spam detector the right to cancel messages? So, we come to a more consensual approach: advisory messages. In this scenario, the

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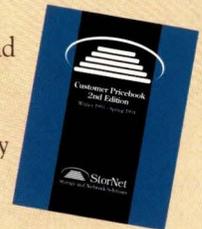
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Circle No. 21 on Inquiry Card

Spam detector sends out a Spam alert. Cooperating systems turn these alerts into local cancel messages. Other systems just ignore them.

Netiquette, Again

At this point, I should probably admit (some of :-)) my sins. I post occasional commercial messages to the Usenet and maintain a fairly substantial email list for commercial announcements. And yes, I do receive some flames for these activities, but not all that many.

I think my practices fall within the general consensus on acceptable use, regardless of specific written policies. Passing a harder test, I wouldn't mind seeing others act as I do. Consequently, I will now summarize my posting guidelines.

Postings should be *very* low in hype. Nothing angers techies faster than piles of unsolicited marketing fluff. Keep your messages brief and information-dense. Save details for follow-up bulletins, emailed on request.

Postings should be relevant to the group involved. Ideally, postings should be in response to questions seen in the group. Failing that, postings should contain newsworthy information. (Product introductions may qualify; recapitulations of price lists do not.) In any case, there should be a strong connection between the topic of a posting and the theme of the group.

Postings are more likely to be accepted in some groups than in others. Some groups, like `comp.newprod`, are intended for commercial announcements. Others tolerate occasional announcements, depending on their nature, relevance and frequency. Some groups are very self-protective and will flame the slightest effort at commercial posting. Some caution is advisable, therefore, coupled with a bit of advance scouting.

The rules on email lists are a little fuzzier, if only because they are far less visible. My first rule, gathered through painful experience, is to avoid sending unsolicited messages. Even when the intent is pure, terrible flames can ensue.

In one instance, I tried to contact a large list of freeware authors. I wanted to offer them free copies of a product containing their work, as a way of thanking them for their efforts. Seemed pretty benign to me.

Unfortunately, my message wasn't

Time Freeware (PTF), exchanged email with us, etc. If you do not wish to get our bulletins, please send a note to `ptf@cfc1.com`. Include the Sent to: line (located just above this paragraph), so we will know which name(s) to remove.

"We try to use direct addresses, to avoid mailing list explosions. If this message came to you via an inappropriate mailing list, PLEASE let us know (again, including the Sent to: line), so we can track it down. If you are getting multiple copies, or if we have a faulty address for you, let us know the address(es) involved, and which one you prefer."

Yes, it's a bit verbose, but it covers all the critical issues, and most recipients react to it in a positive way. I do get cancellation requests, but they are generally polite and almost always include the requested Sent to: information.

Finally, I don't send commercial email messages unless I really have something new to discuss. If possible, I combine several announcements in a single (small) message. All of this increases the signal-to-noise ratio, and keeps my recipients from feeling that I am abusing their mailbox.

Consequently, the vast majority of my recipients do not complain, and I frequently receive responses commending my products, thanking me for the information, requesting address changes and so on. I guess that means I'm doing OK. ➔

Richard Morin operates Prime Time Freeware (`ptf@cfc1.com`), which publishes mixed-media (book/CD-ROM) freeware collections. He also consults and writes on UNIX-related topics. He may be reached at Canta Forda Computer Laboratory, P.O. Box 1488, Pacifica, CA 94044 or by email at `rcm@cfc1.com`.

Nothing angers techies faster than piles of unsolicited marketing fluff. Keep your messages brief and information-dense. Save details for follow-up bulletins, emailed on request.

as clear as it might have been, and some of the addresses I used turned out to be mailing lists. Consequently, I was accused of all sorts of—well—let's just say that reading the responses wasn't a totally pleasant experience.

I also realized that I needed a way to know which address was at fault. Getting a flame from someone who demands to be taken off a list is bad enough. When the return address doesn't match anything on your mailing list, however, you begin to have a real problem.

Consequently, all of my messages include a Sent to: line, set apart from the mail header. This provides an unambiguous way of determining which email address to kill in the case of a mail bounce or disinterested (nay, irate) recipient. The beginning of my message thus tells the recipient:

"This bulletin is sent to people who have purchased products from Prime



Stalking Goliath by S. LEE HENRY

Of all the dastardly problems that plague networks, one of the most frustrating to track down is the problem of “giant packets.” Without much fanfare, this error message says that your network is broken. How severely and why can only be determined by clever sleuthing and a lot of note-taking.

Giant packets have been seen at many locations and for many years. Like Elvis sightings, they invoke a mixture of incredulity and disdain. The last thing you need on a busy network is a problem that is hard to track down and difficult to fathom. The appearance of giant packets is likely to have you reviewing everything you know about TCP/IP and wondering what you can do to simplify your search for the responsible culprit.

Giant Footprints

Most of us would never notice occasional giant packets unless we happen to be watching our console windows when they arrive. Or we might examine our message files from time to time and notice sets of lines that look like this:

```
Aug 22 16:20:10 boson vmunix: le0: Receive:
giant packet from ff:ff:ff:ff:ff:ff
Aug 22 16:20:10 boson vmunix: le0: Receive:
STP in rmd cleared
```

The first of these two lines says that the interface received a

packet that was too large for the receive buffer. It prints the address appearing in the (hardware) source address from the packet. The second says that the interface cleared the Start of Packet (STP) bit. The Lance Ethernet chip will automatically chain buffers together if required; clearing the STP indicates that the subsequent buffer is not a new packet. Since giant packets are clearly out-of-spec, receipt of such a packet is recorded in the messages file, but the packet itself (actually the Ethernet frame) is discarded by the driver.

If you run `etherfind`, for example, asking to see packets larger than 1,500 bytes, you are likely to see a lot of activity like this, but `etherfind` won't capture giant packets and show them to you (see Figure 1).

What Is a Giant Packet?

A giant packet is an Ethernet frame that exceeds the maximum length permitted by the 802.3 specifications (1,518 bytes). Most giant packets appear to be both sourced and destined to the broadcast address `ff:ff:ff:ff:ff:ff`. Thus, they are picked up by every host that sees them and are clearly not valid packets. For one thing, they are too large. The driver allocates its receive buffers to be large enough to handle the largest permissible packet sizes. For another, the broadcast address is never a valid source address.

For those of us who think in hex, a string of `f`'s immediately translates to all bits being “on”; the source and destination addresses in most giant packets are strings of `1`'s. (For

```

boson# etherfind greater 1500
Using interface le0

          icmp type
lnth  proto  source  destination  src port  dst port
1514  tcp     eta     gauss       668      60197
1514  tcp     eta     gauss       668      60198
1514  udp     eta     boson       2049     1022

```

Figure 1. Etherfind in Action

decimal	binary	hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Figure 2. Good Old Hex

```

#!/bin/csh
# if ($#argv != 1) then
    set FILE = "messages"
else
    set FILE = $1
endif
if (! -f $FILE) then
    set FILE = "messages"
endif
cat $FILE | grep giant | awk '{print $1,$2,$3,$4,$11}'

```

Figure 3. The show_giants Script

those of us to whom hex is a spell placed on us by a sorcerer, I've included a hex translation table in Figure 2.) I have also seen giant packets whose source addresses were composed of a's or 5's. In these cases, the source and destination addresses are alternating 1's and 0's. The regularity of these patterns gives giant packets a clearly mechanical appearance. They might, indeed, be related to noise or to a failing network component.

```

le0: Receive: giant packet
from ff:ff:ff:ff:ff:ff
le0: Receive: giant packet
from 55:55:55:55:55:55
le0: Receive: giant packet
from aa:aa:aa:aa:aa:aa

```

You might sometimes see giant packets from hardware addresses that are clearly valid and belong to hosts on your network. That, in itself, doesn't mean that those

particular hosts are misbehaving. There may be something on your network that is corrupting occasional packets from these hosts. After all, an Ethernet interface is innocent until proven guilty! Less than 1% of the giant packet notices on my network corresponded to actual hosts and, of these, a diverse collection of otherwise stable and well-functioning systems seemed to be represented.

```
le0: Receive: giant packet from 8:0:20:e:ef:e1
```

What Causes Giant Packets?

There are a number of theories that have been proposed over the years about the causes of giant packets. Most likely, giant packets are caused by a number of problems.

You might have some hardware that is indeed broken: a failing transceiver, an Ethernet interface or a repeater. Ethernet adapters on PCs are likely more suspect than those on "real computers." Look also at bridges, routers and other gateway products.

Networks running several protocols seem to experience giant packets more often than those that do not. If your network supports LAT (DEC protocol) or AppleTalk, you are more likely to be plagued by giant packets.

You may simply have a cabling problem.

Depending on the cabling plant in your organization, it is anywhere from impossible to trivial for a naive user to introduce cabling "bugs." You should familiarize yourself with all the rules governing the type of network you are running. You should know, for example, the rules for termination and cable lengths (both minimum and maximum). Improper termination, likely to cause bonzo collisions, is not the only cabling fault. An impedance mismatch (e.g., between two different types of cable) can also cause serious network problems.

You should also check the validity of connections to repeaters and bridges and know how to look for faults.

Your problem might be caused by electrical interference or "noise" on the network. Noise might corrupt packets on your network, causing multiple packets to appear to be one packet. Network noise might be caused by components on your network or by external interference. A noisy piece of equipment close to a workstation, or a nearby radio station, might introduce noise.

```

# count_same: count the lines that are
#             the same and print each uniq line
#             along with a count of # of such lines
#
BEGIN {CNT = 0}
{
if ($0 == PREVLINE)
    ++CNT
else {
    if (CNT > 0)
        print PREVLINE, ":", CNT
    CNT = 1
}
PREVLINE = $0
}
END {
    if (CNT > 0)
        print PREVLINE, ":", CNT
}

```

Figure 4. Awk Script for Counting Identical Lines

Stalking

One interesting exercise I tried was graphing the frequency of giant packets on hosts where many were received. The frequency of giant packets clearly correlated with network activity, as one might imagine. This meant, of course, that they correlated with just about everything—network congestion, collisions, the turning on of all of the PCs and Macintosh systems in the building, the use of equipment in the labs, and activity on the elevators.

I used the scripts shown in Figures 3 and 4 as shown in the commands below:

```

show_giants messages | awk '{print $1 $2}' |
awk -f count_same
show_giants messages | awk -F: '{print $1}' |
awk -f count_same

```

The first command counts giant packets by day (*awk* selects the first two fields, month and day). The second counts giant packets by hour (*awk* uses everything up to the first colon—month, day and hour). Both commands then send the selected data to the *count_same* script. Results from the first command might look like this:

```

Aug 8   : 75
Aug 9   : 166
Aug 10  : 294
Aug 11  : 348
Aug 12  : 302
Aug 13  : 28
Aug 14  : 61
Aug 15  : 134
Aug 16  : 44

```

A more interesting exercise was correlating messages from various systems to see which hosts received which giant packets. It was necessary to correct for time since some of the hosts' clocks were slightly off. What I saw clearly were groups of hosts all reporting that they observed the same giant packet at essentially the same time. This was especially obvious when the source addresses varied slightly from the usual pattern. A giant packet with a source address of 54:55:55:55:55:55 or 8:0:57:55:55:55 was much easier to track through the message files from a group of hosts.

Most of my subnets did

not see any giant packets at all. Those that did, however, clearly indicated that all the Suns on that network segment saw basically the same thing. Giant packets clearly never made it across a bridge. The groups of hosts that responded to the same giant packets were always on the same network segment.

The best approach to take in tracking down the cause of giant packets is to segment your network to insulate subnets from the problem or to isolate segments temporarily by moving a bridge around and watching to see where the giant packets continue to appear. Giant packets will not cross a bridge but are transmitted through most, if not all, repeaters. If you can squeeze the problem down to a small part of your network, you can then examine closely the components and cabling in that area. Detaching systems, one at a time, from the network might pinpoint the cause of your problem.

I'm still homing in on my Goliath. If you've gone out with sandals and slingshot and managed to slay yours, I'd like to hear from you. ➡

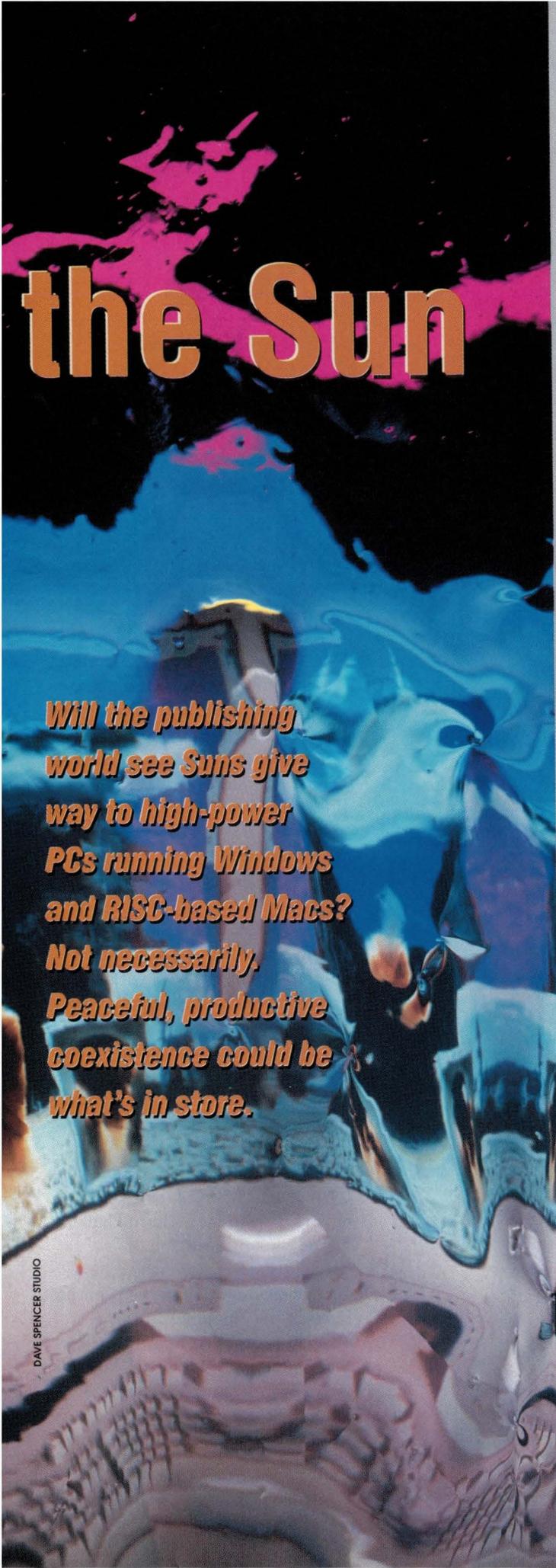
S. Lee Henry is on the board of directors of the Sun User Group and manages computer and networking services for the Physics and Astronomy Department at Johns Hopkins University. Send mail to slee@expert.com.

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DAVE SPENCER STUDIO

DESKTOP PUBLISHING

In recent years, desktop publishing with workstations from Sun Microsystems Computer Corp. has gone in two directions. Sun has been very successful in the technical publications market with programs like FrameMaker from Frame Technology Corp. and Interleaf from Interleaf Inc. Sun hardware has also become the basis for many proprietary high-end publishing systems such as Unda ImageStation from Scitex Corp. and ColorScape from Agfa Corp. Despite Sun's success in these niches, UNIX-based systems have simply not penetrated deeply into mainstream desktop publishing and prepress environments. In those areas, Apple Computer Inc.'s Macintosh remains the undisputed leader.

But times are changing. Within a year, the world of publishing could be a different place. Sun's position as the dominant platform for technical publishing could be eroded as full-featured versions of Frame and Interleaf find increasing popularity on low-cost, high-power computers running one of the many flavors of Microsoft Corp.'s Windows. Meanwhile, Apple's new line of RISC-based Power Macintosh computers has removed many of the reasons that, until now, high-end graphics users had for abandoning their beloved Macintoshes, with the computer's plethora of publishing software and its user-friendly operating system.

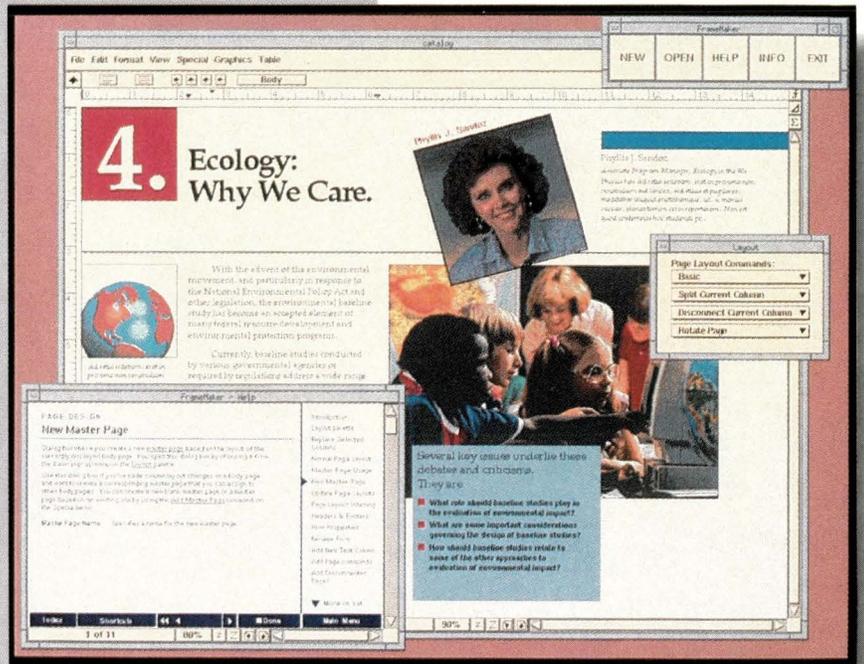
by **SIMSON L. GARFINKEL**, Senior Editor

Is this the beginning of the end for Sun workstations? Hardly. Mainstream graphics tools like Photoshop from Adobe Systems Inc. and CorelDRAW from Prior Data Sciences Inc. continue to be ported to Suns, where they enjoy newfound power. At the same time, other forces—a new generation of emulators designed to let unmodified Macintosh programs run on Sun's SPARC workstations, as well as a push toward electronic imaging—may yet tilt the balance in favor of UNIX-based solutions for high-end publishing applications.

In the final analysis, the new generation of cross-platform applications and platform-crossing environments, combined with improved tools for networking Sun and Macintosh systems, will let users of both environments continue to use the machines they like best—but with less cause to envy their counterparts in the other camp.

The Writing on the Wall

As any Sun user knows, it takes the power of a workstation to process data from a dozen different sources, combine and manipulate it using a sophisticated model, and then produce a wide variety of different reports, each with its own specifications. Having done this work once, a good tools-based environment then allows you to



FrameMaker gives users flexibility: Fonts, point size or leading can be changed character-by-character, for an entire paragraph, or for an individual "flow" of text.

Instead of a page layout system, Interleaf is more like a sophisticated word processor, with its own API and a powerful expert system that understands typography.

automate the process, so it can repeat month after month with only minimal operator intervention. This is quite a different scenario from the typical PC or Mac environment, where even routine chores must be manually repeated each time the user wants to achieve a particular result.

It's not surprising, then, that the impact of PCs and Macs (especially Macs) has been strongest in book publishing, presentation graphics and advertising—all areas where nearly every job is different, and where the most sophisticated integration between a database and a final publication is a user copying a spreadsheet and pasting it into a word processor. By contrast, the best-selling technical publishing packages on Suns—Frame and Interleaf—are designed for producing large, structured documents—the kinds of tasks that are the bread and butter of workstation publishing.

Despite the fact that they are frequently mentioned in the same breath, Interleaf and Frame are actually very different programs designed for different kinds of users. Both give users the pleasure of a what-you-see-is-what-you-get (WYSIWYG) graphical user interface and allow sophisticated mixing of graphics and type on a single



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	SoftWindows	Wabi
Number of compatible applications you can run	Thousands	13 ?
Networking capability	Yes – supports NetWare, LAN Manager, Banyan VINES, TCP/IP	Not yet
Number of UNIX platforms you can run them on	Sun, HP, IBM, Digital, and SGI	3 ?
Availability	Shipping	On & Off
Microsoft Windows 3.1 and MS-DOS 6.21 included	Pre-installed	No

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page. Both contain facilities for common tasks such as producing tables, editing equations and combining several files into large documents. Nevertheless, after years of development, each program has found its own niche, making the two programs less competitive with each other than one might suspect.

Frame Technology's FrameMaker, now in its fourth major release, is fundamentally a page-layout program. A FrameMaker document consists of many pages, each of which can have a unique or a document-wide look. FrameMaker gives users flexibility: Fonts, point size or leading can be changed character-by-character, for an entire paragraph, or for an individual "flow" of text. Nevertheless, Frame has a sophisticated selection of tools for editing text. For these reasons, Frame is used by companies such as market research firm Dataquest, San Jose, CA, to produce its market research reports; by Westinghouse to produce technical documentation; and by students at the Massachusetts Institute of Technology's Media Lab to write their dissertations.

"We use Frame for everything: internal memos, technical reports, camera-ready copy for publication, [and] source-code documentation," says Chuck Musciano, a staff software engineer at Harris Corp. in Melbourne, FL, which has been using Frame since Version 0.6. One of the great advantages of Frame, says Musciano, is that the same program is available on the company's workstations, PCs and Macintosh computers—with absolute file compatibility between the platforms. "People will come to me amazed; they say that 'I have these documents on a PC.' I say, 'Just open them on the workstation.'" This degree of file compatibility is unheard of in the PC world, says Musciano, where even the DOS and Windows versions of the same program frequently use incompatible file formats.

Interleaf's Interleaf, on the other hand, excels at applications such as database publishing, in which information is extracted from a large database and combined with document templates to produce a final work.

In Search of Font Flexibility

Anybody who has actually attempted publishing on SunOS or Solaris 2.x knows that a hidden problem lurks beyond the marketing hype: the font fix.

In the Windows and Macintosh worlds, users can pretty much go to a computer store, buy a floppy or a CD-ROM filled with fonts, slip the disk into the computer's drive, and within minutes the new fonts are available to every application on the system. Sun has offered workstations with bit-mapped screens for more than 11 years but has yet to give its users this kind of font flexibility.

Instead of handling fonts in a unified manner, practically every Sun program that works with publication-quality PostScript fonts needs to perform its own font management. "Solaris doesn't have a unified place to put fonts," explains Frame's Mark Hamilton. As a result, programs like FrameMaker and Interleaf need to have their own font installation strategy—and fonts installed for one program need to be reinstalled for another.

Both FrameMaker and Interleaf use off-the-shelf PostScript fonts—provided you can find some way to get the fonts from the distribution disk onto your workstation. (Most Sun workstations lack a floppy disk drive, much to the chagrin of people used to publishing with personal computers.) And once the fonts are installed, don't expect to use them with most of your non-publishing programs, which are still stuck in the pre-PostScript era, using bit-map fonts residing on your X server. —slg

Instead of a page layout system, Interleaf is more like a sophisticated word processor, with its own API and a powerful expert system that understands the rules of typography. Indeed, large parts of Interleaf are written in Lisp, a language originally developed for artificial intelligence research. With Lisp, users can write their own extensions or build their own application programs on top of the Interleaf framework.

FrameMaker 4.0 includes a different kind of interface that allows developers to integrate the layout program into their custom applications. Called the FrameMaker Developer Kit, this system allows developers to add custom menu options, run any FrameMaker command and read from portions of the document.

Frame's developer kit isn't just for custom applications; it's also the basis for the company's Frame Connections Program, in which more than 400 companies are developing drop-in modules to extend Frame's functionality. "About a half-dozen are shipping today," says Mark Hamilton, Frame's group marketing manager. One of the most interesting drop-in modules is a database publishing application called Publish, made by Brio of Mountain View, CA. Brio's application can be configured to make a query from an SQL database, then fill a frame document with the results. Other Frame extensions perform such functions as table mathematics and automatic language translation from English to French or German.

At Pratt & Whitney's offices in East Hartford, CT, engineering assistant Bebi Newirth uses Interleaf to create documentation for electronic controls that run high-performance turbine engines. "These are very large pieces of documentation—some of them can be more than a thousand pages long," says Newirth. Although Newirth says she spends too much time retyping documents that engineers write out in longhand, her group is increasingly building its documents electronically. For example, Pratt & Whitney has a filter to take engineering documents from the company's CAD system directly into Interleaf.

Unlike Frame, Interleaf excels in large environments where dozens or even hundreds of users need to be working on the same set of documents at the same time, thanks to an integrated document management system. Interleaf can also track multiple revisions and changes to a single file, although Newirth says that the engineers in her group are “uncomfortable with the idea” because they would not have direct control over their files. Instead, Newirth’s co-workers prefer to perform their own revision control by making copies of the Interleaf files with traditional UNIX commands.

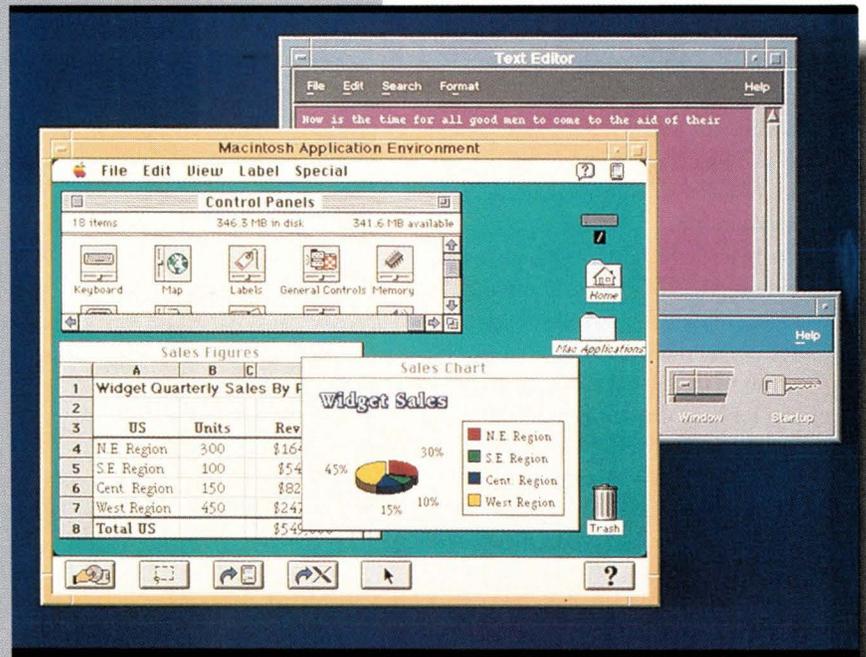
Of the two programs, Interleaf requires a far more powerful workstation than FrameMaker—a result, undoubtedly, of Interleaf’s Lisp core. “I came from a [Sun SPARCstation] 1+ to an IPX,” says Newirth, who now has a SPARCstation 10 on her desk for Interleaf. “I would never want to go back again. Grass grows faster than Interleaf running on a SPARCstation 1+.”

Traditionally, users have considered Frame a friendlier program to use than Interleaf. “I’ve long been an opponent of Interleaf because I think it has a hostile user interface,” says Harris’ Musciano. The company claims to have addressed many of these issues in Interleaf 6, which featured a near-total rewrite of the program’s GUI. Nevertheless, more than 95% of the company’s customers still use Interleaf 5, says David Bucholz, Interleaf 6’s product manager.

Graphics

Both FrameMaker and Interleaf come with built-in modules for technical drawing. While these programs may be fine for simple jobs, users who need to create complicated drawings or illustrations will probably be better off investing in one of the full-fledged drawing and image-editing packages available on the Sun platform.

Adobe Illustrator 3.5, while not as sophisticated as Illustrator 5.0 on the Macintosh, is nevertheless a powerful drawing tool for creating complex diagrams, charts or graphs. An even more powerful program is Altsys Corp.’s Virtuoso 1.0 (originally developed



The Macintosh Application Environment simulates the Mac's Motorola 68000-series CPU, its memory and its I/O hardware.

under the NextStep operating system from NeXT Inc.). CorelDRAW, another popular Macintosh drawing application, is now also available for Suns, as are old Sun standbys such as IslandDraw and IslandPaint, both from Island Software Corp. Not to be forgotten, Adobe's popular PhotoShop pixel-editing program is also now finally available for Suns.

For the most part, the UNIX versions of cross-platform graphics applications cost more than their Macintosh or Windows cousins. One way vendors justify these prices is by stressing performance. Sun's SPARC processor, for example, frequently makes the UNIX versions of these programs speed past their counterparts running on Intel or Motorola CISC processors. Another justification is that most UNIX versions of these programs are sold with network licenses, while the PC and Mac versions are sold for a single CPU.

One problem that remains for publishing on Suns is the lack of applications. While it's true that many mainstream publishing applications are available, other important ones—such as QuarkXpress from Quark Inc.—are not. And for every program that is ported to Sun, there are many more

appearing on Macintosh and Windows platforms every day.

One of the most exciting products to help out with Sun's dilemma is Apple's Macintosh Application Environment (MAE), a software-only emulation package that re-creates an entire Macintosh computer inside a Solaris window.

"We believe that there is a high synergy between UNIX workstations and Macintosh users," says Stuart Freiman, a product marketing manager at Apple. "We found in our research that there were a lot of workstation users out there who actually use Macintosh."

According to Apple's internal research, 40% of UNIX users use Macintosh computers somewhere within their business. For many, the Mac is a PowerBook laptop computer. Others need to use applications that are only available on the Macintosh platform. It is for these users that Apple created MAE, Freiman says.

Like Insignia's SoftWindows, which puts a PC in a window, the Macintosh Application Environment builds a complete computer in software. MAE simulates the computer's Motorola 68000-series CPU, its memory and its I/O hardware. The Sun's file system appears as a Macintosh disk, using technology similar to that which Apple developed for its Macintosh AUX UNIX offering. The result is a system that can run most popular Macintosh applications.

"The overwhelming majority of folks we surveyed say the important things for them to run are the top Macintosh applications—Microsoft Word, Microsoft Excel, spreadsheets and word processing applications. The tier after that was the ability to run some of the desktop publishing applications," says Freiman.

What MAE won't give users is speed. On a low-end SPARCstation, Apple says that MAE's performance will approximate that of a low-end 68030-based Macintosh IIci or IIvx machine. On a SPARCstation 10, MAE will deliver low- to medium-range Quadra performance. Nevertheless, at \$549, it's priced considerably less than the hardware-based alternative. With discounts available for volume purchases,

MAE opens up the possibility for integrating low-cost, high-quality applications directly onto the Solaris desktop.

The Fast Future

For current Sun customers, the alternative to integration is migration to the new generation of high-power PCs. Even for large organizations committed to Sun standards like Interleaf and FrameMaker, such a migration isn't as impossible as it once seemed, thanks to new versions of those programs once only available on other platforms.

Easing the transition is the fact that both Interleaf and FrameMaker have complete file compatibility between the versions of their programs running on different platforms. Frame and Interleaf are also pricing the PC versions of their products significantly lower than the UNIX ones, largely because the Windows market will not tolerate application programs that cost more than \$2,000. That's one of the reasons why the UNIX version of Interleaf 6 costs \$2,500, while the DOS version costs \$1,795.

For these reasons alone, Sun should be especially wary of the new generation of Pentium-powered personal computers appearing on the market. These machines' performance is similar to or better than a SPARCstation 5, and they are often priced \$500 to \$1,000 less than their SPARC competitors.

"I think Sun and UNIX applications have to face the fact that you can buy that Pentium box for a very attractive price," says Interleaf's Bucholz. According to Bucholz, DOS versions of Interleaf are the now the company's second best selling product, right after versions of Interleaf for Sun. The DOS version runs even faster on similar hardware, says Bucholz, since there is less overhead from the operating system.

Despite these factors, neither Sun nor its third-party vendors expect much in the way of competition from Intel-based personal PCs—and if they are, they are not admitting it. In fact, Sun expects that it will soon be weaning publishing customers away from Mac and PC platforms, now

SGML Steps In

As users move toward electronic document distribution, they are showing increased interest in SGML, the Structured Graphics Markup Language.

SGML is a standardized file format for representing complex documents—the sort of file format you might want to use with a "smart" word processor. With SGML, for example, you don't make a section headline by saying that a particular line of text should be printed in larger type and a bold font. Instead, you define a series of SGML "tags" to do things like define the start of a section, indicate a bulleted or numbered list or denote an embedded graphic.

If you want to actually print a SGML document, you need to create a table that tells the computer how to display different sections of text that have different tags; a different definition might be used for displaying an SGML document on a computer screen, or delivering it in ASCII over the Internet, or even reading it over the telephone with a speech synthesizer.

Obviously, the strength of SGML is its flexibility. But in order to make use of it throughout an industry, it's necessary that there be a standard set of tags, called Document Type Definitions (DTD), on which everybody agrees. A variety of industry-specific forums are now working on just that.—*slg*

that standard programs such as Adobe Illustrator are available for SPARC workstations.

What's happening now with these standard applications, says Katherine Parker, Sun's market-segment manager for publishing, is an opportunity for entire corporations to run on the standard Sun platforms. The reasons, says Parker, are "because we have PostScript built in, because we have 24-bit color support built in, because we have the very high I/O bandwidth [and] we have very fast networking that is standard."

Networking is key to Sun's long-term plans—not just for document creation, but for viewing. That's because Sun hopes that its users will ultimately do away with printed documents and distribute information electronically to the desktop (where it will be displayed, presumably, on Sun workstations).

Both Frame and Interleaf are aggressively pursuing the electronic distribution market: Frame with a product called FrameViewer, and Interleaf with its WorldView program. Both products allow users to create compound documents containing text, graphics and hypertext links, and then to disseminate those documents cheaply through an organization using a network, CD-ROM or floppy disk.

Perhaps the biggest difference between Interleaf's WorldViewer and Frame's FrameViewer products is the need for preprocessing. Interleaf requires that its Interleaf 6 files first be processed with its \$10,000 WorldBuilder application—and WorldViewer files, once generated, cannot be edited. Frame's FrameViewer, on the other hand, is basically a read-only version of FrameMaker 4.0, allowing it to read any file on the system.

The Multiplatform Future

Another part of Sun's future might just be on preview at Campos Photography, a 16-person custom photo lab near Buffalo, NY.

While the company is still primarily based on its photographic laboratory, Campos' electronic imaging department now has two computers: a

Companies Mentioned in this Article

Adobe Systems Inc.

1585 Charleston Road
Mountain View, CA 94039

Circle 141

Agfa Corp.

200 Ballardvale St.
Wilmington, MA 01887

Circle 142

Altsys Corp.

269 West Renner Parkway
Richardson, TX 75080
virtuoso_info@altsys.com

Circle 143

Cayman Systems Inc.

26 Landsdowne St.
Cambridge, MA 02139

Circle 144

Frame Technology Corp.

1010 Rincon Circle
San Jose, CA 95131

Circle 145

InterCon Systems Corp.

950 Herndon Parkway
Herndon, VA 22070

Circle 146

Island Software Corp.

4000 Civic Center Drive, Suite 400
San Rafael, CA 94903

Circle 147

ISTR Inc.

812 Main St.
Buffalo, NY 14202

Circle 148

Prior Data Sciences

240 Michael Cowpland Drive
Kanata, Ontario K2M 1P6 Canada

Circle 149

Scitex America Inc.

A division of Scitex Corp. Ltd.
8 Oakpark Drive
Bedford, MA 01730

Circle 150

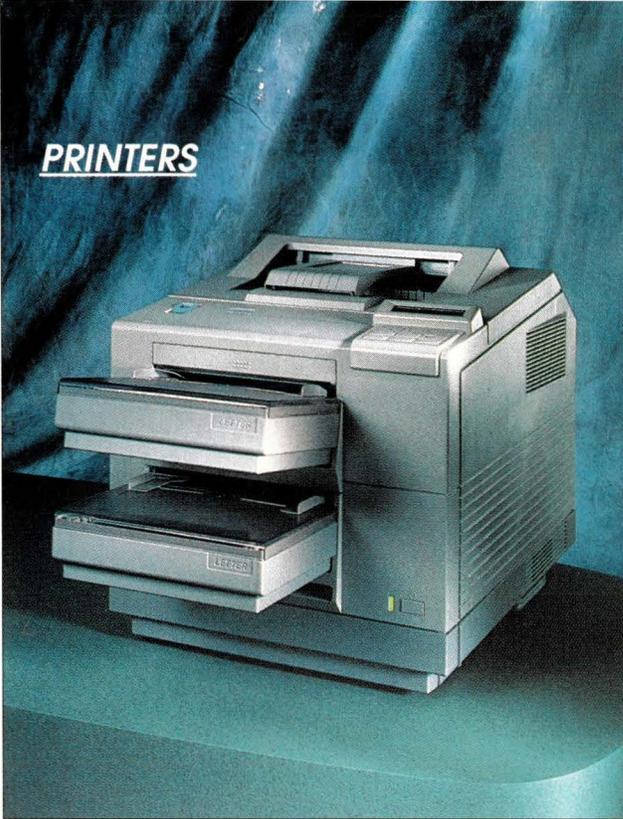
SPARCstation 2, equipped with 64 MB of internal RAM and a 150-MB RAM disk; and an Apple Macintosh Quadra 950 with 80 MB of system RAM. The two systems are networked together with Ethernet, with more than 3 GB of storage between them.

"The Sun's better for some things, and the Mac is better for other things," says George Campos, the company's owner. "What necessitates the Sun is when the images get large and more demanding. A lot of times you are taking your image to color film so it can be enlarged. At that point it is not unusual to work with files that are from 200 to 400 MB. We probably put anything on the Sun where the original file size is over 30 to 40 MB."

Key to all cross-platform approaches is tight networking between the Sun and Macintosh platforms. It's not necessary that the same applications be on both Sun and Mac; what's important is that the file formats be compatible. For example, Campos Photography uses Adobe Photoshop on its Mac and a high-end program called Magic Inkwell from ISTR Inc. on its Sun, but both programs can read and write industry-standard TIFF files. Many options exist for moving the files back and forth between the Sun and Mac platforms, from hardware-based approaches such as Cayman Systems Inc.'s GatorBox to software-only systems such as InterCon Systems Corp.'s NFS/SHARE and InterPrint, which give the Macintosh NFS and LPR connectivity.

Thus, while hardware advances on the desktop are giving Sun users more reasons to consider migrating to PCs and Macs, new applications for Solaris and improved connectivity are giving people more reasons than ever for staying with Sun—or, at the very least, for building heterogeneous networks. What all this means is that Sun is likely to maintain its dominance in the world of technical publishing, while slowly making inroads in high-end publishing applications and in large organizations still leery of heterogeneous networks. →

PRINTERS



Compromise in the Printer Wars?

by MICHAEL JAY TUCKER, Executive Editor

In printing, the question has long been whether intelligence should reside at the printer or at a host. Now differing requirements for different types of printing may be driving the technology in both directions at once.

This month, *SunExpert* presents our yearly survey of printers, compiled over several weeks by our research editor, Maureen McKeon. A glance at the table will show a fundamental division in the market between host-based printer partisans and intelligent printer advocates.

The quarrel between the host-based and intelligent printer camps is one of the oldest in computer technology. The former group believes printing is best done by host systems, which then download bit streams to relatively simple printers. The latter, meanwhile, argues that printers should be as intelligent as possible.

Could this argument finally be coming to an end? And in a favor of a negotiated settlement?

Sun Microsystems Inc., and its printer-oriented planet, SunPics, have long been strong advocates of the host-

based method. Sun's NeWSprint printer technology is a host-based approach. In fact, SunPics thinks it is the only logical way to do network printing. Citing market research from International Data Corp., in Framingham, MA, SunPics Product Manager Jack Androvich notes, "What's interesting is that most printers attached to networks are attached through servers. Although the leaders in the market, particularly HP, have done a good job of driving intelligent printers, the market is really used to dealing with servers."

He gives several reasons for the superiority of the approach. There is cost, for instance. Printers can be less expensive if they don't contain sophisticated CPUs. And there is ease of administration. To upgrade the software, you simply load it on the host. There's no question of swapping firmware.

Sun rates as "other" in market research firm Dataquest Inc.'s listing of top printer companies. However, in at least some applications, Sun's host-based approach to printing may be growing in importance. Dataquest analyst John Goetz notes that as personal printers attack more complex problems, it sometimes makes sense to offload that complexity to the superior power of a workstation CPU.

	1993 Unit Shipments (thousands)	1993 Market Share (%)	1993 End-User Revenue (millions)	1993 Market Share (%)
Hewlett-Packard Co.	3,901.0	34.2	3,757.1	40.8
Panasonic Communications & Systems Co.	1,427.9	12.5	452.0	4.9
Epson America Inc.	1,292.6	11.3	506.1	5.5
Okidata Corp.	881.9	7.7	461.2	5.0
Canon Computer Systems Inc.	758.2	6.7	393.2	4.3
Apple Computer Inc.	757.2	6.6	474.0	5.1
Citizen America Corp.	542.0	4.8	102.5	1.1
IBM Corp.	435.4	3.8	700.0	7.6
Star Micronics America Inc.	323.1	2.8	89.4	1.0
Brother International Corp.	114.0	1.0	73.2	0.8
Other Vendors	966.0	8.5	2,204.8	23.9
Total	11,399.0	100.0	9,213.4	100.0

Source: Dataquest

But advocates of intelligent printers remain completely unconvinced. "My suspicion is that if you look at the entire printer market, the clear winner is the intelligent printer, in terms of sheer volume," says IDC's director of printer research, Angele Boyd. "I suspect that even if you look at just the Sun environment—at just those networks where Suns predominate—the winner would still be the intelligent printer. Or, at most, it would be split, half intelligent and half host-based."

Boyd argues that there are no real cost savings for host-based printing. "Most host-based proponents say that host-based printers are cheaper. The reality is that they're not much. A user then says, 'Why should I buy this thing when it's just as expensive and it gives me some limitations?'"

These "limitations" are a result of complexity. To use a host-based system, after all, one must use and administer the host. By contrast, an intelligent printer can do some of its own administration. "Users don't want to spend time configuring it and loading software," says Boyd. Intelligent printers, she says, can be used right out of the box. This makes them much more appealing to end users. "I really don't think it is a technical issue," she explains. "It is more of a market and user-concern issue."

Still, host-based printing does have its users, and some of them are rather eloquent in their defense of the technique. "We find, with host-based printing, we have much more flexibility," says Sylvia Berens, vice president of San Diego-based Apunix Computer Services, which markets and uses Sun-based

printing technology.

In particular, she notes, "with most intelligent printers, you end up doing PostScript relatively quickly, but you print raster files relatively slowly." It's in the rasters, where CPU horsepower is vital, that a workstation comes into its own. "Sun is really well-suited for scanning and printing," she says. "That's where you justify having the power of the Sun."

In fact, SunPics' Androvich argues that the printer market actually segments, with host-based approaches being more attuned to the needs of high-end printing. "If you were to approach this from the bottom up," he says, "the small business and home office market comes with the HP [i.e., intelligent printer] model, but the next level up, where the big people live, you've got larger operations that are already using servers." Not only are they already using servers, he says, but they are also doing more sophisticated kinds of printing, where the power of the host is absolutely necessary.

Berens gives some support to the idea that host-based and intelligent printers might actually have different missions. All of her company's printers are "dumb printers," she says, but "it depends on your philosophy as a system administrator. People who are using a mixed environment would probably be more inclined toward an intelligent printer."

In fact, it may be that neither side is winning, or ever will. Rather, the printer market is splitting up, according to function, between the two approaches. "There is a shift going on," says John Goetz, senior industry

analyst for market research firm Dataquest Inc. in San Jose, CA. "The trend in multiuser or network printers is away from host-based systems, [but] the single-user systems are moving toward host-based systems."

The reason, he says, is that in networks, printers have to have the intelligence to act as independent nodes that can speak to any node in the system—without going through a server that may or may not be compatible with other users' equipment. "The issue with network printers is that there might be some opportunity for a host-based controller, but only if you have a closed environment where every system is from the same vendor," he says. "But the reality today is mixed environments. There aren't any closed shops."

On the other hand, he says, "personal printers are growing in complexity and sophistication." So much so, in fact, that they are outstripping the ability of inexpensive embedded controllers to handle them. "The printers are more complex, so the controllers you put into them are more complex and require more memory. Increasingly, it makes sense just to rely on the power of the host. "The cost of putting those things elsewhere is more compelling."

In markets, as in the physical sciences, debates usually don't end in compromise. One product sells, and the other doesn't. This may be one of the rare exceptions. Perhaps the long-standing debate between host-based printing partisans and the intelligent printer advocates can come to a peaceful conclusion. There's a place for both. ➡

High-Resolution Printers (600 dpi and above)

compiled by MAUREEN MCKEON

Company/Manufacturer Model	Engine	Base/expanded RAM	Emulations	Resolution (dpi)	Print speed (ppm)	Rated monthly duty cycle (pages per month)	Interfaces	NeWSprint-compatible	PostScript	Number of fonts supported	Compatible fonts	Paper handling	Paper sizes supported	Price (\$)
ALPS Electric U.S.A., 3553 North First St., San Jose, CA 95134. Circle 200														
LSX1000	Brother	2 MB/ 34 MB	HP	600	10	10K	Parallel, serial	N	—	83 resident	PCL 5e	250-sheet tray, built-in envelope adapter	8 1/2 x 11, 11 x 17, A4, envelopes, card stock, labels, transparencies	1,599
Canon Computer Systems Inc., 2995 Redhill Ave., Costa Mesa, CA 92626. Circle 201														
LBP-860	Canon	2 MB/ 34 MB	HP	600	8	—	Parallel, serial	N	Y	45 scalable	TrueType, Intellifont, PCL 5e	10-envelope, optional 500-sheet cassette, 75-envelope, 250-sheet cassette, 100-sheet tray	8 1/2 x 11, 11 x 17, A4, envelopes, card stock, labels, transparencies	1,839
Dataproducts, 6219 DeSoto Ave., Woodland Hills, CA 91367. Circle 202														
LZR 1580	Fuji-Xerox	8 MB/ 32 MB	HP, IIP, PCL 4	600	15	50K	Ethernet, serial, LocalTalk, Parallel	—	Y	35 resident scalable fonts	Adobe Type 1	Up to 3 cassettes (fixed trays), 250 each, envelopes	Up to 11 x 17 (A3)	4,295
LZR 2080	Fuji-Xerox	8 MB/ 32 MB	HP, IIP, PCL 4	600	20	50K	Ethernet, serial, LocalTalk, Parallel	—	Y	35 resident scalable fonts	Adobe Type 1	Up to 3 universal trays, 250 each, envelopes	Up to 11 x 17 (A3)	4,995
Digital Equipment Corp., 146 Main St., Maynard, MA 01754-2571. Circle 203														
DECLaser 5100	Canon	6 MB/ 66 MB	HP PCL 5e, ANSI, Tektronix	600	8	20K	Parallel, serial, AppleTalk, Ethernet	N	Y	120	TrueType, Adobe, PCL	One 250-sheet tray, one 100-sheet tray	A, A4	1,599
Printserver 171600†	Canon	16 MB/ 32 MB	HP PCL 5	600	17	70K	Ethernet	N	Y	43 resident	Adobe Type 1, 16 PCL	Two 500 input, one 500 output, 100 envelopes	A, A4, B5, 8 1/2 x 11, 8 1/4 x 11, executive	4,695
GENICOM Corp., 14800 Conference Center Drive, Ste. 400, Westfields, Chantilly, VA 22021-3806. Circle 204														
GENICOM 7610	—	2 MB/ 34 MB	Epson, FX-850, Diablo 630	600	10	8K-28K	Parallel, serial, standard	N	Y	83 resident	HP PCLe	250-sheet universal tray, second tray optional, manual feed	8 1/2 x 11, 8 1/4 x 11, A4, B5, envelopes	1,599
GENICOM 9080	Canon	—/—	All via NeWSprint	600	8	10K	SCSI	Y	Y	All via NeWSprint	All via NeWSprint	100-sheet multipurpose tray, 250-sheet cassette	8 1/2 x 11, 8 1/4 x 11, A4, A3	4,995
GENICOM 9170†	Canon	4 MB/ 8 MB	All via NeWSprint	600	17	50K	SCSI	Y	Y	All via NeWSprint	All via NeWSprint	Two 250-sheet cassettes, high-capacity 1,500-sheet feeder	8 1/2 x 11, A4	4,995
LaserMaster Corp., 6900 Shady Oak Road, Eden Prairie, MN 55344. Circle 205														
Unity 1200 XL-T Plain-Paper Typesetter	Toshiba	24 MB/ 48 MB	HPGL	1,200	8	3K-10K	LocalTalk, Parallel, serial, optional Ethernet	Y	Y	135 resident	TrueType 1 & 3	250 sheet tray, optional second tray, multipurpose feeder	Up to 11 x 17	6,995
Unity 1200 XL-O Plain-Paper Typesetter	Toshiba	32 MB/ 48 MB	HPGL4	1,200	8	3K-10K	LocalTalk, Parallel, Serial, Ethernet	Y	Y	235 resident, room for 2,500 total	TrueType 1 & 3	250-sheet tray, multipurpose second tray, 150 sheets or envelopes	Up to 12 x 19 1/4	8,995
Lexmark International Inc., 740 New Circle Road, Lexington, KY 40511. Circle 206														
Lexmark WinWriter 600	Lexmark	2 MB/ 8 MB	PCL 4	600	8, 300	25K 10	—	—	N	44 standard, 6 bit-mapped	TrueType, PCL	200 input, 200 output, optional 500-sheet input	Letter, A4, B5, executive, optional legal tray, envelope feeder	1,399
IBM Laser-Printer 4039 10R by Lexmark	Lexmark	2 MB/ 16 MB	PCL 5	600	8, 300	25K 10	Ethernet, token ring, LocalTalk, NetWare, Vines, AppleTalk, TCP/IP	—	Y	52 scalable, 14 bit-mapped	Adobe Type 1, Intellifont, PCL 5 PCL 4	250 output, 200 input, optional 500 second drawer, envelope	Letter, A4, B5, executive, optional legal tray	1,499

Y = Yes N = No O = Optional † = Duplex * = Color printer, all others are black and white.

SURVEY: PRINTERS

Company/Manufacturer Model	Engine	Base/expanded RAM	Emulations	Resolution (dpi)	Print speed (ppm)	Rated monthly duty cycle (pages per month)	Interfaces	NetWare/PostScript-compatible	Number of fonts supported	Compatible fonts	Paper handling	Paper sizes supported	Price (\$)
Lexmark International Inc., continued													
IBM Laser-Printer 4039 10D by Lexmark†	Lexmark	2 MB/16 MB	PCL 5	600, 300	8, 10	25K	Ethernet, token ring, LocalTalk, NetWare, Vines, AppleTalk, TCP/IP	— Y	52 scalable, 14 bit-mapped	Adobe Type 1, Intellifont, PCL 5	130 input, 250 output, optional 300 second drawer, envelope	Letter, A4, B5, executive, optional legal tray	2,099
IBM Laser-Printer 4039 12R Plus by Lexmark	Lexmark	2 MB/16 MB	PCL 5 enhanced	600, 300	8, 12	35K	Ethernet, token ring, LocalTalk, NetWare, Vines, AppleTalk, TCP/IP	— Y	75 scalable, 2 bit-mapped	Adobe Type 1, Intellifont, PCL 5, TrueType	200 input, 250 output, optional 500 second drawer, envelope	Letter, A4, B5, executive, optional legal tray	749
IBM Laser-Printer 4039 12L Plus (LAN) by Lexmark	Lexmark	4 MB/16 MB	PCL 5 enhanced	600, 300	8, 12	75K	Ethernet, token ring, LocalTalk, NetWare, Vines, AppleTalk, TCP/IP	— Y	75 scalable, 2 bit-mapped	Adobe Type 1, Intellifont, PCL 5, TrueType	500 input, 500 output, optional 500 second drawer, envelope	Letter, A4, B5, executive, optional legal tray	2,249
IBM Laser-Printer 4039 16L Plus (LAN) by Lexmark	Lexmark	4 MB/16 MB	PCL 5 enhanced	600, 300	8, 16	50K	Ethernet, token ring, LocalTalk, NetWare, Vines, AppleTalk, TCP/IP	— Y	75 scalable, 2 bit-mapped	Adobe Type 1, Intellifont, PCL 5, TrueType	500 input, 500 output, optional 500 second drawer, envelope	Letter, A4, B5, executive, optional legal tray	3,399
Mannesmann Tally Corp., P.O. Box 97018, Kent, WA 98064-9718. Circle 207													
T9008 Laser Printer	TEC	2 MB/32 MB	HP LaserJet IV PCL 5	600	8	20K	Parallel, RS-232, auto switching, Ethernet, AppleTalk	N 0	45 scalable, 1 bit-mapped	PCL 4 & 5, TrueType	250-sheet tray, 100-sheet multipurpose tray, optional 500-sheet tray	Up to legal	1,499
NEC Technologies Inc., 1414 Massachusetts Ave., Boxboro, MA 01719. Circle 208													
SilentWriter 1097	Motorola	7 MB/9 MB	Genuine Adobe HP LaserJet III (PCL 5)	600	10	10K	Parallel, serial, LocalTalk, SCSI-2	N Y	35 resident, 14 HP III compatible bit-mapped, 8 scalable HP III compatible	Adobe Type 1, Adobe PostScript Level 2, HP LaserJet	250 sheet letter tray, built-in 10-envelope feeder	Letter, legal	1,429
Pennant, the IBM Printing Systems Company, 501 Merritt 7, Norwalk, CT 06856. Circle 209													
3912†	Proprietary	4 MB/16 MB	PostScript, HP LaserJet, IBM IPDS	600	12	50K	Serial, parallel, coax	— Y	91 resident, 650+ downloadable, 40+ languages	PCL 5, HP LaserJet	Optional 500-sheet tray, envelope feeder	Letter, legal, envelopes, A4, transparencies, executive, A5	3,595-4,595
3916†	Proprietary	4 MB/16 MB	HP LaserJet, PCL 5, PostScript, IBM IPDS	600	16	75K	Serial, parallel, coax	— Y	91 resident, 650+ downloadable, 40+ languages	PCL 5, HP LaserJet	500-sheet tray, optional 300 duplex, envelope feeder	Letter, legal, envelopes, A4, transparencies, executive, A5	4,895-5,895
Printware Inc., 1270 Eagan Ind. Road, St. Paul, MN 55121. Circle 210													
Pro III	Fujitsu	12 MB/32 MB	PostScript, Autologic ICL	1,200	12	20K	Parallel, RS-232 serial, AppleTalk	N Y	300 Printware fonts	Adobe Type 1 & 3	—	Letter, legal, tabloid, statement, A3, A4, B4, B5, 12 x 20	15,990 list 10,990 for readers
NewGen Systems Corp., 17550 Newhope St., Fountain Valley, CA 92708. Circle 211													
TurboPS/660B	Canon BX	12 MB/96 MB	HP PCL 4, PCL 5, HP-GL 7475A	600	8	10K	AppleTalk, serial	— Y	35 PostScript fonts	Adobe Type 1 & 3	250-sheet tray all paper sizes, one multipurpose 100-sheet feeder	Letter, legal, 11.7 x 25	3,995
ImagerPlus 6	Toshiba TN-7270	16 MB/96 MB	HP PCL 4, PCL 5, HP-GL 7475A	600	8	10K	AppleTalk, serial, parallel	N Y	35 PostScript fonts	Adobe Type 1 & 3	250-sheet tray all paper sizes, one multipurpose 100-sheet feeder	Letter, legal, 11.69 x 19	4,995
TurboPS/1200B	Canon BX	20 MB/96 MB	HP PCL 4, PCL 5, HP-GL 7475A	600	8	10K	AppleTalk, serial, parallel	N Y	35 PostScript fonts	Adobe Type 1 & 3	250-sheet tray all paper sizes, one multipurpose 100-sheet feeder	Letter, legal, 11.7 x 25	4,995
ImagerPlus 12	Toshiba TN-7270	40 MB/96 MB	HP PCL 4, PCL 5, HP-GL 7475A	1,200	8	10K	AppleTalk, serial, parallel	N Y	35 PostScript fonts	Adobe Type 1 & 3	250-sheet tray all paper sizes, one multipurpose 100-sheet feeder	Letter, legal, 12 x 19½	7,495
QMS Inc., One Magnum Pass, P.O. Box 81205, Mobile, AL 36689-1250. Circle 212													
QMS 1725 Print System	Canon BX	12 MB/32 MB	HP PCL 4, HP-GL745A/7550A	600	8	10K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	39 resident for PostScript level languages	—	250-sheet paper cassette, 100 multipurpose tray, 250 face-down output	Letter, A4, legal, executive 11 x 17, B4, B5, A5, A6, A3	3,906
QMS 1660 Print System	—	12 MB/64 MB	HP-GL, HP PCL 5, line printer	600	16	10K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	39 resident type-faces for PostScript, HP PCL 5	—	250-sheet input, 100 multipurpose tray	Letter, A4, legal, executive ledger, 11 x 17 B4, B5, B6, A5, A6, A3	4,199

Y = Yes N = No O = Optional † = Duplex * = Color printer, all others are black and white.

SURVEY: PRINTERS

Company/Manufacturer Model	Engine	Base/expanded RAM	Emulations	Resolution (dpi)	Print speed (ppm)	Rated monthly duty cycle (pages per month)	Interfaces	NeWSprint-compatible PostScript	Number of fonts supported	Compatible fonts	Paper handling	Paper sizes supported	Price (\$)
QMS Inc., continued													
QMS 1725 Print System	Canon NX	8 MB/32 MB	HP PCL 4	600	17	75K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	39 resident for PostScript level languages	—	Two 500-sheet input trays, 500-sheet face down	Letter, A4, legal, executive	4,999
QMS 860 Plus Print System	Canon BX	4 MB/32 MB	HP PCL 4 HP-GL745A/ 7550A	600	8	10K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	39 resident for PostScript level languages	—	One 250-sheet input trays, 1,000-sheet multipurpose tray	Letter, A4, legal, executive	5,099
QMS 1725 Print System SLS	Canon NX	13 MB/32 MB	HP PCL 5, HP-GL745A/ 7550A, CCITT Group 4	600	17	75K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	39 resident for PostScript level languages	—	Two 500-sheet input trays, 500-sheet face down	Letter, A4, legal, executive	5,999
QMS Magicolor Laser Printer*	—	12 MB/64 MB	HP PCL 5, HP-GL 745A/ 7550A	600	8	5K	Ethernet, token ring, parallel, serial, LocalTalk	— Y	65 standard, 29 especially appropriate for desktop publishing	—	250-sheet paper input	Letter, A4, legal, executive	9,999+
SunPics, 2550 Garcia Ave., Mountain View, CA 94043-1100. Circle 213													
SPARCprinter II†	Lexmark 4039	Equals workstation-RAM	PostScript, TIFF, ASCII, TROFF, Sun-Raster files	600	12	35K	Supplied with cables for high-speed Sun Parallel interface	Y Y	57 (the default set supplied with workstation)	—	200-sheet universal tray, optional 500 sheet feeder	8 1/2 x 11, 11 x 17, A4, B5, executive, labels, transparencies, envelopes, card stock	—
Tektronics Inc., 26600 S.W. Pkwy., P.O. Box 1000, Wilsonville, OR 97070-1000. Circle 214													
Phaser 220e*	Sharp	8 MB/8 MB	HPCL, PCL 5	600	2	12K	AppleTalk, RS-232 serial, Parallel	Y Y	17-39 resident	TrueType, PCL	Dual paper tray for paper and transparencies	8 1/2 x 11	3,995
Phaser 220i*	Sharp	10 MB/14 MB	HPCL, PCL 5	600	2	12K	AppleTalk, RS-232 serial, Parallel	Y Y	39 resident	TrueType, PCL	Dual paper tray for paper and transparencies	8 1/2 x 11	5,995
Texas Instruments, P.O. Box 149149, MS 2240, Austin, TX 78714. Circle 215													
TI microLaser Pro600	Sharp JX9600	6 MB/22 MB	HP LaserJet III PCL 5, PostScript II	600	8	10K	Ethernet, token ring, SCSI, parallel, serial, bidirectional serial	— Y	23 scalable PostScript, 8 scalable PCL 5	TrueType, PCL	Two 250-sheet trays, envelope feeder	Letter, legal, A4, Com-10, Monarch, C5, DL envelopes, transparencies, labels	1,599- 1,799
TROY, a division of Pierce Companies Inc., 2331 S. Pullman St., Santa Ana, CA 92705. Circle 216													
TROY 512	Canon	2 MB/50 MB	HP 4+	600	12	8K	Parallel, serial	— Y	45 internal scalable typefaces 1 bit-mapped PCL 5	PCL 5, enhanced	500 optional tray, duplex unit	8 1/2 x 11, 8 1/2 x 10.66	3,300
XANTE Corp., 2559 Emogene St., Mobile, AL 36606. Circle 217													
Accel-a-Writer 8100	Canon	12 MB/64 MB	PostScript 2	600	8	10K	AppleTalk, serial, parallel, SCSI, EtherTalk optional	Y Y	35 resident	PCL IV, PostScript Type 1 & 3	100-sheet multipurpose tray, 250-sheet cassette	Letter, legal, ledger, A3, A4, 11.8 x 17.5	3,995
Xerox Corp., 701 South Aviation Blvd., El Segundo, CA 90245. Circle 218													
4505/4505 PS	Fuji Xerox	2 MB/16 MB	PCLe, Adobe PostScript 2	600	5	10K	Ethernet, token ring LocalTalk, parallel, serial	Y Y	35 scalable Intellifonts, 10 scalable TrueType, 35 Adobe Type 1	HPLJ 4 series	One 250-sheet tray, one 50-sheet tray or 5-envelope feeder	Letter, legal	1,229/ 1,629
4510/4510 PS	Fuji Xerox	2 MB/16 MB	PCLe, Adobe PostScript 2	600	10	20K	Ethernet, token ring LocalTalk, parallel, serial	Y Y	35 scalable Intellifonts, 10 scalable TrueType, 35 Adobe Type 1	One bitmap PCL font compatible with HPLJ 4 series	One 250-sheet tray, one 50-sheet tray or 5-envelope feeder	Letter, legal	1,839/ 2,379
4520/4520 MP	Fuji Xerox	4 MB/52 MB	PCLe, Adobe PostScript 2	800	20	50K	Ethernet, token ring, LocalTalk, parallel, serial	Y Y	35 scalable Intellifonts, 10 scalable TrueType, 35 Adobe Type 1	One bitmap PCL font compatible with HPLJ 4 series	Three 250-sheet trays	Letter, legal, 11 x 17	3,749/ 5,199

Y = Yes N = No O = Optional † = Duplex * = Color printer, all others are black and white.



A C and C++ Debugger

by BARRY SHEIN, Technical Editor

This month, *SunExpert's* Computer Publishing Lab takes a glance at a promising debugger that has some growing to do.

DynaTrap

Dynasoft Inc.'s DynaTrap is, in essence, a C and C++ program debugger of a type we have seen before. Comparable products that come to mind are Purify from Pure Software Inc., and CodeCenter from CenterLine Software Inc., as well as several more conventional debuggers such as dbx and gdb. The primary features that distinguish DynaTrap, Purify and CodeCenter from their predecessors dbx and gdb are runtime error-checking and incremental execution. These debuggers check at runtime for errors involving managing blocks of memory in the program. For example, calling `malloc()` to allocate a new block of memory and then reading its contents before initializing its value, or trying to store something in the allocated block that doesn't fit are common and inarguably devilish programming bugs. Sometimes you are lucky and the program fails in a way and place that tells you just where you went wrong in the code. A lot of the time, however, the program fails or misbehaves mysteriously because some corrupted value lurks until it is used somewhere else in the program,

leaving little hint where you went awry.

So the program bugs that DynaTrap is designed to help track down are worth finding and fixing as soon as possible—preferably before a program is released for production use. DynaTrap also has the nice feature, like Purify, that it will notice certain serious problems even when they do not cause any apparent anomalies in the program's behavior.

Let's take the same simple example (see Listing 1) I used in my review of Purify (see "Purify and NeWSprinter CL+," *SunExpert*, October 1993, Page 71). The listing includes a purposely coded error: Some newly allocated memory is used before it is initialized.

It's possible to type directly into the text window, which has the same look and feel as the character cell interface.

To run this through DynaTrap, we need to compile the program (using either C or GCC) with the `-g` (enable debugging) flag. This can be done via a Makefile or, in such a simple case, directly on the command line. Because DynaTrap expects the `.o` files to exist, we will use:

```
% cc -g -c prog.c
% cc -g -o prog prog.o
```

To set up for debugging with DynaTrap, we need to do the following exactly once:

```
% dynatrap_startup -g prog.o -o prog
```

Again, this can be done in the Makefile using macros like `$(CFLAGS)` and `$(OBSJ)` to keep everything consistent as the project develops. Typically, you would make this command dependent upon any changes to the Makefile itself.

The command `dynatrap_startup` creates a file `.trap_prog` in the current directory that DynaTrap will use to locate various components of the project. To begin debugging, you would enter:

```
% ascii_trap prog
```

for the character cell (textual) interface (there are also Motif and Open Look interfaces; more on these later). This starts up the debugger. To check only for serious program faults (similar to `dbx`'s or `gdb`'s behavior) you can simply type

```
(trap) run
```

In this example, nothing interesting happens because the error is not so catastrophic as to alert the operating system. To enable runtime checking, we enter instead:

```
(trap) setopt resource_manager on
(trap) check_instr on
```

The first command enables the resource manager, which lets us then enable various runtime error checks. The next line, `check_instr on`, tells DynaTrap to perform instruction-level code checking. We then run the program and get the result in Listing 2.

DynaTrap has found the bug and identified it correctly. It locates the file (`prog.c`), pinpoints the offending line (36) of source code, and displays that erroneous line.

Alternatively, I could have run DynaTrap with

```
% ascii_trap -backend prog
```

This enables the backend debugger, designed to be run later in the code cycle. It checks for the following errors (from the manual):

- Accesses to uninitialized memory heap blocks.
- Accesses to unallocated memory heap blocks.
- Out-of-bound accesses to global, static and local arrays.
- Attempts to free already freed memory blocks.
- Memory accesses straddling two memory heap blocks.

While at the prompt, with `-backend` enabled, you can also check for memory leaks, trace possible sources of memory leaks and several other problems.

As with conventional debuggers, you can also set breakpoints, examine and modify variable values and display source code lines.

Another time-saving feature of DynaTrap is its ability to incrementally load and unload object files. This allows you to start debugging a program, notice a problem, fix that one file and compile only that file, producing a `.o` file, and then load it back into the debugger without having to completely relink or restart the debugger. For large projects that take a while to link, this can save time. Although with modern processors and typical programs this may not seem important because linking takes only a

Listing 1. In Search of Errors

```
#include <stdio.h>

char **
maketable(rows, len) int rows, len;
{
    char **rp;
    int i;

    if((rp = (char **)malloc(sizeof(char *)*rows)) == NULL)
        return(NULL);

    for(i=0; i < rows; i++)
        if((rp[i] = (char *)malloc(sizeof(char)*len)) == NULL)
            return(NULL);
    return(rp);
}

#define ROWS 100
#define LEN 80
#ifdef notdef main(argc, argv) int argc; char **argv;
{
    char **text;

    /*
     * Allocate text table
     */
    if((text = maketable(ROWS, LEN)) == NULL) {
        fprintf(stderr, "%s: Could not allocate text table.0, argv[0]);
        exit(1);
    }

    /*
     * Try to read the table before initializing (ERROR!)
     */
    if(text[0][0] == ' ')
        printf("Highly unlikely!\n");

    exit(0); }
#endif
```

Listing 2. Error Found

```
(trap) run
Running: ~/prog
(memory heap): contain uninitialized data
stopped in main() at line 36 in file "prog.c"
36  if(text[0][0] == ' ')
```

few moments, I have certainly worked on systems that took 15 minutes or more to relink. Being able to avoid this pause for each debugging run would be a godsend in those environments.

There are several other notable features of DynaTrap such as data integrity checking (e.g., do pointers within structures point somewhere sensible?), suppression of certain types of error checking or suppressing reporting on particular lines, viewing variables and values and so forth.

Now let's go to some criticisms. There is something unlovable about the interface. It is plagued by little, annoying botches. For example, I use delete as my erase character. For some reason, DynaTrap insists on blindly changing it to backspace. DynaTrap also leaves it at backspace when I exit the debugger back to the shell. Since I don't have backspace on any key, this forces me to keep doing stty commands and explicitly typing Control-H in the debugger to correct typing errors.

DynaTrap's command interpreter is primitive. For example, if I type `check_instr`, forgetting to follow that with a space and then the word `on`, it doesn't complain that I need to tell it off or on as one might expect; instead, it tells me I have made a syntax error. This is the same error I get if I just type nonsense to the command interpreter. I've built command interpreters like this, and I know it would take just a few minutes' work to see if what the user typed is an incomplete command rather than an unrecognizable command and distinguish these two errors as helpfully as possible.

I could not quite get the Open Look GUI to run remotely. At first I thought this may have been related to the licensing. But if I had the `DYNATRAPHOME` environment variable wrong, it would start the GUI window remotely but just display an error that it could not find some start-up files and refuse to run (perfectly reasonable). If I had that variable set correctly, my `DISPLAY` environment variable was truncated to `":0.0"`, which is interpreted by X11 to be the local screen. Perhaps I misunderstood something, but that was confusing and a little frustrating. In this day of X terminals, a program

with a GUI must be willing to run on a display other than the one on the machine that runs the program.

When I moved to the actual machine (a SPARCstation) to use the Open Look GUI, I was presented with a familiar interface of several buttons corresponding to commands I might type at the prompt and a text window below it to show interaction. It is also possible to type directly into the text window, which has the same look and feel as the character cell interface. Clicking a button pops the corresponding text (e.g., "next") into the text window, as if you'd typed that command (or cut and pasted it, or bound the string to a function key). Oddly, it didn't work for commands that take an argument such as `print` because it immediately types an Enter (or Return) for you. This doesn't leave you an opportunity to

insert the name of the variable you wish printed and actually yields nothing but the now-familiar "syntax error." Working the print button was not intuitive to me. After playing around with it and getting nowhere, I resorted to contacting Dynasoft. To save others the effort I expended, here's the explanation: Select the variable with the mouse, then click on the command button (such as "print").

Finally, although the help interface is welcome inasmuch as it is better than nothing, it's rather odd. It switches between making you type in a number to indicate what you want information about and typing in the actual command you want help about. There's no rhyme or reason to this other than perhaps trying to squeeze a lot into the screen. In the text interface, when you finally get it to display help, it will just scroll right out of view if the text doesn't fit in the screen. In the GUI, it does the same thing, but you can use the text window's scroll bar to get the help text back and read it. Overall, I'd call this primitive. Dynasoft says it will be addressing these concerns in its next release.

The manual is no-frills but clear and understandable. The manual comes in two sections (all fitting into a one-inch looseleaf binder): tutorial and reference

sections. There are appendices to the reference section that walk through several examples of using the product. The code for the examples is supplied as part of the software installation.

Overall, I would say this product has promise but lacks maturity in several ways that you might find distracting. I'm not entirely sure (other than perhaps price) why you would prefer DynaTrap over products like Purify or CodeCenter. The latter are more mature products and do about the same things. My recommendation is to evaluate this product (free evaluation copies are available) in that light. ➔

DynaTrap

Company
Dynasoft Inc.

Address
1982 Washington Valley Road
P.O. Box 309
Martinsville, NJ 08836-0309

Phone
(908) 560-9208

Fax
(908) 560-9324

Email
info@dsoft.com

Best Feature
A C/C++ debugger that does what it promises.

Worst Feature
Little to recommend it over its competitors, has some distracting interface bugs.

Price
\$1,495 for floating license, including documentation and first year of customer support.

Circle 155

NEW PRODUCTS

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

i860-Based Chassis for Suns

Sky Computers has announced the Skystation II, a desktop device that fits under a Sun or SPARClike workstation and provides number crunching



with up to eight Intel Corp. 80860 (i860) processors. The company says a Model 40 SPARCstation with one such board could have an aggregate performance of 662 MFLOPS on numerically demanding tasks. A Model 514 SPARCstation with such a board, meanwhile, would have an aggregate performance of 746 MFLOPS.

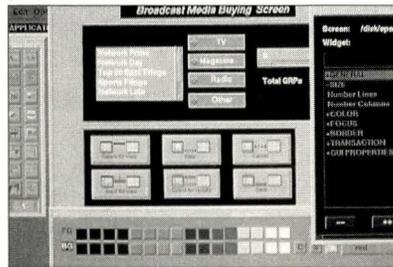
Skystation II connects to workstations via SCSI ports. The product

comes with the company's Skychannel interface technology and Skyvec Software Development environment. Pricing on the Skystation II ranges from \$20,000 to \$50,000.

Sky Computers Inc.
27 Industrial Ave.
Chelmsford, MA 01824
Circle 101

JAM 6

JYACC has shipped Version 6 of its JAM development tool set. JAM is a development environment combining features of a GUI builder with those of



a fourth-generation language. The new version also integrates graphical and database components. JAM 6 now features a Visual Object Repository that

stores and accesses applications such as widgets, bit-map images and procedures. In addition, JAM 6 comes with a graphical editor for developers to manipulate objects.

JAM 6 is targeted at the transaction processing market. It comes with improved transaction management features, which will allow for rapid but codeless development of database applications. When a developer encounters a situation that requires traditional coding, however, the product can support a hook into a 4GL or 3GL. Pricing begins at \$2,000.

JYACC Inc.
116 John St.
New York, NY 10038
Circle 102

DynaTrap Debugger

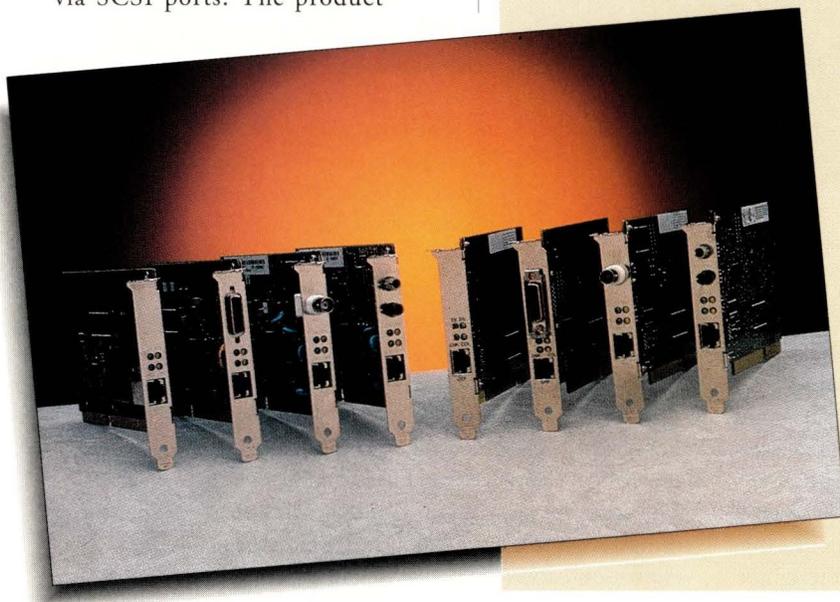
Dynasoft has introduced DynaTrap, a debugging and programming environment for C and C++ programmers. According to the company, DynaTrap differs from other debuggers in that it deals with component object modules directly, rather than attempting to debug the entire executable in a single pass.

SNMP and TCP/IP for under \$100

For developers of local-area network devices, Allied Telesis has introduced a set of interface cards that support both TCP/IP and SNMP and cost under \$100. The cards come with an SNMP agent that supports the MIB II standard, a TCP/IP protocol stack and the company's own 16-bit Ethernet interface card software. The TCP/IP and SNMP software is distributed by the Wollongong Group. ATI's cards, meanwhile, are available with 10Base-T, 10Base-2, 10Base-FL or AUI interfaces.

ATI

575 E. Middlefield Road
Mountain View, CA 94043
Circle 100



DynaTrap allows a user to debug more quickly, since the whole program doesn't have to be reloaded after every code change. The product supports Motif and Open Look and comes with a variety of tools, including a data browser and a memory leak detector. It is priced at \$1,495.

Dynasoft Inc.

1982 Washington Valley Road
P.O. Box 309
Martinsville, NJ 08836-0309
Circle 103

HDS Shows IBM-Oriented X Terminal

For downsizers looking to integrate modern open systems-based networks with legacy devices, Human Designed Systems has announced a line of X ter-



minals that support local 3270 terminal emulation and directly connect to mainframe systems. Called the HDS ViewStation TR Series, the machines can have up to four IP addresses (one for each network) and can act as a network router. In addition to the support for 3270 emulation, the machines also have a variety of local X clients, including VT320 emulation, a PostScript display application, a clock, calculators and screen savers.

There are several different models. Monochrome terminals include a 14-inch model at \$1,399, a 17-inch at \$1,899 and a 19-inch at \$2,199. Color machines include a 14-inch model at \$1,899, a 15-inch at \$1,999, a 17-inch at \$2,499, a 17-inch Trinitron at \$2,799, a 19-inch color at \$3,199 and a 19-inch Trinitron at \$3,699.

HDS Inc.

421 Fehely Drive
King of Prussia, PA 19406
Circle 104

ICS Has More Widgets

Integrated Computer Solutions has expanded its catalog of widgets. The new edition of the company's Widget Databook includes three new Motif tools. The first is the Graphicspower Builder from ICL Inc. This product gives developers a high-quality graphical representation of applications. The second is a pair of ARACOR Class Libraries from Arcor, which allow C++

programmers to build applications in the X11/Motif environment. The third is Xprinter from Bristol Technology, a PostScript and Printer Control Language (PCL) library.

The ICS Widget Databook comes with a CD that allows users to browse the widget collection. The Databook is \$10 per copy, or \$25 for a year's subscription. Individual widgets purchased from the catalog are priced separately. A developer's license for

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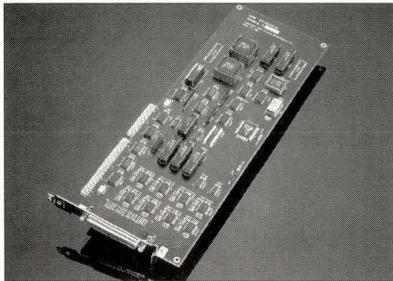
Circle No. 18 on Inquiry Card

Xprinter begins at \$1,900. Source code licenses for the ARACOR libraries are \$6,395 and \$3,295, respectively. The Graphicspower Builder is \$4,000 per seat.

Integrated Computer Solutions Inc.
201 Broadway
Cambridge, MA 02139
Circle 105

Aurora Shows HP I/O Boards

Peripheral and SBus board vendor Aurora has entered the Hewlett-Packard Co. market. The company has introduced a series of four-port



asynchronous and synchronous ISA serial expansion cards for HP 9000

Series 700 workstations—the 400A, 400AX and 400A+.

Both the 400A and 400AX offer four asynchronous serial ports, speeds up to 115.2 Kb/s and are designed for standard LAN terminal and peripheral connectivity. The 400AX also includes extended RAM buffers. Aurora's 400A+ has four async/sync serial ports, supports speeds up to 128 Kb/s and is compatible with a variety of communications protocols, including SNA, X.25 and Point-to-Point Protocol (PPP). The 400A lists at \$499, the 400AX at \$799 and the 400A+ at \$999.

Aurora Technologies Inc.
176 Second Ave.
Waltham, MA 02154
Circle 106

Andataco Introduces System Analysis Tool

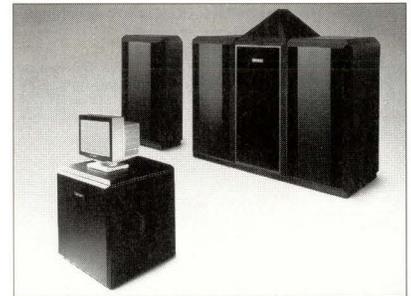
Andataco has introduced a system and performance analysis tool: ASAP, the Andataco System Analysis Program. ASAP gathers the system performance statistics collected during daily operation of a workstation. It then displays that data for a systems administrator

who needs to determine the efficiency and CPU utilization of workstations on a network. ASAP displays daily information on disk utilization, load average and NFS activity. The product can recommend additional hardware or software solutions to system bottlenecks. Pricing begins at \$95.

Andataco
10140 Mesa Rim Road
San Diego, CA 92121
Circle 107

Amdahl Shows Parallel DB Server

Amdahl has introduced a line of massively parallel database engines, the Xplorer 2000 Series. The Xplorer,



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based on nCube's systems, gives businesses a platform on which to do high-speed database work as an alternative to the mainframe. It can also function as a co-processor to offload database search tasks from a mainframe. The Xplorer 2000 Model 50 has 32 to 64 processors, and the Xplorer 2000 Model 100 has 64 to 512 processors. The smaller system is field-upgradable to the larger.

The Xplorers come bundled with Oracle Corp.'s Oracle7 RDBMS. The machines can also be configured as database offload processors for SQL queries to IBM's DB2. Pricing on the machines is said to start at just under \$1 million.

Amdahl Corp.
1250 East Arques Ave.
P.O. Box 3470
Sunnyvale, CA 94088-3470
Circle 108

**Hummingbird
Announces eXceed 4**

Hummingbird has announced eXceed 4, its 32-bit X server software for PCs. eXceed 4 includes its own scripting language (eXceed BASIC). The company says eXceed BASIC makes it easier for systems managers to administer large PC X desktop populations.

Other enhancements include support for color and auto-resizing of fonts as well as remote UNIX file transfer and printing. eXceed 4 lists at \$545.

**Hummingbird
Communications Ltd.**
2900 John St.
Markham, Ontario
Canada L3R 5G3
Circle 109

UNIX Print Server

Pacific Data Products expands its family of network printer interfaces with the DirectNet EX external print server. The DirectNet EX provides printing on Ethernet networks. It also supports multiple network protocols, multiple printer models and provides printer management capabilities for heterogeneous network environments.

This print server lets customers connect printers directly to their Novell Inc. NetWare and TCP/IP networks. It also provides two high-speed, bi-directional Centronics ports and one serial port.

Standard UNIX printing and file transfer protocols including LPR, LPD and FTP are supported so no system-specific setup software is needed. DirectNet Ex is SNMP-compatible and provides easy network management and diagnostics. Pricing is \$549.

Pacific Data Products Inc.
9125 Reheo Road
San Diego, CA 92121
Circle 110

**MPEG Digital
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VideoCam is RAD Technologies' turnkey hardware/software digital video production system. VideoCam enables real-time capture, compression, editing and delivery of digital video over client/server networks and CD-ROM. RAD incorporates features like full-motion capture and software-only playback of digital video and



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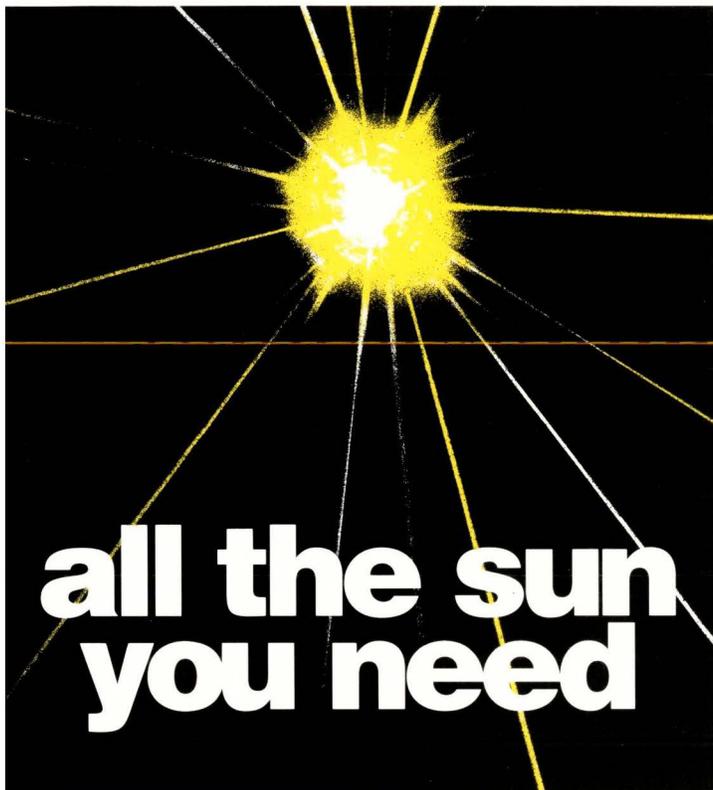
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- Weitek has announced price reductions on its SPARC Power μ P processor. The chip has been discounted from \$1,500 to \$1,200. Additional chips are \$995. **Weitek Corp.**, 1060 East Arques Ave., Sunnyvale, CA 94086. **Circle 111**

- Version 4.1 of Reflection X, the Windows PC X server, has been announced by Walker Richer & Quinn. Version 4.1 has several new features, including DECnet support, enhanced windows management and easier client launching. **Walker Richer & Quinn, Inc.**, 1500 Dester Ave. North, Seattle, WA 98109. **Circle 112**

- Puzzle Systems, a vendor of Novell Inc. emulation products for UNIX, has ported its SoftNet Utilities to Solaris 2.x for x86. SoftNet Utilities enable a Solaris platform to act as a network server to PC clients on Novell Netware Networks. **Puzzle Systems Corp.**, 16360 Monterey Road, Ste. 250, Morgan Hill, CA 95037. **Circle 113**

- Spry and Performance Systems Inc. have announced an arrangement under which PSI will resell a customized version of Spry's Air Series Internet software as a front end for the company's InterRamp service. InterRamp is a dial-up service that provides personal Internet access to PCs, Macs and workstations. **Spry Inc.**, 316 Occidental Ave. South, Suite 200, Seattle, Washington 98104. **Circle 114**

- For Lisp users, Harlequin has ported its LispWorks product to Solaris. LispWorks is a programming environment for the development of complex applications. **Harlequin Inc.**, 1 Cambridge Center, Cambridge, MA 02142. **Circle 115**

- Looking for an alternative to Wolfram's Mathematica? Waterloo Maple Software has announced Release 3 of its Maple V mathematical software package. Release 3 sports improved symbolic and numeric functions. **Waterloo Maple Software**, 450 Phillip St., Waterloo, ON, Canada N2L 5J2. **Circle 116**

- Tadpole Technology has begun shipping SPARCbook 2, a SPARC-based notebook, with two 520-MB drives, for a total of 1 GB worth of storage. Tadpole says this may be the first time a notebook has had 1 GB of internal storage. **Tadpole Technology Inc.**, 1201 Technology Blvd., Austin, TX 78727-6208. **Circle 117**

- Symix has announced Version 3.0 of the Symix Solution, business management software for manufacturing companies. Version 3.0 features enhancements in business performance, manufacturing management and new customer service features. **Symix Computer Systems Inc.**, 2800 Corporate Exchange Drive, Columbus, Ohio 43231. **Circle 118**

- Gimpel Software has announced FlexeLint 6.0 for C/C++. FlexeLint is the first lint tool to support C++. The product analyzes a mixed suite of C and C++ programs and reports on bugs, glitches and inconsistencies. **Gimpel Software**, 3207 Hogarth Lane, Collegeville, PA 19426. **Circle 119**

- An enhanced version of Liant's C++/Views is now available. C++/Views is an object-oriented application framework for developing multiplatform GUIs. Version 3.0 of the product supports Borland C++ 4.0 and Symantec 6.1. **Liant Software Corp.**, 959 Concord St., Framingham, MA 01701-4613. **Circle 120**

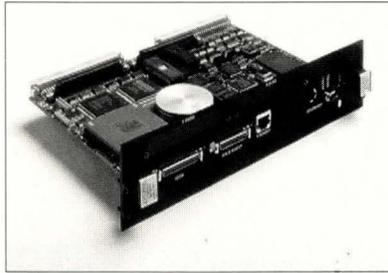
playback of MPEG and Motion-JPEG video. All can appear directly on workstation platforms with no additional hardware requirements. Network applications using VideoCam include training, on-line help and product demonstrations.

Software includes all recording, compression, editing and playback materials, and lists at \$2,495. The RAD Pro-Video capture board and software lists at \$5,995, and the RAD MPEG module is available for \$3,995.

RAD Technologies Inc.
2639 Terminal Blvd.
Mountain View, CA 94043
Circle 121

SPARC 10 for VME

Themis Computer has introduced the SPARC 10 MP. The 10 MP is a multiprocessor SPARC engine that can support four hyperSPARC or two TI SuperSPARC processors on a single 6U VME board. The product is thus effectively a SPARCstation 10 work-like on a VME board for developers of embedded computers and other VME-oriented markets.



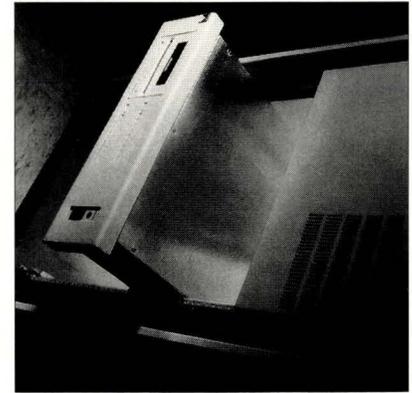
Buyers can choose between the 55- to 80-MHz hyperSPARC processors and the 40- to 60-MHz SuperSPARC. They can also insert one or two memory cards for a total of 256 MB. Other features include Ethernet connectivity, a Fast SCSI II port, two serial ports, two SBus slots and a Centronics port.

SPARC 10 MP can support Solaris 1.1 (aka SunOS) and Solaris 2.3. In addition, it can run the various real-time OSs now available for SPARC. Pricing for a system with 32 MB of DRAM begins at \$12,995.

Themis Computer
6681 Owens Drive
Pleasanton, CA 94588
Circle 122

Rack-Mount SPARClike

A rack-mounted SPARCstation-10 compatible has been introduced by Pinnacle Data Systems. Called the DataRackmount 10, the product can



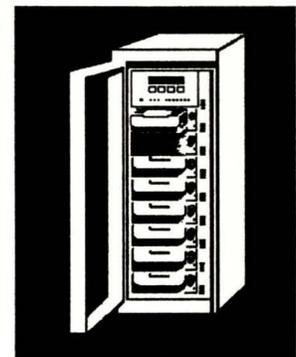
fit into a standard 19-inch server rack. It includes one, two or four SuperSPARC processors and holds up to 512 MB of RAM. There are a variety of storage options, including up to four half-height or two full-height 5¼-inch devices.

DataRackmount has six models that vary according to the number of

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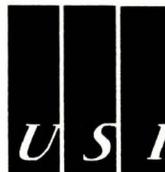
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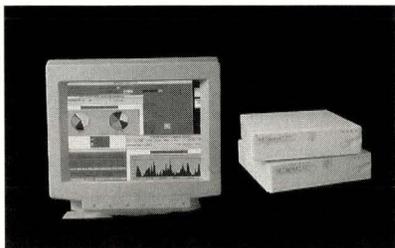
Uni Solution, Inc. 1-800-552-4UNI

processors and the amount of off-chip cache, which ranges from none to 1 MB per CPU. Pricing is \$6,000 to \$25,000.

Pinnacle Data Systems Inc.
1350 West Fifth Ave.
Columbus, OH 43212
Circle 123

Proactive Network Manager

Frontier Software Development has announced Netscout Resource Manager, a proactive monitor and manager of LAN/WAN traffic and



SNMP network devices within an enterprise network. A software package, Resource Manager runs on the company's line of Netscout network probes and managers. Resource Manager monitors network traffic parameters and device statistics. When a problem arises, a Netscout Probe with the software makes a record of the network traffic at the time of the problem, reports the problem to a central station and takes corrective action.

The Resource Manager can be ordered with the Netscout Probes or downloaded through the net to existing probes. Pricing begins at \$695.

Frontier Software Inc.
1501 Main St.
Tewksbury, MA 01876
Circle 124

100Base-T Ethernet Switch

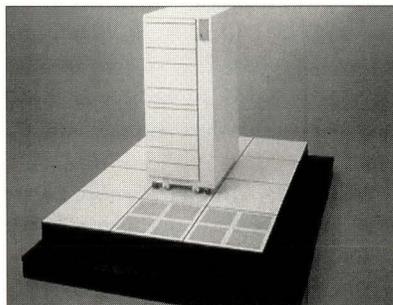
A 100Base-T-compatible Ethernet switch has been introduced by Grand Junction Networks. The FastSwitch 10/100 is a 27-port Ethernet workgroup switch. Each of 24 ports gives a different individual node a private 10-Mb/s Ethernet. One of the remaining ports can then link the workgroup to a corporate network, or to another private node.

The remaining two ports provide dedicated 100 Mb/s paths to server systems. Pricing begins at \$7,950.

Grand Junction Networks Inc.
47281 Bayside Pkwy.
Fremont, CA 94538
Circle 125

DataPad Set for Lift-Off

Liebert has introduced the DataPad, a structure that combines UPS, power distribution, air conditioning and communication functions. Placed



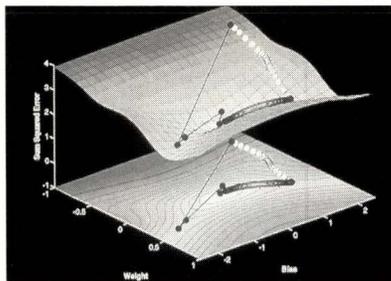
beneath a midrange computer system, DataPad eliminates free-standing equipment and provides considerable space savings.

The DataPad is built from a variety of specialized modules, which can be added or subtracted depending on current needs. Each module consists of a steel support structure that contains the air conditioning, power supply or other form of hardware. Modules are 2 by 4 feet. Pricing ranges from \$26,000 to \$33,000, depending on configuration.

Liebert Corp.
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229
Circle 126

Matlab Neural Network

For developers of neural networks, MathWorks has introduced Version 2.0 of its Neural Network Toolbox for Matlab. The product lets developers



use the company's Matlab environment to design, simulate, customize and apply neural networks, which attempt to model organic neurons for such applications as pattern recognition and accurate decision-making based on ambiguous data.

Neural Network Toolbox 2.0 is faster than its predecessor in its use of the Leven-Marquardt algorithm to train back propagation networks. The product also supports several new network architectures, including radial basis functions, Elman recurrent networks, adaptive linear networks and learning vector quantization. Pricing is \$2,495 for a network license, and \$1,995 for a CPU-locked license.

The MathWorks Inc.
24 Prime Park Way
Natick, MA 01760-1500
Circle 127

4 x 2 SCSI Switch

Applied Concepts has introduced the SCSI Switch Model ACI-2014. This 4 x 2 Electronic Crosspoint switch allows six independent SCSI chains to



be switched from its front panel or from a remote RS-232 port. The product supports 10-MB/s Fast SCSI and supports both 8- and 16-bit Wide SCSI devices.

The SCSI Switches use proprietary switching circuitry that allows users to operate with 19.7 feet of SCSI cable into each switch port, and 19.7 feet additional SCSI cable out of the switch ports. With the Switch residing between a host and its peripheral, users can operate SCSI devices at a distance of almost 40 feet. Pricing begins at \$1,295.

Applied Concepts Inc.
9130 S.W. Pioneer Court
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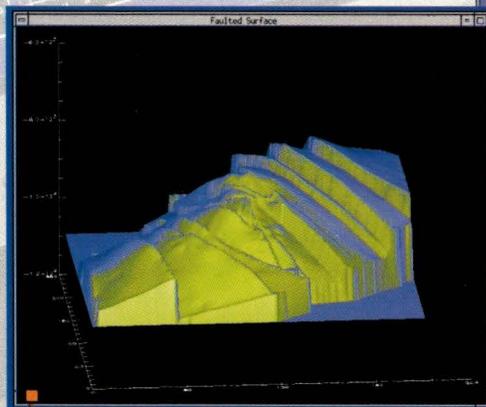
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Selected Equation:
 $(\text{COS}(x) * \text{SIN}(y)) / (2.0 + (\text{SIN}(y) * \text{SIN}(x)))$

Equations: Z1 = (x,y)

Of Range Intervals: 60

Start of X Range: -3.14159
End of X Range: 3.14159

Start of Y Range: -3.14159
End of Y Range: 3.14159

Z Display Options
 Surface Mesh
 Shaded Surf.
 Both

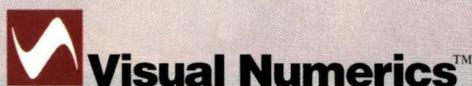
PV-WAVE Commands Used to Generate the Display Above:

```
WAVE> TEK_COLOR  
WAVE> x = ((DINDGEN(60) * (((3.142)-(-3.142))(60-1.0))) + (-3.142)) # REPLIC  
WAVE> y = REPLICATE(1.0,60) # ((DINDGEN(60) * (((3.142)-(-3.142))(60-1.0)))  
WAVE> z = (COS(x) * SIN(y)) / (2.0 + (SIN(y) * SIN(x)))  
WAVE> SHADE_SURF,z,xy,XStyle=1,YStyle=1,XTitle='X',YTitle='Y',ZTitle='Z',Col
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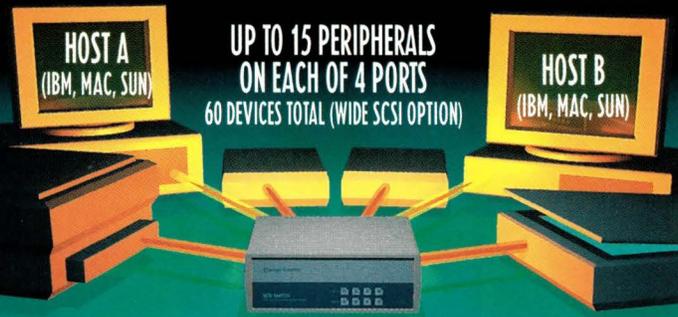
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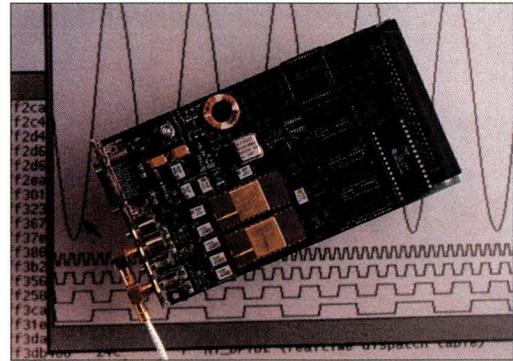
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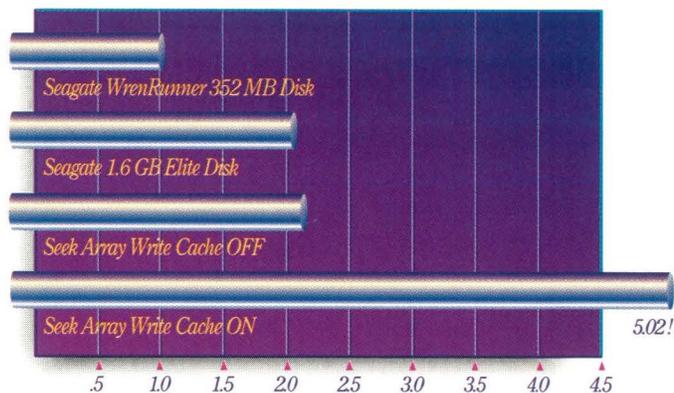
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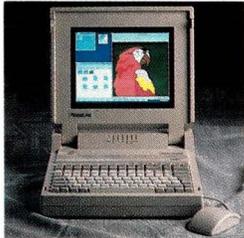


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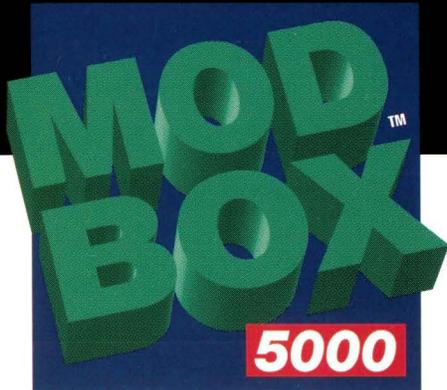
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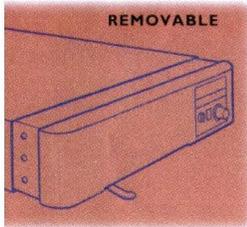
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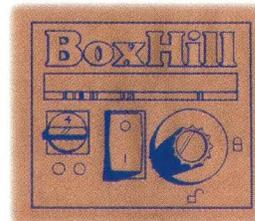
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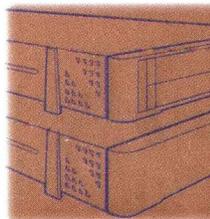


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