SunExpert

erving the UNIX Client/Server Network

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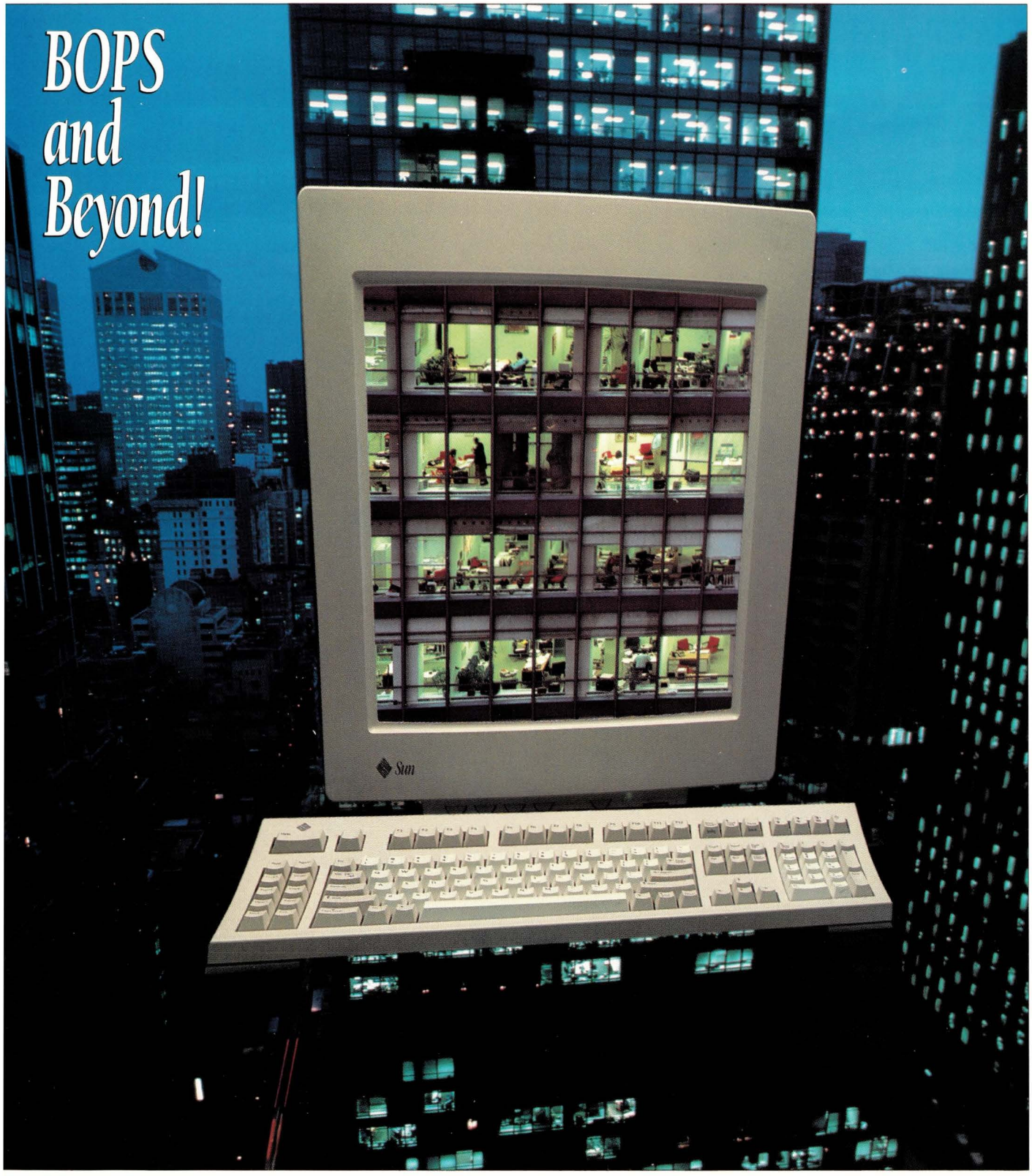
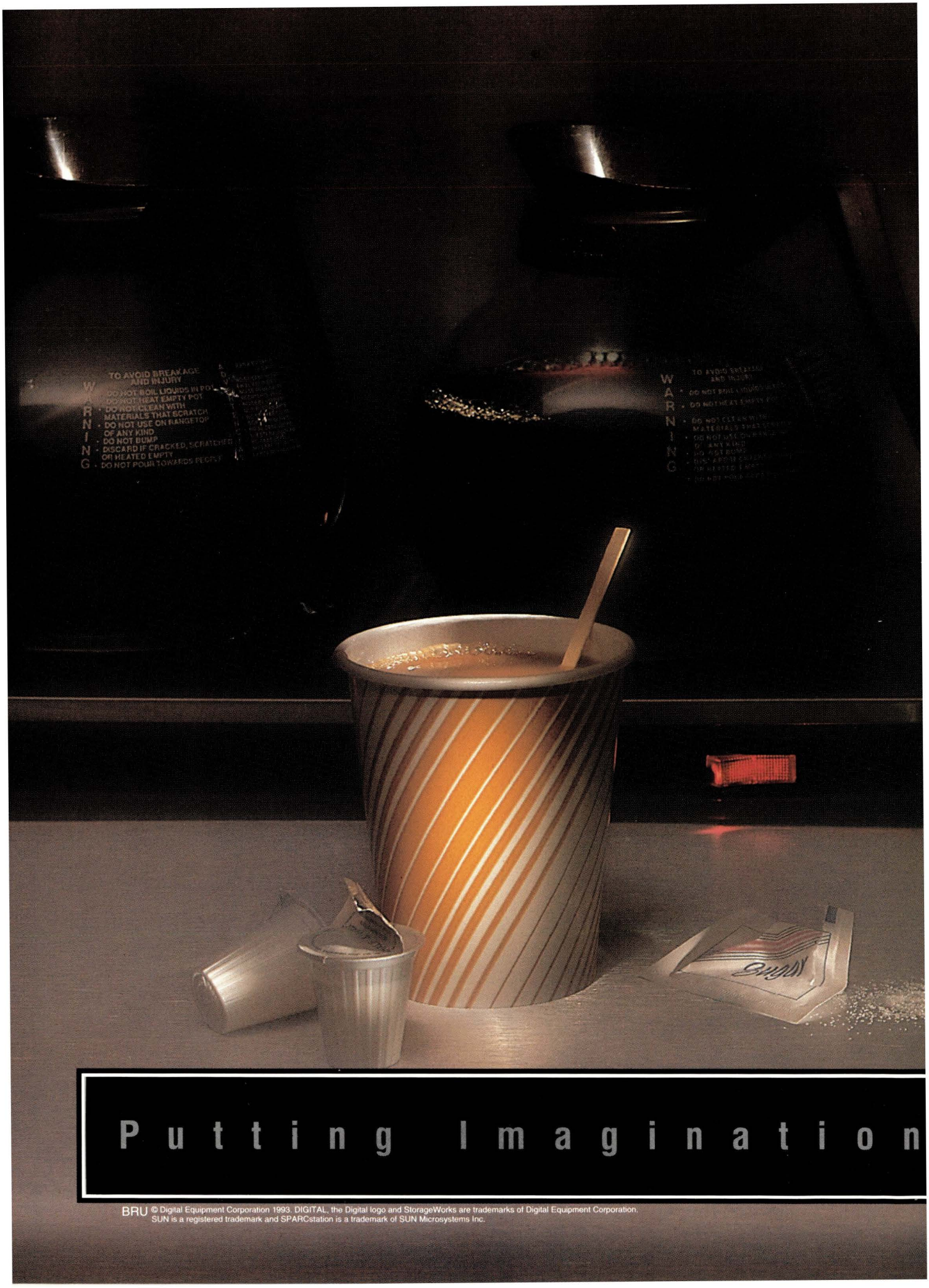


Reviews: SuperCOMPserver 10, RS/6000 Model 250

News: The ATM Team



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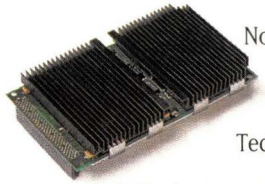

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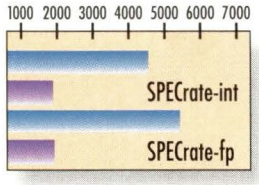

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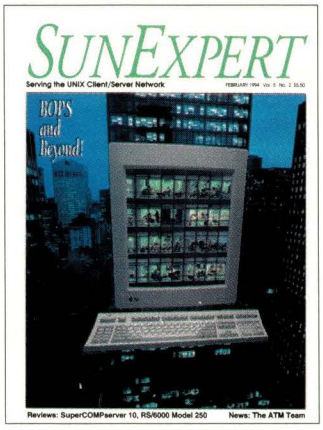

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Images from Uniphoto Picture Agency

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

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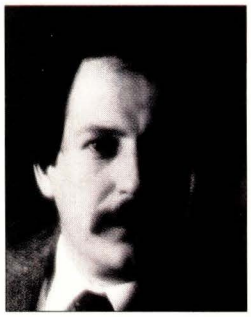
Editorial

Linchpin or Has Been: The Choice is Yours

This month's cover story explores yet another irony of the UNIX marketplace. It's another one of those "Gee, look what my PC can do that UNIX systems have been doing for at least a decade" deals. It's integrated office automation (OA) packages. BOPS, technobabble for business office productivity systems, were pioneered in the UNIX environment but taken to marketing heights and sales success in the Macintosh and PC arenas. With tools like Publish and Subscribe and OLE, we'll have to wait and see how far the personal computer can go in moving data from app to app. (I've heard that OLE is a euphemism for what matadors have to walk through to get their job done.) What a concept: Keep data files and instructions separate.



I can imagine rational people making the case that the current movement toward UNIX as a glue OS for client/server environments is driven by this very approach. Files are files. Devices are files. Everything is a file: character special files, block special files, FIFO files, symlink files, and on and on.

If you throw in piping, NFS and Ethernet, you get a glimmer of why UNIX systems can become linchpins in the migration to client/server systems. As mainframe/superminicomputer-based data centers experiment with downsizing, and PC/Mac and Novell networks try to reach up to robust, yet elegantly simple in design, UNIX-based workstations and servers, each will find a point of equilibrium. Despite the fact that every major vendor would claim to be on the crest of a great rightsizing wave, the water, in real live data processing shops, has just begun to swell. You, *SunExpert* readers, as power users, systems administrators and network managers–UNIX veterans all–will have to embrace new and expanding roles if the network is ever to become the computer.

Doug Pryor

P.S. Ken Jones, SunSoft's rep to the COSE (Common Open Software Environment) Core facilities data gathering subgroup, is looking for info about current resource use along with "wish lists" from sysadmins. Get a copy from `kenjones@rmtc.Central.Sun.COM`.

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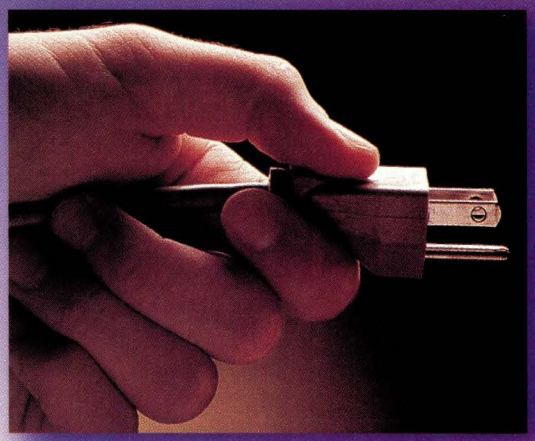

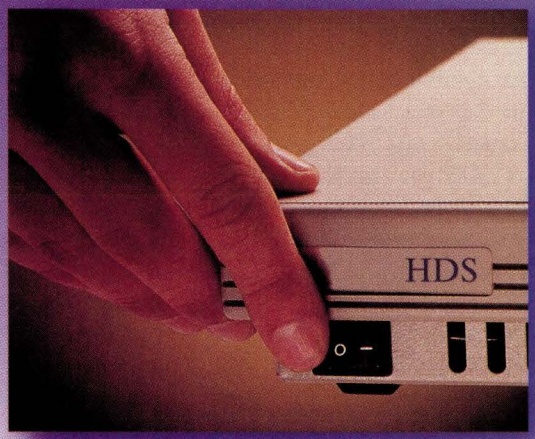

1. Plug it in
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HDS X Window terminals are the easiest to install and the easiest to use. When equipped with local storage all you have to do to start using one is plug it in and turn it on. Because all of the terminal's fonts, server code and applications are stored locally there's no need to install, configure or change anything on your host computer.

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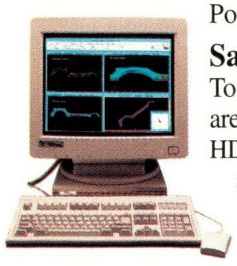

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LETTERS

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

Keepalives and TCP

Dear Peter Collinson:

I was reading your column in *SunExpert* (November 1993, Page 30), and there's a major error in it regarding keepalives. Keepalives are generally designed to catch the case where neither side has communicated for a while and thus no data or acks have flowed.

In the Control-S case, TCP has a mechanism called the zero window probe, which allows the sender to periodically try to send a little data, even if the advertised window size is 0.

Craig Partridge
craig@bbn.com

Nits in Frame 4.0 Review

Dear Editor:

I read, with interest, your December 1993 review of FrameMaker 4.0 [Page 74].

I've been using 4.0 for a little while now, ever since we finally got our service support upgrade. I am writing in regard to your nit about the Ctrl-r access to commands. Oh, I too made a comment about the quick reference guide being so thick.

In any event, things like file saves can be done as Esc f s. Almost all Ctrl-r options can also use the Esc key. At least, this is true on the UNIX version. I've always used the Esc key to access hot-key features, even in prior versions.

One of the things that has always ticked me off is the weird key sequences that are needed to grab a special character from a PostScript font. I have a simple little PostScript program that will dump a PostScript font as a table listing of the characters and their hex, octal and decimal values. Frame has never allowed entry of PostScript characters via their number, until now. It is extremely easy to modify the file that defines the entry of the PostScript characters. Actually, I didn't redefine the sequences, but added to them, so that the original Frame keystrokes are still there, as well as my new ones. So I can now access all PostScript characters between 80 hex and FE hex (FF access is broken due to a Frame bug) by simply hitting control f (for font :-) and the two-number hex code of the character.

You could easily define your Escape sequences. Obviously, you couldn't do Esc s for save, since Esc s is the start for the Special menu.

Another nit that you didn't mention is PostScript font support. There isn't any. The Island products allow you to add the PostScript AFM and font description file, and it will happily display and use the font. With Frame, bitmaps are needed for the characters, in order for anything to be displayed. Thank goodness the Mac Fontographer program provides those bitmaps in a wide range of user-selectable sizes. After that, adding a font is not too bad.

Mike Brown
brown@wi.extrel.com

SBus Communications Breakdown

Dear Editor:

As you are aware, the December 1993 issue contained an article [Page 44] on the popularity of the SBus and "A guide to 23 vendors and 63 products." I was very disappointed that CoSystems, in the Sun marketplace since 1988, was not included in either the story by Michael Jay Tucker or in the product listing.

Our first SBus product, introduced in 1990, has grown into a complete family of data communications controllers designed specifically for VME and SBus workstations and servers from Sun, Solbourne, Tatung, CompuAdd, Hyundai, Force Computer and other compatibles manufacturers. CoSystems' SBus cards are designed to install in any available SBus slot and come with a 12-month warranty on hardware and software. Each board carries a 30-day "satisfaction" guarantee.

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Steven A. Martinez
Vice President
CoSystems
3350 Scott Blvd., Bldg 61-01
Santa Clara, CA 95054
steve@cosystems.com

Pot: Kettle Black

Dear Editor:

In regards to your editorial in the December 1993 issue [Page 4], I laughed the first time I saw the Sun ad to which you refer. However, now that I think back to all the crap I've put up with under Solaris 2.1, I tend to cry.

While 2.3 looks (so far) to be fairly solid, I can't help but think that it is so because of the efforts of us unwilling beta testers, the ones who bought into 2.1 thinking it might be somehow useful. Only now can we seriously consider moving our SunOS platforms into a Solaris environment.

We have some real faithful followers of Rev. Gates in this company. They get a real big kick out of my rejoinder to the Sun "guinea pig" ad:

Pot: "Kettle, black?"

Sun really needs to rethink who might be laughing over their little joke.

Willard Dawson
uunet!bsan.bsan.com!wdawson

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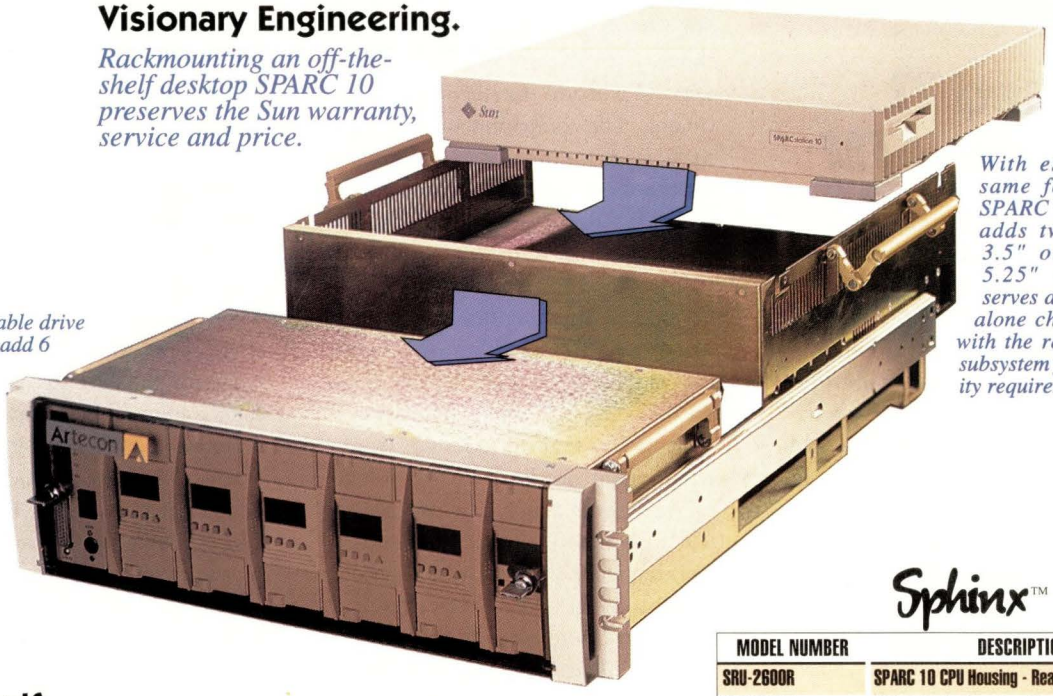

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RDU3-DSK-S-1.6GB	1.6GB 3.5" Removable Disk Module
RDU3-DSK-S-2.0GB	2.0GB 3.5" 5400 RPM Removable Disk Module
RDU3-DSK-S-2.1GB	2.1GB 3.5" 7200 RPM Removable Disk Module
RDU3-4mm-S-2.06GB	2-8GB Removable 4mm DAT Module
RDU3-4mm-S-4.0GB	4-16GB Removable 4mm DAT Module
RDU3-FLP-S-1.4MB	3.5" Removable Floppy Module

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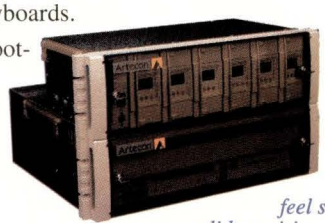

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NEWS

Sun and TI Team on ATM

Sun Microsystems Computer Corp. (SMCC) and Texas Instruments Inc. have announced an agreement to collaborate on Asynchronous Transfer Mode (ATM) technology implementations. The two companies will work together to put the networking technology onto two chips, which would be made available to third parties, as well as used by SMCC itself.

ATM is, of course, the very high-performance networking technology that some analysts have suggested will ultimately supplant everything from Ethernet to Fiber Distributed Data Interface. At the moment, though, it remains very much a business in the making. Even the protocol itself is less than solid.

However, Sun thinks ATM is firm enough to start building products. "ATM is still evolving. A lot of confusion exists on the wide-area side," says Anil Uberoi, group marketing manager for networking products at SMCC. "But at the local level, we believe we've got everything we need to start deploying it."

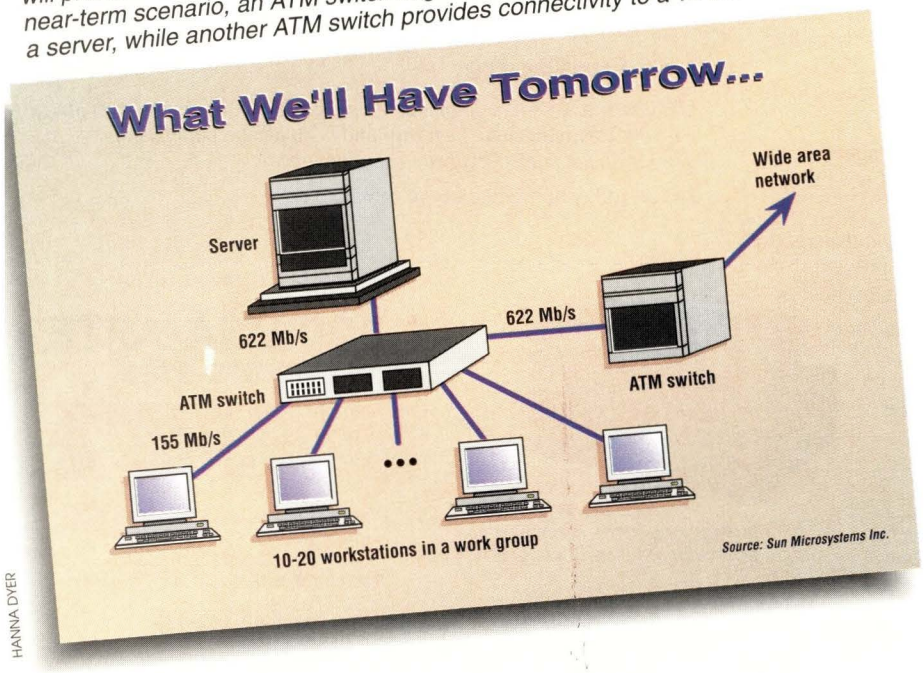
To this end, TI and Sun are cooperating on the two-chip set. Sun will use the chips in its own SBus-level products. TI will add the silicon to its own catalog. The companies say this may make it one of the first, if not the first, off-the-shelf ATM implementations available. "Right now, all the ATM solutions are more or less hand-crafted, custom solutions," says Uberoi. "There hasn't been anything that you could go to a grocery store and buy. It is significant that in 1994, you'll be able to do so."

He stresses that this does not represent a major cast-in-stone technological direction for Sun. The company will continue to sell most other networking technologies–including everything from Fast Ethernet to FDDI. However, Uberoi does hope that the chip set will accelerate the development and acceptance of ATM products. "People who will use ATM in the '94 time frame are by nature early adopters. We are enabling them to build products and get to market soon."

In particular, the two companies envision developers producing ATM switches that would link work groups of 10 to 20 workstations to each other and to servers. Other ATM switches would then link the LAN to a WAN.

All in all, Uberoi is optimistic about ATM. "There are already people on the wait list for this product," he says. "That tells me there is serious demand."

Sun Microsystems and Texas Instruments are introducing a chip set they hope will promote a whole new series of ATM products. In what could be a typical near-term scenario, an ATM switch might link workstations to each other and to a server, while another ATM switch provides connectivity to a WAN.



HANNA DYER

SunConnect Encompasses New Direction

SunConnect, the networking and connectivity planet of Sun Microsystems Inc., has announced a series of products designed to give network administrators greater control of their systems. The company has announced a new version of its SunNet Manager product; a new product, Cooperative Consoles+, that allows a server on one network to manage another network; and Encompass, software that allows a systems administrator to manage a network from any node within, or even remotely via dial-up access.

"It lets you manage anything from anywhere," says Brian Biles, product line manager for Network Management at SunConnect.

The Encompass product will include technology licensed from NetLabs Inc., Los Altos, CA, and will share common interfaces with NetLabs' own NetLabs/ DIMONS 3G network management platforms.

The new version of SunNet Manager is Release 2.2. It will be easier to install and will be made available for SPARC under Solaris 1 and Solaris on the X86.

Cooperative Consoles, meanwhile, is meant for organizations that have multiple, more or less autonomous networks, each with its own network administrator copy of SunNet Manager, and servers. With Cooperative Consoles, one network manager can share network data with another. More importantly, one network manager can manage the other's network if need be.

"If one goes to lunch, the other can manage his network," explains Biles. "In effect, it makes SunNet Manager

If the Swiss had a knife like this, they wouldn't need an army.

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into a multiuser system."

More radical still is Encompass. The company describes it as an API-independent management platform based on an object-oriented data repository. "It is basically an object broker," says Biles.

Whatever it is called, though, Encompass allows one or several network administrators to enter their company's network and manage it from virtually any point. There is no reason that someone could not, for example, manage a LAN in Hong Kong from a modem-equipped portable in a hotel room in Cleveland.

Because it shares a common interface with the NetLabs product, Encompass will support applications based on SunNet Manager and the NetLabs/DIMONS 3G platform. Moreover, the company says that since Encompass is API-independent, it will be able to support any network management API that should emerge in the future.

And, finally, at the same announcement, SunConnect introduced a new management extension. Called Cooperative Reporting, this extension provides the network management tools with an RDBMS, an SQL interface, report generation tools and other software the customer can use for such things as storing, retrieving and processing configuration and event information.

HP Shows Servers, Workstations, Terminals

In a flurry of announcements, Hewlett-Packard Co. has introduced new low-end servers, workstations, and X terminals. Among the target markets for the new machines are commercial desktops and commercial departmental systems. While the systems will be sold into the scientific and technical markets as well, they are meant to herald HP's advance into what it calls "distributed enterprises"–i.e., commercial and retail organizations with multiple offices and stores whose local systems must coordinate closely with centralized corporate ones.

The new workstations, in fact, are meant for at least corporate desktops. They are to go to users who have experimented with all the powers of PCs and find themselves unfulfilled.

The servers and the workstations are based on the PA7100LC, a low-cost version of the PA-RISC, introduced on December 20, 1993.

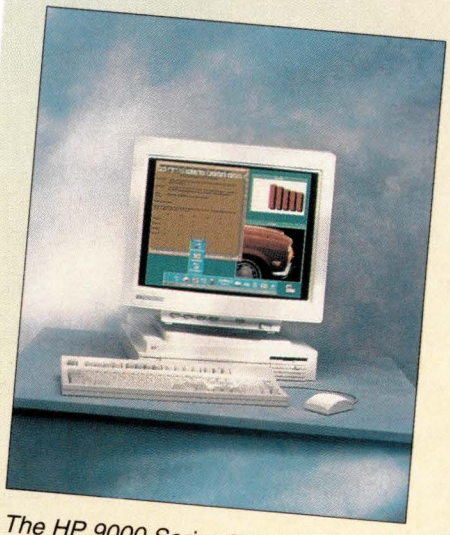
The E series servers, which replace HP's F series machines, come in three models–the Models E25, E35 and E45. The machines have 48-, 64- and 80-MHz CPUs, respectively, and can be upgraded with a board swap.

The machines are expandable from 16 MB to 512 MB of RAM. They have 535 MB to 4 GB of hard disk, with up to 140 GB of additional external disk. And for secondary mass storage, there are several choices of QIC, DAT and CD-ROM. The E series servers come with two to four 32-bit expansion HP-PB I/O slots, and have built-in networking ports, a twisted-pair (10BaseT) Ethernet and an AUI Ethernet port. In addition, the machines have a SCSI-2 port, a Centronics parallel port and up to 16 RS-232 ports.

Depending on the configuration, pricing on the machines ranges from $4,000 to $20,000. And, again depending on the configuration, performance ranges from 44 SPECint92 (and 80 estimated OLTP transactions per second) to 80 SPECint92 (and an estimated 155 transactions per second).

What is, perhaps, most remarkable about the machines is their mission. They are targeted, says Douglas Gibson, product marketing manger of the general systems division at HP, "at the Wal-Marts of the world."

Specifically, this means organizations with several offices, branches or stores scattered around the globe. Each store or office has to have local (and reasonably powerful) computers to provide local MIS support. But each of those systems must be highly networkable–both downward to individual desktop or point-of-sale systems, and upward to regional and corporate databases. Moreover, systems must be inexpensive. For that reason alone, the role has usually been assigned to Intel Corp.-based servers. However, HP says that its E series can do the job better with RISC and UNIX.



The HP 9000 Series 712/60, shown here running HP Wabi and the Ami Pro word processor from Lotus, is one of two new workstations being introduced by Hewlett-Packard. The workstations are being offered for traditional workstation applications and are being groomed for a role on the commercial desktop.

The HP 9000 E series server is Hewlett-Packard's new low-end server. The product is meant to provide computing to what the company calls "distributed enterprises," that is, companies with multiple branch offices that need local computing but which also must communicate with corporate systems.

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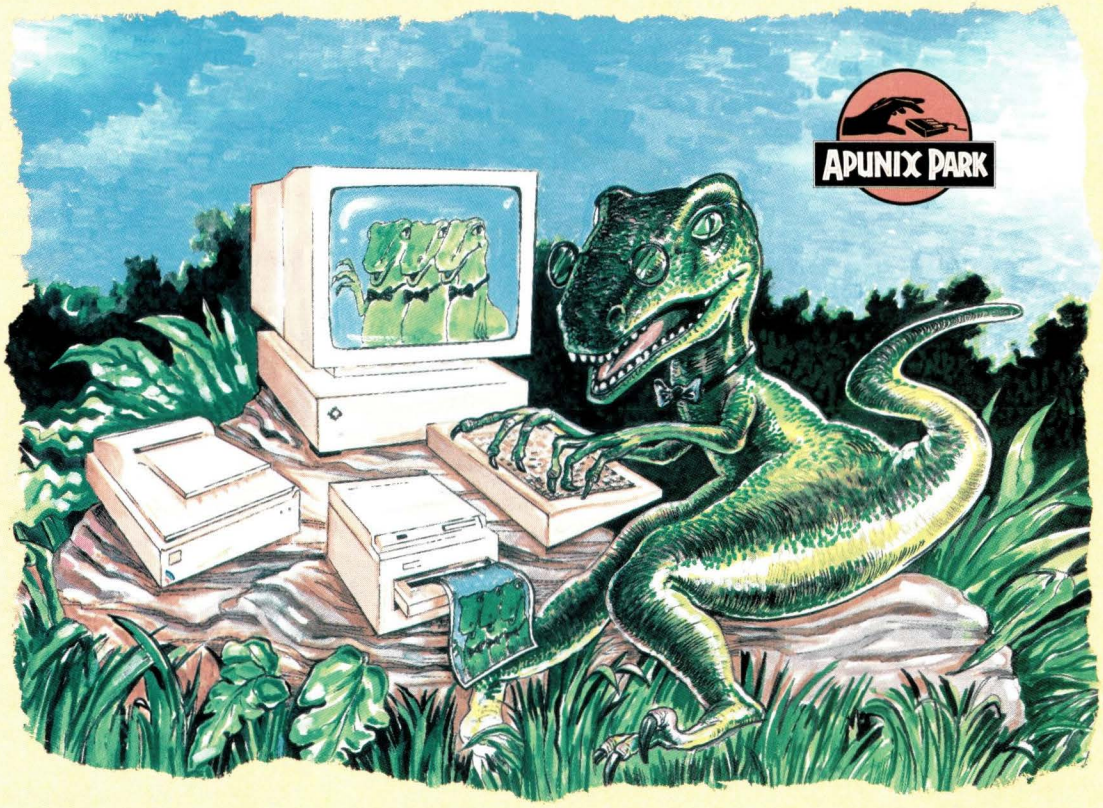

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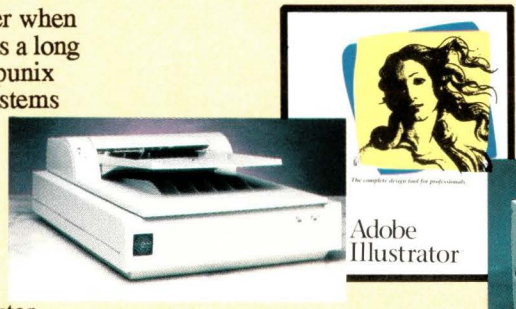

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SunWorld BEST PRODUCT 1992

Interview with Dr. Chong Lee

by Maureen McKeon
Research Editor

Dr. Chong Lee of Phase X Systems

Editor's note: *The X Window System is, of course, the interface technology of choice for UNIX workstations. However, it is also a technology in constant flux, as new corporate and company alliances change the face of computing.*

This month, to get some perspective on where X has been and where it may be going, SunExpert *spoke to Dr. Chong Lee, president and founder of Phase X Systems, a vendor of X terminals.*

Dr. Lee's career spans several companies and technologies. He has served in management and technical capacities with such companies as Tektronix, Metheus-Computervision Corp. and Samsung. He is a senior member of IEEE and has published more than 20 technical papers, in addition to teaching at the Oregon Graduate Institute.

Q: Could you give a brief description of the X Window System?
A: The X Window System is basically a graphics window-based system using X as the primary way of communicating between the user interface and the application. With this technology, the majority of application execution takes place on the server, while the graphics presentation in windows format is placed on the desktop.

Q: Why isn't the user interface built in?
A: To make the user interface portable and so the operating system remains independent.

Q: Are there any hardware or display dependencies?
A: Not really. To keep the user interface portable, the X Window designers decided to separate it from the application and operating system dependencies. That's why the set of libraries and presentation tools that make up X Windows are standard.
One of the fundamental design goals of X architecture was network transparency, which was achieved by separating the windowing function into two distinct elements: applications processing (on the server) and user interface (on the X display device).

Q: Can you compare X to other systems such as MacOS, Windows, Presentation Manager?
A: The distinctions are very clear. X is easier and more powerful to program than MS Windows. X was designed with networking built in from the start. X is multitasking, portable and open. MS Windows and MacOS are all kernel-based systems.

(continued on Page 14)

The desktop systems, meanwhile, are the HP Series 7000 Models 712/60 and 712/80i, based on a 60- and 80-MHz processor, respectively. The machines are meant to be inexpensive (the company says that the "street price" on the machines will begin at $3,995) workstations for a variety of applications, ranging from low-end CAD to customer service.

Briefly, both machines will offer 79 SPECfp92, while the 60 will have 58 SPECint92 and the 80i will have 84 SPECint92. In terms of graphics, the 60 will offer 5.9 Xmarks, and the 80i wil have 8.5 Xmarks. Both machines can support displays between 15 and 19 inches, and normally have 16 MB of RAM (expandable to 128) and 260 MB of internal disk (expandable to one gigabyte). They can have up to 14 GB of external disk and come with two expansion slots. As something of a first for HP, the machines can also support a floppy disk.

As for I/O, the workstations have the usual features: keyboard, mouse, 16-bit audio, Ethernet, SCSI-2, RS-232-C and a Centronics port. There are options available for X.25, token ring and so on.

Again, what is most remarkable about the machines is their mission. While they will be sold into traditional workstation markets, they are also being presented as the platform for what HP calls "the Enterprise Desktop," a collection of hardware and software from HP and its partners. This is, effectively, the executive information system that MIS people have proposed for some years (see "BOPS and Beyond," in the Features section).

An EIS is usually defined as a highly intelligent desktop system that works with a business professional. It links personal-productivity tools and data-analysis software with corporate data and does so in real time. HP says that an Enterprise Desktop is something you need if you must "synthesize and react instantly to changing information from multiple, enterprisewide data sources."

This includes, HP says, financial traders, brand managers, customer-service reps and information systems application developers.

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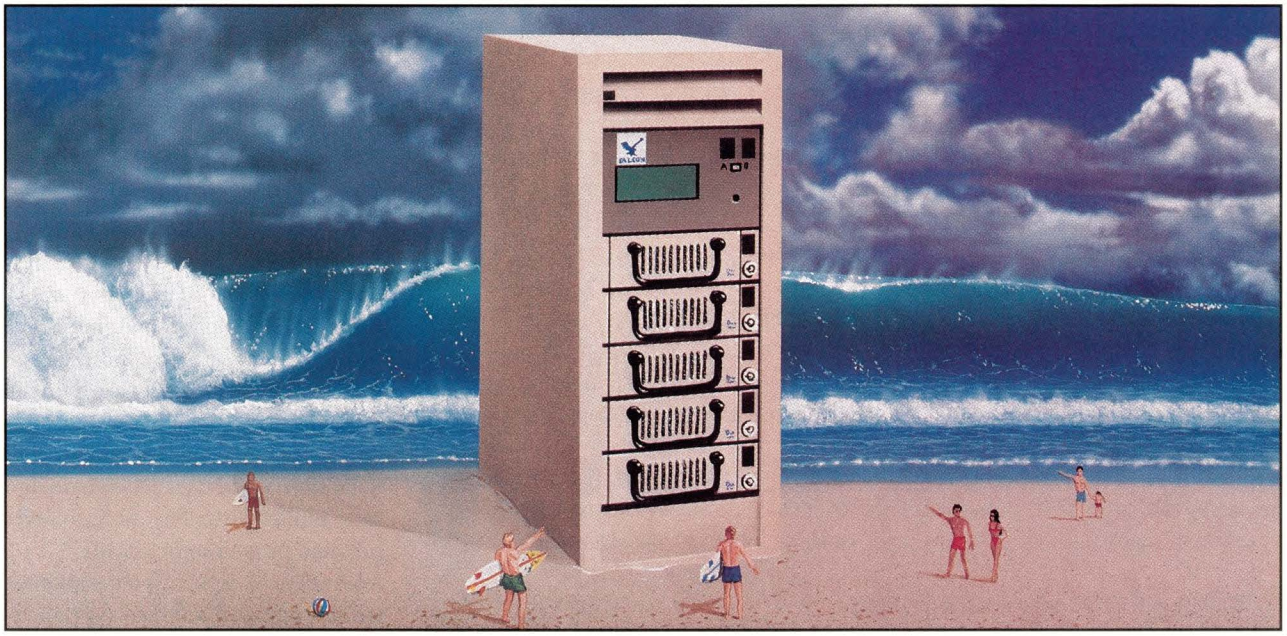

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(Dr. Chong Lee interview, continued from Page 12)

Q: Does X make possible the integration of different hardware and operating systems?
A: Yes. X allows application sharing among multiple hosts and users. This is where MacOS and Presentation Manager are deficient. X is an enabling technology for integration. You have the building blocks to create a homogeneous environment out of various hardware and operating systems.

Q: How does X allow distributed computing?
A: Distributed computing has been around for a while, but X has enhanced it. When you run X Windows, every window on your X terminal or PC can be from a different host, running a different application. X naturally allows interprocess communication. X makes for better distributed computing through a uniform user interface.

Q: What are the benefits of X terminals and the X Window System? How do X terminals change the hardware and software decisions of buyers?
A: The main benefit of X is that through a consistent user interface, various systems can be networked. The buying decision is easier and it can be focused on the strategic direction of the company. You don't need to be concerned about APIs, future network crisis, data integrity and recovery pitfalls, etc.

Q: Are there financial benefits to using X terminals?
A: Absolutely, both long and short term. The hidden cost of managing, networking and the total life-cycle cost is much greater with PCs running MS Windows. Just the cost of upgrading PCs or workstations to provide an adequate service level is enough to justify the use of X terminals.

We have seen the price of an X terminal with the same graphic resolution cost about half the price of an equivalent workstation. Especially when you have many seats to enable, users see that the dollar amount of savings multiplies quickly.

Q: How will COSE impact the X market?
A: COSE will help X. COSE sets common guidelines for open systems based on the X technology. X is a key ingredient of COSE. In that sense, I believe that X is endorsed and recognized even more. So the impact is positive.

Q: What are the threats to X?
A: MS Windows is definitely a threat. PCs have been around for a long time, and MS Windows has been accepted over a longer period. X terminals are still a new concept for a lot of people.

Q: What is the future of X?
A: X Windows will continue to grow and be more broadly accepted. Vendors will put X inside everything: in applications, in operating systems, and even NT will have X. If Microsoft doesn't do that, third-party vendors will. The fastest growing segment of the market is X terminals. If you look at Sun and HP, you realize that HP adopted X terminals early on and it worked well for them. But Sun avoided X terminals and adopted diskless workstations and they are paying the price–they're playing catch-up.

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Circle 160

As a result, the new workstations are being sold to people who have tried to develop EIS systems with high-end PCs and been disappointed. "Everyone will tell you that a PC can do everything," says Janet Muto, commercial program manager for workstations at HP. "But it isn't easy."

In addition, HP introduced a new X terminal–the HP Entria. This is a low-end X terminal priced from $995. It comes with a variety of system software and systems-administration software in the company's HP Enware X Terminal Manager package. The X terminals have a PCMCIA slot and audio support for such applications as voice mail.

SunSoft and NeXT Pushing the Object Movement

Recycling is a '90s thing to do. Saving time and money is also a '90s thing to do. Considering that, doesn't object-oriented programming seem to be the '90s thing to do? Software reuse is based on the concept that if one programmer writes a piece of code, another programmer can pick up that code as an object and use it elsewhere in his own applications. The move to object-oriented programming seems inevitable. It's now just a question of which company will do it first on a large scale.

SunSoft Inc. is bound and determined to be the first to market with a complete object-based operating environment as developers and end users make the move to object technology. Sun has partnered with NeXT Computer Inc., which will publish an open specification called OpenStep. OpenStep is an open application programming interface (API) derived from the operating system-independent subset of NeXTStep 3.2. Sun and NeXT hope to establish OpenStep as an industry standard for object development.

SunSoft will license NeXTStep's application environment for use in its Solaris enterprise system software. NeXT will freely license the APIs and the OpenStep trademark to all independent implementations that pass an OpenStep test suite. The NeXTStep environment will be integrated with

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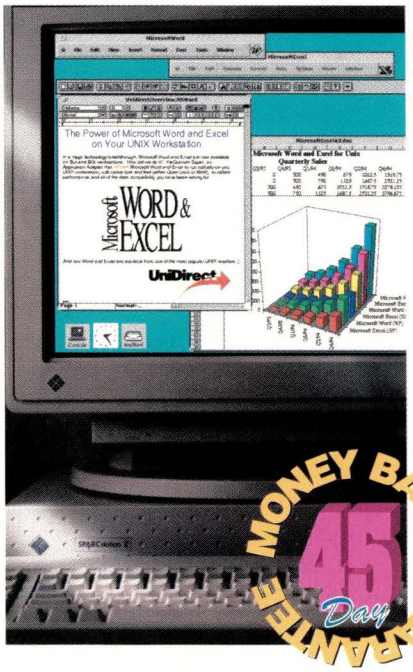

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Solaris' Distributed Object Environment as part of Sun's Project DOE effort.

Steven P. Jobs, chairman and CEO of NeXT, says, "SunSoft's choosing of NeXTStep parallels Apple's choosing of PostScript 10 years ago." PostScript was open at that time. Adobe freely licensed the API and made money from licenses. Apple joined Adobe in evangelizing for PostScript, and it became a great success. Jobs hopes Sun and OpenStep will have the same result.

Object techology greatly reduces the time it takes to construct applications, increases their reliability and allows reuse of software components. Scott McNealy, chairman and CEO of Sun, believes object oriented is an important direction: "I believe that object technology is one of the core technologies that will drive enterprise computing in the '90s...Sun is now in a great position to drive a volume object standard for the future."

SunSoft also unveiled a series of agreements with NeXT for further promotion of open specifications and the standardization of object technology. Sun predicts this move will shorten time to market for a full Solaris-based object system by two to three years.

Other issues agreed upon in the Sun-NeXT agreement were a minority equity investment in NeXT by Sun. NeXT agreed to port the native NeXTStep operating system to the SPARC architecture with marketing and technical assistance from Sun's SPARC Technology Business.–*mm*

MS-Word and Excel for Suns

Elsewhere in this issue is an article that bemoans the relative rareness of UNIX-oriented software vendors with personal productivity tools for workstations, like those that are available for PCs from DOS-oriented vendors (see "BOPs and Beyond" in the Features section).

Part of the reason for that is DOS-oriented vendors already fill the market demand with UNIX versions of their DOS products (as does, for example, Lotus with its Ami Pro for UNIX). Now, even those who cannot or will not commit the resources for a UNIX port can offer UNIX product via specialized tools that make porting unnecessary.

Microsoft Corp., for example, has never been accused of being a close, personal friend of UNIX. Now, however, its MS-Word processor and Excel spreadsheet are available for UNIX workstations in general, and Sun Microsystems Computer Corp. workstations in particular, through the efforts of Quorum Software Systems Inc.

Quorum makes Equal, an "application adapter." It takes a Mac application and translates its high-level application interface calls into their UNIX equivalents. In December of last year, Quorum announced that customers purchasing the Equal product on CD-ROM could get either Word or Excel bundled along with it as an upgrade from any UNIX-only equivalent. Customers could send in proof of purchase for any UNIX spreadsheet or word processors–including Lotus 1-2-3, Wingz, 20/20, IslandCalc, and so on–and get Equal with Word or Excel for $299.

SunPC for Solaris 2

In a move that could put still more DOS software on Sun Microsystems Inc. screens, the part of Sun that handles PC-to-Sun connection products has announced a Solaris 2 version of the SunPC DOS emulation package. SunSelect, Chelmsford, MA, brought out Release 4.0 of the package in December 1993. The company says the new version not only runs on Solaris 2.0 but also provides improved serial communications–up to 19.2 Kb/s, or eight times faster than SunPC 3.1.

Moreover, until March 15, SunPC can be purchased for $295, which is 25% less the usual price, $395.

The SunPC software can be used on its own; however, two Intel Corp. processor-based accelerator cards are also available. These are the 80486 SX-based SunPC Accelerator SX card and, for more demanding applications, the 80486 DX-based SunPC Accelerator DX card.

This Just In...

• The Power µP SPARC upgrade processor from ***Weitek Corp.***, Sunnyvale, CA, will now be supported by SunService. The Power µP chip is a SPARC processor that Sun customers can use to upgrade their systems. Weitek says that a Power µP can increase a SPARCstation 2's performance by as much as 1.9 times. Now, Sun's own support organization, SunService, will support workstations with the chip as though it were a Sun product.

• ***Digital Equipment Corp.***, Maynard, MA, has announced a new documentation service for visually impaired users. With the company's Vision Impaired On-Line Documentation, documentation can be downloaded and read in a number of different ways. These include screen readers with voice boards and hard-copy Braille printers.

• Once again, the trademark demon has struck. ***Montage Software*** is a newly formed developer of database products–specifically, the company makes what it calls an "object-relational" database that combines features of both object-oriented databases and more traditional RDBMSs. However, Montage is also the name of a group of financial software products from Infinity International Financial Technology Inc. Infinity has informed the press that it has gone to court to seek a injunction and damages for the use of the name.

• Looking for a new trade show? Something different from Las Vegas, Singapore or Frankfurt? How about Vietnam? ***Adsale Exhibition Services Ltd.***, of Hong Kong, has announced that a dual trade show, Vietnam Telecomp '93 and Vietnam Broadcasting '93, held late last year in Hanoi, was the most successful Information Technology fair ever held in the country. Vietnam Telcomp '94 and Vietnam Broadcasting '94 will be held November 14-18 in Ho Chi Minh City.

• ***Oberon Software Inc.***, Cambridge, MA, has announced that its SynchroWorks object-oriented programming language will be adapted to work with SunSoft's Product DOE (Distributed Objects Everywhere). SynchroWorks allows developers to build applications by assembling objects on a screen without any 3GL programming.

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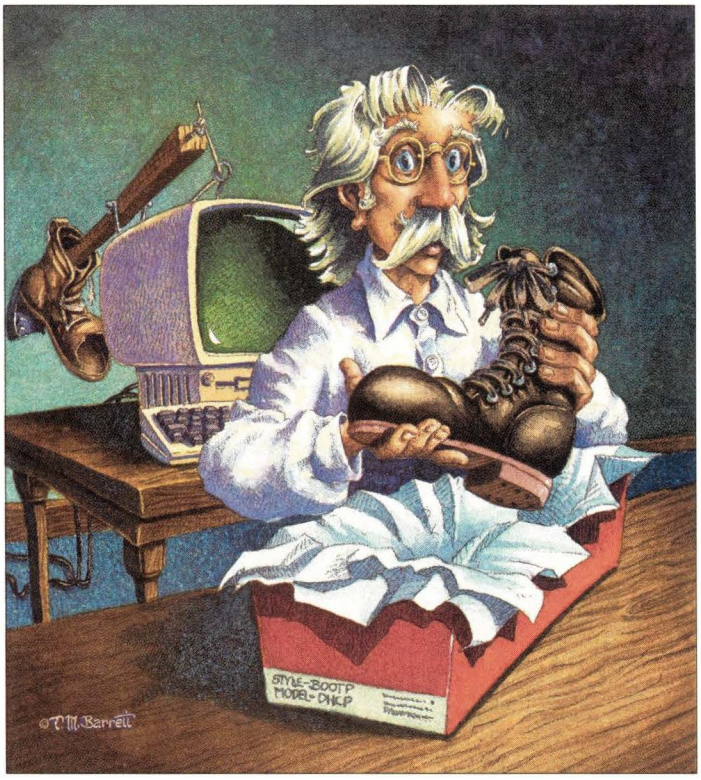

TOM BARRETT

Starting Again from the Beginning

by MICHAEL O'BRIEN

"Now, where shall we begin?"
–Bad guy with really neat coathanger to nice girl in desert tent in "Raiders of the Lost Ark"

"Caveat emptor."
–Trad.

"Cave canem."
–Instructions on box of DHCP software…except in an ideal world of perfect network configurations

Q: BZZZZaaaww-www….

A: You're fired. BOOTP is not that boring. Anyway, you seem to have been asleep for most of a month.

What put you to sleep was the discussion of the Boot Protocol, apparently. Well, I'm sorry to tell you that some folks thought that BOOTP was a pretty nifty idea. Not only that, it could be improved on. This led to the development of the Dynamic Host Configuration Protocol, or DHCP, which is what we'll be discussing this month.

Some folks are wondering why this discussion is even taking place. Well, in the first place, this gives you some idea of what's going on when you turn your Sun workstation on. In the second place, I've been having trouble getting Mr. Protocol himself started in the morning, and when it got to the point where I was just sort of raining Big Stuf Ding-Dongs all over the bedspread in a futile attempt to get some sort of reaction, I was finally reduced to reading the specs on something more helpful. Now, Mr. Protocol is not only up and going in record time, he even knows who and where he is, which is a helluva lot more than I can say for myself at that hour.

BOOTP, as you will recall, was designed to support booting workstations and other devices that need information from outside before they can complete the booting process, information such as their own Internet

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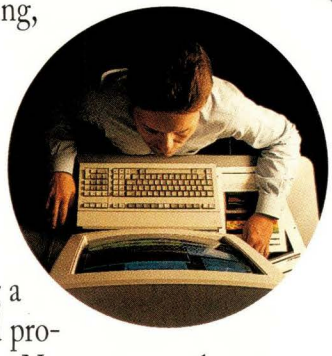

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address or the name of a program file to download. This facility was found to be so useful that an expanded and more general protocol was designed, called the Dynamic Host Configuration Protocol, or DHCP.

One of the biggest problems in this area, however, is that of legacy systems. New operating-system releases may be distributed on whatever medium comes to mind, and may be installed simply by reading them in. System managers everywhere are probably choking at the use of the word "simply" in the previous sentence, but compared to the alternative, it *is* simple. BOOTP and DHCP are designed to be implemented in hardware, because it is hardware that is responsible for the boot process. Of course, not all workstations need to boot from hardware, but those without a local disk don't have much choice. If they are to be dynamically configured in the same way as hosts that boot from a local disk, then the protocols that support dynamic configuration on that network can be changed only by changing at least some hardware.

This immediately puts a whole new time scale on things. In some sense, it freezes the boot protocol forever, since the one thing an institution will rarely do is to replace all of its workstations at once. In order to change the bootstrap protocol, a workstation vendor must either simultaneously upgrade the hardware in its entire product line in the field, or declare some older segment of its product line to be inoperative by fiat. Neither of these options is particularly palatable, either to the vendor or to the customers who must upgrade their hardware. Opening up hundreds of workstations to change chip sets in each is not an appealing notion for anyone.

One assumes, therefore, that the time scale upon which boot protocols are changed must be geological. Observation shows this to be the case. Sun, for example, still uses a mixture of RARP, TFTP and a homebrew "bootparams" remote procedure call protocol to boot its diskless workstations. As nets become more heterogeneous in nature, however, some sort of uniform boot procedure will have to evolve, if for no other reason than to make network administration possible.

Why, then, did DHCP come so swiftly on the heels of BOOTP? Mr. Protocol is glad you asked. At least it shows you've woken up.

The reason is that BOOTP provides several services that are becoming critically important as the Internet evolves. One, which will not surprise those who have read Mr. Protocol's previous rantings on the matter of Internet address space, is dynamic assignment of IP addresses. This permits the reuse of IP addresses among machines, so that subnets may be dynamically reconfigured; that is, you can unplug a machine from one subnet and plug it into another without anyone going berserk trying to reconfigure the network tables.

Also, in the event that an organization has a large population of workstations, only a few of which need IP numbers at any given time, the IP address space can be better utilized. Frankly, Mr. Protocol can't think of too many such populations in his past experience, but he is willing to concede that they exist.

However, one of the most important design criteria behind DHCP is that it be upward compatible with BOOTP. This means that a BOOTP client can use a DHCP server, which immediately eliminates one entire generation of PROM-yanking. Furthermore, BOOTP specifies the possibility of BOOTP relay servers, which act to allow several different physical nets to share a common BOOTP server, using doubly homed hosts that can receive a broadcast BOOTP request on one network and resend it to the BOOTP server on another network, as well as relaying the response. DHCP uses a packet structure that is similar enough to that used by BOOTP that BOOTP relay servers will pass DHCP packets in both directions.

The first real difference to note between DHCP and BOOTP is that while BOOTP interactions consist of a single request and a single response, DHCP is more highly interactive in nature. First, however, comes a more basic question: If DHCP packets masquerade as BOOTP packets, how is one to tell the difference?

The answer is: If you're a BOOTP client or server, you don't. To these systems, DHCP packets look exactly like BOOTP packets with a bunch of vendor-defined baggage floating around in the "vend" field (see Figure 1 under "options").

As you can see by comparing this month's table with last month's, however, the "vend" field has now been renamed the "options" field, and it contains the remainder of the material that differentiates DHCP from BOOTP. As with BOOTP, the "options" field must begin with a four-byte "magic cookie" consisting of the decimal numbers 99, 130, 83 and 99. No, don't ask; I looked it up in the ASCII table and it didn't make any sense there either. Mr. Protocol just grins a lot. Fat help he is. Anyway, it keeps the BOOTP players happy. You also may have noticed that the "options" field got a whole lot fatter than the old "vend" field. This brings the minimum size of a DHCP message up to 576 octets, which is the minimum IP datagram size that a host must be prepared to accept.

One option that must be present in all DHCP packets, however, is the "DHCP message type" option. DHCP, after all, has several complete exchanges between the server and a DHCP client, but to preserve compatibility with BOOTP, the "op" field has to be either BOOTREQUEST or BOOTREPLY. The extra differentiation takes place in this options field. The possible DHCP message types are DHCPDISCOVER, DHCPOFFER, DHCPREQUEST, DHCPACK, DHCPNAK, DHCPDECLINE and DHCPRELEASE.

Before going into the details of the interaction, however, it would be well to mention some of the other design goals for DHCP. First and most important, DHCP specifies a mechanism and not a policy. Local administrators can exert local control over allocation of resources as required. However, such manual configuration should not be required for either hosts or networks. At the same time, of course, DHCP should guarantee that

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any specific network address will not be in use by more than one host at a time. In addition, it should ensure that host configurations are retained across both host and server reboots. We'll see how these goals are met, or at least made possible, by the details of the protocol exchange.

In its full glory, when not behaving just like a BOOTP server, a DHCP server waits for a DHCP client to send out a packet with "DHCP message type" set to DHCPDISCOVER. The "op" field of all client-to-server messages is set to BOOTREQUEST, and in all server-to-client messages it is set to BOOTREPLY. This keeps BOOTP relay servers happy.

The DHCPDISCOVER packet is broadcast on the local physical subnet.

Figure 1. DHCP Fields

Field	# of bytes	Description
op	1	packet op code/message type
htype	1	hardware address type
hlen	1	hardware address length
hops	1	client sets to zero, optionally used by relay agents when booting via a relay agent
xid	4	transaction ID, a random number chosen by the client, used to associate messages and responses between a client and a server
secs	2	filled in by client; seconds elapsed since client started trying to boot
flags	2	flags; currently only a "Broadcast" bit
ciaddr	4	client IP address; filled in by client in DHCPREQUEST if verifying previously allocated configuration parameters
yiaddr	4	"your" (client) IP address; filled in by server if client doesn't know its own address (ciaddr was 0)
siaddr	4	IP address of next server to use in bootstrap; returned in DHCPOFFER, DHCPACK and DHCPNAK by server
giaddr	4	relay agent IP address; used in booting via a relay agent
chaddr	16	client hardware address; filled in by client
sname	64	optional server host name, null terminated string
file	128	boot file name, null terminated string; "generic" name or null in DHCPDISCOVER, fully qualified directory-path name in DHCPOFFER
options	64	optional parameters field

HANNA DYER

Each server may respond with a DHCPOFFER message that includes an available network address in the "yiaddr" field (as well as all sorts of other configuration options expressed as DHCP options). The client picks one of the (possibly) several DHCPOFFER messages and then broadcasts a DHCPREQUEST message, which *must* include the "server identifier" DHCP option to indicate which server it has chosen to respond to. This message causes other responding servers to forget about any IP addresses they may have temporarily assigned to this client, and causes the targeted server to commit the binding to permanent storage. The same server responds with a DHCPACK message containing the configuration parameters for the requesting client.

Note that the client need not have requested the same IP address as the one sent in the DHCPOFFER message; if it thinks it has a better idea, it is free to ask for it. If the server doesn't believe the address requested by the client is available, however, the server may respond with a DHCPNAK message.

The client is not encouraged to believe implicitly that the IP address handed to it by the server is valid. It should perform a final check on the address, for instance, by sending out an ARP request for it. If it finds that the address is invalid, it sends a DHCPDECLINE message back to the server and restarts the entire configuration process. If the address is valid, the client uses the remainder of the configuration parameters it's been handed and proceeds to boot itself in a normal fashion.

At this point Mr. Protocol feels compelled to point out some weasel words in RFC 1541, which describes all of this. It says, "The client should wait a minimum of ten seconds before restarting the configuration process to avoid excessive network traffic in case of looping." Boy howdy. You betcha. I think it should be pretty easy to see a nice loop of DHCPDISCOVER/DHCPOFFER/DHCPREQUEST/DHCPACK/DHCPDECLINE messages floating around in a network

when a brain-dead server refuses to believe a client's ardent claims that it cannot use the IP address that the server insists upon assigning to it over and over and over again. "Here!" "No!" "Here!" "No!" It takes a computer not to be discouraged by this sort of behavior. What's interesting is that without really good network monitoring tools, it can be hard to discover that such esoteric stuff is going on in your network at all.

Note that if a client wants to reuse a previous address, it can start the entire exchange with a DHCPREQUEST and avoid the DHCPDISCOVER exchange completely.

An IP address is not assigned permanently under DHCP, or at least, it need not be. IP addresses are assigned with "leases," which expire after a given amount of time. Hosts that are coming up to the end of the "lease" are required to revalidate the address, and if the lease runs out before they can obtain a revalidation, they must cease using that address immediately. This is another one that Mr. Protocol is really, really fond of. The console messages we get right now are bad enough. Now, just imagine getting one that says, "IP address lease expired: Your session is toast."

Mr. Protocol would like the concession to sell peanuts to the crowd at a site where that one crops up. ➸

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

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

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

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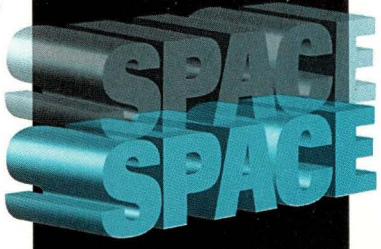

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UNIX Basics

KEITH GRAVES

Passwords

by **PETER COLLINSON**,
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One of the things that UNIX does for you is provide an identity. You exist as a user on the machine; you have private files stored in a home directory; you have an email address. Each of your files is tagged with your ownership. The inode for the file contains a numeric *user id*, often abbreviated to *uid*. However, it's more convenient for you to be known by a name than a number. Humans find names easier to remember.

There has to be some way of relating your account name to the uid. This is done by the password file, `/etc/passwd`. When you log in, you type a name that gets looked up in the password file. The file is used to tie your name to a particular uid. How do you prove who you are? Well, you know what happens. You type a password into the machine, and this is checked against the one stored in `/etc/passwd`. If it matches, you are let in. If not, the system refuses you access.

If you are using Solaris or have C2 security installed on SunOS, the password might not be stored in `/etc/passwd`. It will be stored in a "shadow password file": `/etc/shadow` on Solaris and `/etc/security/passwd.adjunct` on SunOS. I'll get into the reasons for this later. For the moment, I am considering how UNIX did this originally.

Password Encryption

It turns out that many programs need to have access to the password file. Consider `ls`. It reads data from the file system and is presented with the numeric uid attached to each file it inspects. It wants to turn that uid into a name so its output is easy to read. So, we need to allow a commonly used process access to the password file. How do we ensure that people cannot find your password?

One way might be to make the password file readable only by the superuser and make `ls` into a *setuid* program. When you run `ls`, it takes on the access rights of the owner of the file, rather than your less privileged permissions. If `ls` is owned by the superuser, then when you run it, it reads the password file owned by the superuser. It turns out that this is not really a good idea. We want to minimize the number of setuid programs on the system and, anyway, how does any

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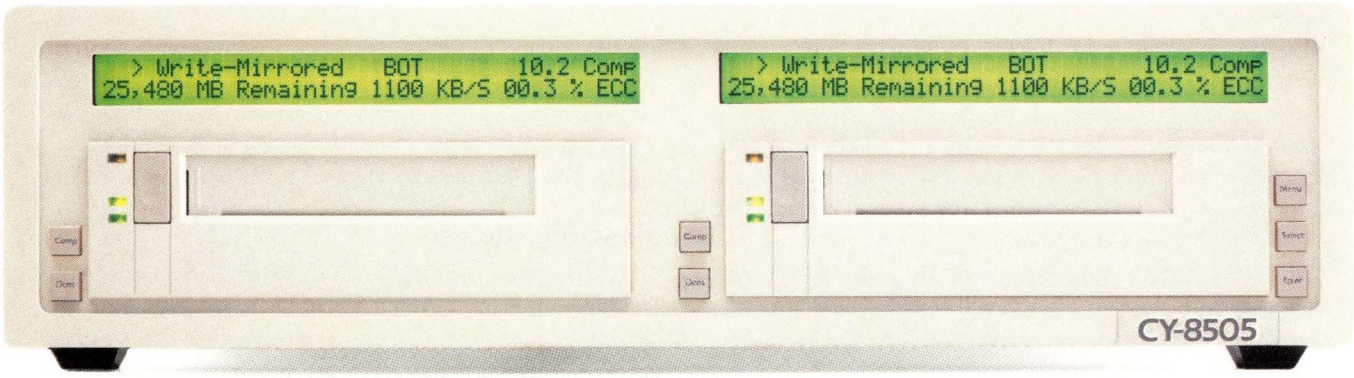

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programmer write a program to get access to the password file? How do we allow users to use standard UNIX tools like `awk` or `grep` on the password file? The relationship between the uid and the user's login name is needed by many programs, and we want to give them easy access. It's overkill to use file system security to guard passwords.

The other way of hiding data is to use encryption. We can allow anyone access to the password file but encrypt the password stored in the file so no one can read it. This presents yet more problems. To encrypt a string, we need some code that turns it into another string in a way that hides the original value. We don't want the result to be the same each time through the code, and we present the encryption code with a key that sets some variables to different values for each invocation.

So we have a key and a string to encrypt. We encrypt the password and store it in the password file. This has not solved the problem. If we expect to decrypt the stored version and compare the plain text with the one you are typing in, then we are going to have to store the key somewhere. Someone can come along, grab the key and decrypt the password.

The trick is never to use decryption. When you type your password into the system, it is encrypted and the new encrypted string is compared with the stored string in the password file. If they are the same, then you have typed in the original password. More correctly, you have typed one that generates the same encrypted string as the original. This is likely to be the original password.

Your login name is used as the key. This provides sufficient data to perturb the algorithm; it will generate different encryption strings when two people use the same password. UNIX has no facilities for decrypting passwords. This is why systems administrators cannot tell you your password when you forget it; all they can do is clear it and get you to set a new one.

Breaking into Machines

Certain people in the world make a hobby of roaming around the Internet (and the phone system) trying to break into machines. The intent is not usually burglary or vandalism, or at least it doesn't start that way. It's a challenge, defeating those locks and getting onto someone else's system.

This means that everyone on a system is open to attack, and everyone is part of the security force defending their system against unwanted intrusion. Security is always a compromise between convenience of access for legitimate users and denial of access to unauthorized ones. The only safe computer is one locked in a secure room with a guard on the door. This is not terribly convenient, and so we tend to take some risks.

One of the risks we all seem to take is not educating users in the selection of sensible passwords. Dan Klein (then at the Software Engineering Institute, Carnegie Mellon University, and now vice president of technology development at LoneWolf Systems) did some significant password cracking work back in the winter of 1989. He was given password files from a large number of systems and used exhaustive decryption to see how many passwords he could get. He did rather well. He had a sample of 15,000 accounts and got 25% of them.

It doesn't take a genius to create the methods he used. All you need to do is write a small program that uses the same routine the `login` program uses to interrogate the legitimate password file. You then supply the routine with a large number of different possible passwords, sit back and wait for matches to pop up. Dan used several publicly available word lists and added a bunch of guesses about the types of passwords that people use.

ome people put control characters in their passwords to expand the required character set still further.

At the time, I found Dan's success rate somewhat depressing. The object of choosing a password is to make it hard for someone else to guess using whatever they know about you. The rules for generating sensible passwords have been known for over a decade. They are really not hard to follow.

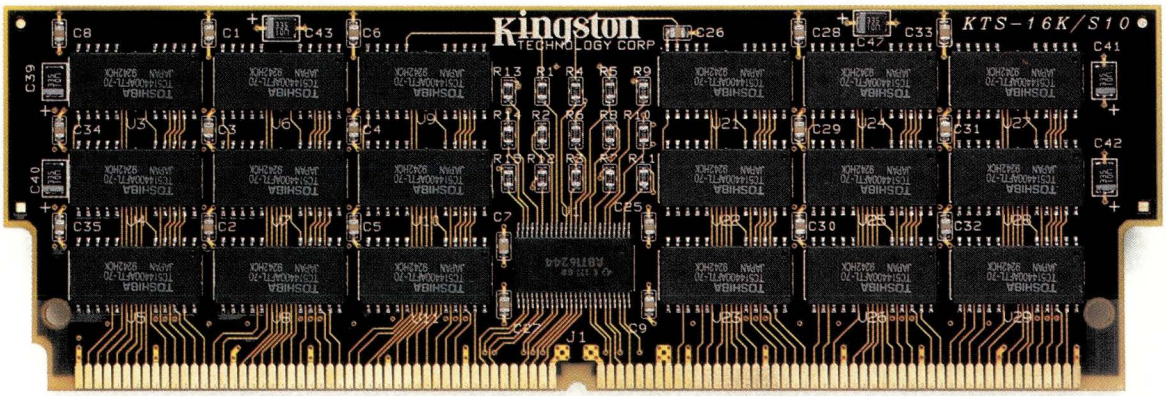
Better Passwords

First, don't use your login name in any form: as is, reversed, doubled, capitalized. About 3% of Dan's successes were the account name of the user. Don't use your own first or last name. On many systems, this is stored in the password file and is readily available to the cracker. Don't use the name of the system you are logging into. Don't use information readily obtainable about you: the names of your spouse, children, dogs, cats, car number plate, room number, etc. About 4% of Dan's hits were proper names.

Don't use a password of all digits, or all the same letter. This reduces the potential character set that the cracker has to use when searching for your password. It's a good idea to include some punctuation characters. Some people put control characters in their passwords to expand the required character set still further. I am a little queasy about this. I have logged in from too many strange environments and worry that I will not be able to get a control character onto the target machine. I don't know whether this is still relevant.

Don't use a word contained in dictionaries, spelling lists or other lists of words–this boils down to "don't use a word." A little over 7% of Dan's successes were readily available in `/usr/dict/words`.

Don't use a password of less than seven characters. The password encryption code only uses the first eight characters of whatever you type. You can use passwords that are longer than this and extra characters will be ignored. Using longer passwords means that any cracking program has a harder job.



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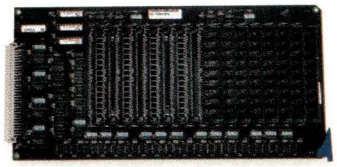

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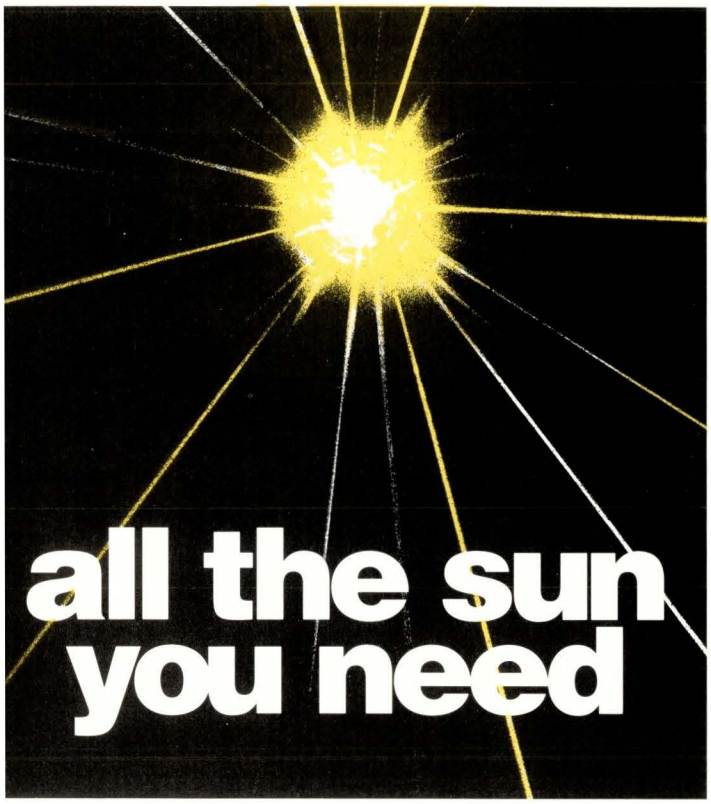

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The SunOS `passwd` program objects to passwords that are shorter than five characters. If you insist by repeatedly typing it in, it will grudgingly accept it. The program will also complain if you simply enter digits. It doesn't complain if you just enter lower-case letters. The Solaris `passwd` program accepts anything you give it.

You should use a password that is easy to remember. You should never write it down. Use a password with mixed-case alphabetics and with nonalpha characters–digits or punctuation. Make sure you can type the password quickly. This makes it harder for people to guess your password if they watch you type it. I sometimes have a couple of repeated characters in my password; this is often hard to spot when watching someone type a sequence reasonably quickly.

The best passwords are nonsense, but random nonsense can be hard to remember. One way round this is to take a phrase like, "Random rubbish is hard to remember" and create a password from its initial letters `Rrihtr`. It's a good idea to capitalize some of the internal letters rather than (or in addition to) the first. Perhaps `RriHtr` would be better. If you must use a word or full name, then complicate it by adding punctuation characters: `zaphod` is in most crackers' dictionaries by now, but it will be hard to find `zap*ho;d`.

Some people advocate using the relationships between numbers, words and symbols: `2b|not2b` is "to be or not to be." Again, I'll guess that this is in most crackers' dictionaries by now. So pick up the idea and generate your own variations.

Another idea is to choose two short words at random and join them with some punctuation: `losT+Pig`, `fRog_sTar` or whatever. Beware of making this too simple; some password cracking programs can pick likely words from a dictionary and test combinations with different punctuation characters.

Changing Passwords

If you have accounts on several machines, it's a good idea to have different passwords on each one. If your account is breached on a machine, then at least the intruder is kept there and cannot trample on every system to which you have access rights.

This is very probably unrealistic. It's hard to remember several different passwords. You could use an algorithm to generate a set of passwords, perhaps using the initial letter of the system along with a constant stem. This is probably a weak idea. If you don't do it carefully, someone might guess your password to another system. I tend to have wildly different sets of passwords for machines on different sites but use the same password on a set of related machines. I will think hard about the password and try to create a good one. I rely on that to prevent access to any machine in a group.

Some UNIX systems implement password aging. The notion is that you force users to change their passwords regularly by timing out the current one after some period. I am convinced this is a bad idea.

There comes the moment when you log in and the system says, "You must change your password now." You have no

time to consider a sensible password that follows the rules. You just pick something and sling it in. Some systems will tell you that your password is about to die some days in advance of the actual event. I am suspicious that these messages just get lost in the mess of output when you log in, and you still end up setting your password to something fairly useless.

If the aging system does not store all the passwords that you have ever used, then you can just flip between two passwords. This is possibly an improvement on just keeping one password working on the machine forever, but I am not sure it's a huge improvement.

Alternatively, if the system stores all the passwords that you have ever used, then you end up running out of memorable ones. After some point, you are forced into generating a password using some algorithm, perhaps some constant stem, `fred1`, and cycling the last character, making `fred2`, `fred3` and so on. Incidentally, Dan discovered that the most used password in his sample is `fred`; the second is a tie between `password` and `passwd`; the third is `random`. I digress.

It seems a good idea to change passwords regularly. It doesn't seem a good idea to force this on people. Password aging systems are enthusiastically stupid, and I believe that they may result in worse security.

You should always change your password if there is the slightest suspicion that system security has been breached. But wait a little until you are sure that the cracker has not installed something that is looking at what you type.

Shadow Password Files

Well, I hear you say. All this stuff is well and good for those older UNIX systems that stored encrypted passwords in the `/etc/passwd` file. My system doesn't do that. It uses a "shadow" password file. I'm safe and can just use any old password.

The notion of the "shadow" password file is simple. Only three or four programs on the system need to validate your password. These programs are all setuid to the superuser. We move the actual encrypted password out of `/etc/passwd` and into another file (Solaris uses `/etc/shadow`). We make this file readable only to the superuser, and doctor the validation code. Now, mortals cannot easily get hold of the encrypted passwords and cannot run password crackers on them.

Shadow password files emit this warm glow of self-confident security. They stop the curious user on your system from finding your password idly one afternoon. But they don't stop the determined system cracker who has found that new way to become superuser on your system. They make it harder to get hold of the data to perform exhaustive decryption; they don't stop it happening. Having shadow passwords on your system should not make you relax the rules. It's still important to choose good passwords.

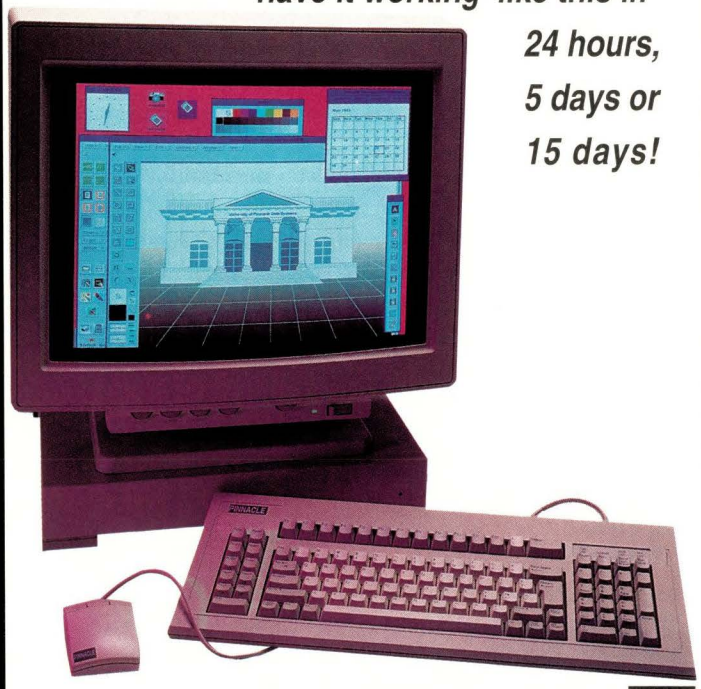
Accounts

Having rambled on at some length about the need to generate good passwords, it seems sensible to add some words about good system practice in managing accounts.

When your Sun crashes
or
When your screen goes...

...call PDS at (614) 487-1150 and we'll have it working like this in

24 hours,
5 days or
15 days!



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Circle No. 23 on Inquiry Card

First, every account should have a password. This is fairly easy to check for. It's a simple `awk` script that looks at `/etc/passwd` or `/etc/shadow`. The accounts in the machine that exist to provide "dummy" users (`bin`, `sys`, `daemon`, etc.) should have a password or have the password field hand-edited to star "*"–nothing encrypts to this. You may find that the shadow password file will have `NP` set for accounts like this. When you get a new system in the door, check that the passwords of these users are set. The password file will tend to come preloaded with these names, and some vendors just ship empty entries. It can be nasty if the superuser account has no password and you have not spotted this.

void having accounts with names like 'guest' or 'visitor' with easily guessed passwords. System busters will home in on these accounts first.

Second, users must be discouraged from giving their passwords to others. This is sometimes done to allow access to a file. It seems simpler than setting up the correct access permissions to permit "legal" access. Copy the file to `/tmp` or some other public area rather than give out your password. If you give your password to another, then you risk your own security. Your friend might write the password down or remark on it to someone else.

Also, you don't really want other people logging in as you. One of the ways of detecting that your account has been compromised is the "Last login at" message. It tells you when and where you logged in last. You should get used to the idea that this reflects your last action on the machine. Then the day it doesn't is the day after your account was cracked.

You should avoid having accounts on the machine that map into commands (`who` or `lpq` are favorites here) unless you are happy that the command in question has no back doors. I was at a site recently that had a `kermit` login with no password–"It's safe because it changes into a public directory." I pointed out that the `kermit` command has an "escape to local shell" option–and using it, I could access the whole system. There is a way around this using `chroot`, and I implemented this quickly. Luckily, FTP daemons refuse to do business for accounts with no passwords. Otherwise this account would have been an easy way for a remote user to copy files.

You should avoid having accounts with names like "guest" or "visitor" with easily guessed passwords. System busters will home in on these accounts first. If they get in by guesswork, then their presence is likely to be undetected or regarded as innocuous. Everyone who is put onto the machine should be given their real identity.

In the same vein, you should avoid having accounts that are used by several people. It's tempting to set up an account that maps onto a project where several people are to share files. The correct way to deal with this is to set up a new group using the `/etc/group` file and then place all the people in the group. The project members can then create directories and files whose access is controlled by the group access permissions.

Finally

The routine that does the encryption of passwords was designed to be slow to discourage exhaustive decryption. Our ability to generate faster and faster processors may mean that the days of password access are numbered. Here's a snippet from the net.

"Roch Bourbonnais, a Thinking Machines Corp. engineer, has ported and optimized the CM/2 port of the UFC-crypt to a CM/5 system. The UFC-crypt (Ultra Fast Crypt) implementation on the CM/2 Connection Machine (parallel computer) is a UNIX password checking routine (`crypt()`) ported by Michael Glad at UNI-C.

"The port, which is written in CM-fortran, utilizes the CM/5 vector units and is partly programmed in `cdpeac` (vector unit assembly language). The package achieves 1,560 encryptions/second/vector unit. This scales to 6.4 million encryptions per second on a large 1,024-node machine or 800,000 encryptions per second on a small 128-node machine.

"With this impressive performance, all combinations of six letters can be tried in less than an hour and all combinations of six lower-case letters can be tried in less than one minute.

"Congratulations to Jorgen Bo Madsen, Danish Computing Centre for Research and Education."

Further Reading

If you are interested in Dan Klein's paper, you can find the original in the *Proceedings of the UKUUG* summer 1990 conference in London. It was reprinted in the *Proceedings of the Second Usenix Workshop on UNIX Security.* The conference was held in Portland, OR, in August 1990.

You can also find some of Dan's conclusions along with a wealth of other information in the excellent book *UNIX System Security* by David A. Curry, published by Addison-Wesley Publishing Co. (ISBN 0-201-56327-4).

Alternatively–or perhaps in addition–don't miss *Practical UNIX Security* by Simson Garfinkel and Gene Spafford. This is published by O'Reilly & Associates Inc. It's one of the few books from the house of O'Reilly with no animal on the front cover. It has a safe. I am reliably informed that the animal is in the safe, and yes, there are tiny airholes to permit it to breathe. ⊸

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

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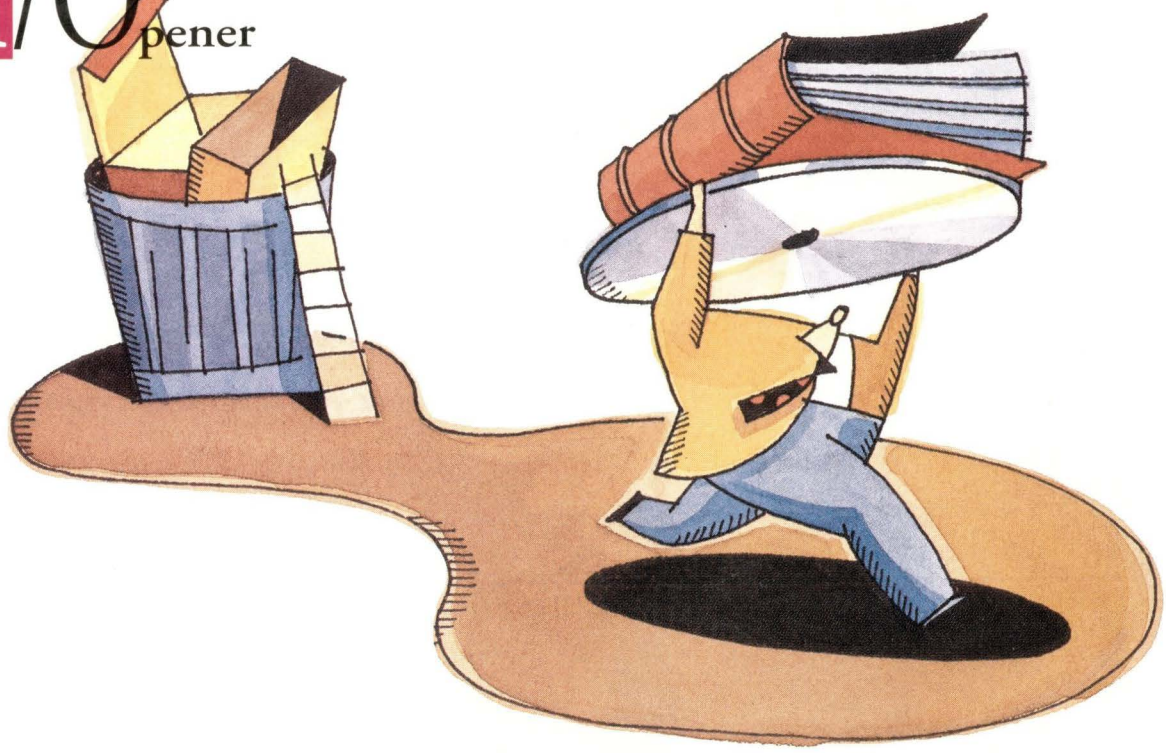

ROBIN JAREAUX

Mixed-Media Publishing

by **RICHARD MORIN**,
Technical Editor

I wasn't planning to become a mixed-media publisher. I was just going to make up CD-ROMs containing UNIX-related freeware. I would sell them by mail order, through UNIX VARs and computer stores, and so forth.

Following a helpful suggestion by my spouse, however, I started thinking about attaching some sort of printed material. An associated booklet could contain quite a bit of useful material: introduction, usage notes, indexes, like that. Always nice to add value; makes the customers happy and loyal.

It could also serve to introduce prospects to the contents of the disk(s). Looking at a shrink-wrapped jewel box, it's frustrating to wonder whether the enclosed disk is worth the asking price. A nicely printed booklet would go a long way toward solving this dilemma.

In the end, it turned out that none of these reasons were the important ones. It seems that UNIX VARs, in general, weren't all that interested in freeware and certainly had no time for products that sell for well under $100. Computer stores, even big ones, had very little interest in UNIX-related products. So, my expected marketing channels were not available.

Serendipitously, it turned out that some adventurous professional and technical bookstores *were* willing to sell my product. It looked a bit like a book to them, and they had no real problem with my addition of a CD-ROM. Seizing the opportunity, I obtained a string of ISBNs, courted the appropriate bookstores assiduously, and worked to make my product fit well into their idea of a proper book.

Other Publishers

Somewhat later, O'Reilly and Associates introduced their opus, *UNIX Power Tools*. Great book, and the attached CD-ROM just makes it better. Also useful to me, as it helped convince bookstores that mixed-media UNIX books are "legit." O'Reilly has now published a second mixed-media product, *X Window System Administrator's Guide*, and I'm sure others will follow.

More to the point, other publishers are getting involved. In the past two weeks, I have spoken with two major publishers of UNIX-related books. Both are planning to introduce books with CD-ROMs, and both wanted my assistance and cooperation. What they have gotten, so far, is some helpful advice, which I will now give to one and all.

The Freeware Market

The freeware market isn't well-suited to large publishers. For one thing, freeware users expect and demand really current material. A book that is a year old is just getting started; a year-old

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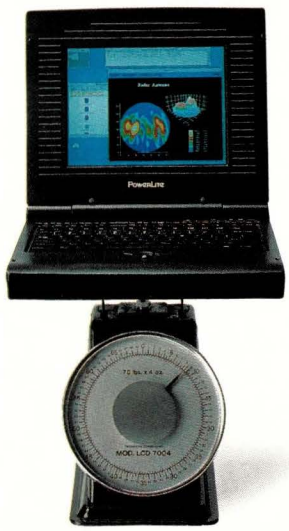

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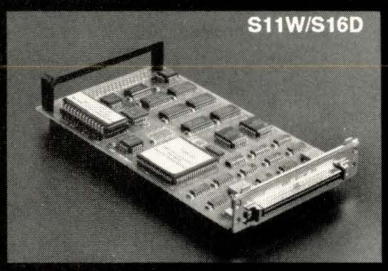

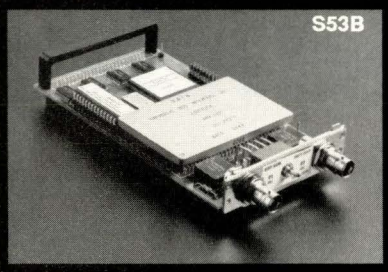

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freeware collection is, in general, history. Normal publishing schedules and arrangements simply don't work very well in this market.

Worse, there are dozens of hungry, garage-based entrepreneurs out there. These folks work late into the night, meeting the constant product turnover that the customers demand. They accept, and sometimes exacerbate, the market's razor-thin margins. They may not all make money at it, but they define the shape of the current freeware marketplace, and conventional publishers need to be aware of their presence.

There is also the question of added value. It is easy to add value to freeware distributions, but difficult to retain much proprietary advantage. A publisher can enhance the freeware, only to have competing publishers grab the changes and run with them. Rules of the game...

A publisher can certainly add value in the book itself, but there has to be balance and connection between the book and the disk. This isn't impossible, but it *is* tricky: How do you balance a megabyte or less of book text against 600+ megabytes (much more, if compressed) of CD-ROM materials? If the book doesn't work well with the disk, the product's synergy will be reduced, and much of its competitive advantage will be lost.

Finally, freeware publishers need to be concerned with issues of support. A collection of compressed archives off the Internet doesn't require much support. If the packages are clean, current and easy to find and retrieve, most customers will be happy. Nonetheless, there will always be some problems, and publishers have to be able to field questions quickly, before irate customers get on the net and start flaming about "shovelware."

If the product is intended as a "plug and play" distribution, these problems are magnified immensely. Any conventional software distributor knows about the problems of engineering and supporting mass-market product releases. It's hard to get everything right, and customers are *very* demanding about things working as promised, expected or even desired.

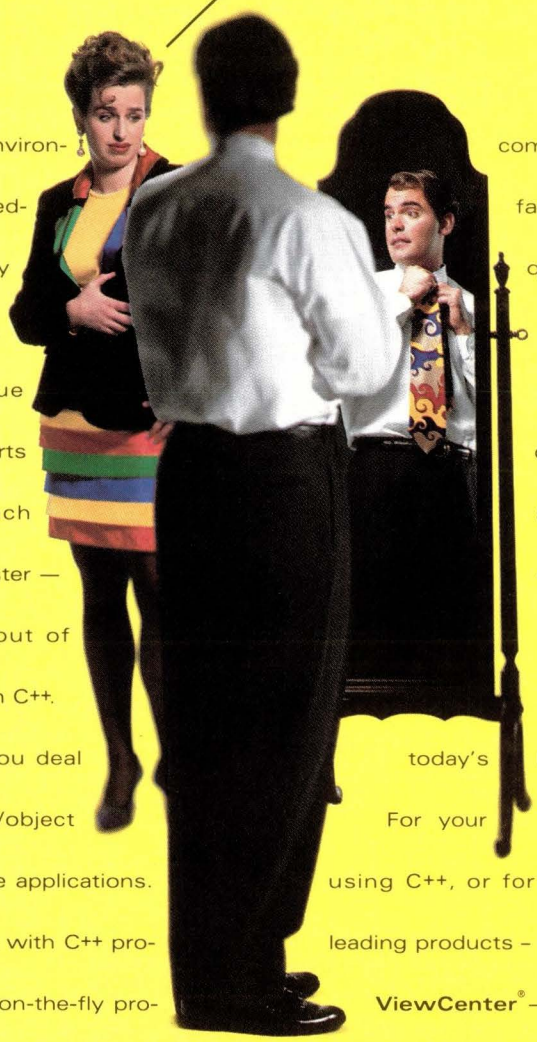
Making matters worse, the engineering staff in the freeware arena isn't even vaguely under the publisher's control. New releases appear on the net at random intervals, in random states of completion. The software is generally not well engineered for binary distribution. Installation paths, for instance, are commonly hard-coded into Makefiles or even into the source code itself.

Thus, mixed-media freeware publishers face the same problems encountered by conventional software publishers, and more. Lacking proprietary control of their basic product, they can't raise margins high enough to pay for extensive development. They don't control the freeware's development schedule or even its direction. (The good news is that I'm going to paint your house for free. The bad news is that you don't get to pick the colors, and I may stop work in the middle if I get bored.)

Nonetheless, it's a fun business to be in, and I wouldn't change the rules even if I could. I've dallied with the proprietary software market, and I like this one a lot better. And nobody is

How do you balance a megabyte or less of book text against 600+ megabytes (much more if compressed) of CD-ROM materials?

"THAT TIE'S HIDEOUS."



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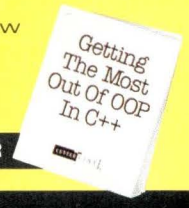

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Circle No. 7 on Inquiry Card

forced into a particular market, in any case, so complaining about the ground rules seems a little off the mark.

In closing this section, I should note that mixed-media publishing may be an appropriate way to sell low-end proprietary software packages. These are typically packaged as a disk, a manual and a fancy shrink-wrapped box. Punt the box, stuff the disk into the manual, and you have a mixed-media publication.

The price has to be low enough, of course, to fit in with bookstores' normal stock. Anything over $75 is probably going to raise some eyebrows, and anything over $100 is quite unlikely to be accepted for resale. Nonetheless, I think the concept makes sense, and that we'll be seeing a lot more of it in the next few years.

Electronic Anthologies

But, having discouraged (or at least cautioned) the publishers about their intended product, what can I offer them in its place? Ideally, such a product should draw upon the publisher's strengths: licensing, marketing, distribution channels, and, in general, MONEY. Is there a CD-ROM-based product that they can and should produce, allowing them to dominate or even ignore the garage-based entrepreneurs?

I think there is, and I would very much like to see publishers get started on it. First, however, a bit of background may be in order. Books are expensive to produce, inventory, distribute and sell. Academic, professional and technical books are worse than most. They are demanding to create and frequently have very small markets. Consequently, prices tend to be high.

Meanwhile, the traditional markets for these books are drying up. Schools and libraries are strapped for cash, and expensive books are a luxury they can't afford. Many companies are in a similar state, and their employees are feeling a bit frugal, as well. College professors, never particularly well-paid, are now finding themselves unable to follow the published literature.

The problem isn't distributed evenly across all books. Reference works on popular topics (C programming, UNIX programming, etc.) have a fairly assured audience. Works on more esoteric subjects (*Proceedings of the Second International Colloquium on Acroamatic Interactions*) are more likely to languish.

So, here is my suggestion: Publishers should examine their backlists for books that can be collected into CD-ROM-based anthologies. The disks should support on-line searching and browsing, high-quality printing of selected pages, and so forth. Hypertext and other flashy amenities are nice, but optional.

If I could buy a few hundred interesting books on a single CD-ROM, for under $100, I'd think about it very hard. So would many libraries, schools and companies. And, amazingly, the publishers wouldn't lose a thing.

Most purchasers would use their disks to do automated searches, browse the literature, etc. Having found a book of interest, they might print out a few selected pages. Few, however, would want to read the entire thing on-line, let alone print it out on their laser printer. Instead, they would send off for a book they now knew to be well worth the money. Thus, I believe that publishers would find that CD-ROM anthologies actually *increased* their sales of backlisted titles.

Unlike many of my wacko enthusiasms, I'm pretty sure that this concept will actually go somewhere. The only questions have to do with timing, pricing and selection of materials. If you are a publisher, feel free to call on me for (more) advice. If you are an interested consumer, bug your favorite publishers to get started... ⊸

Richard Morin operates Prime Time Freeware (ptf@cfcl.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 rdm@cfcl.com.

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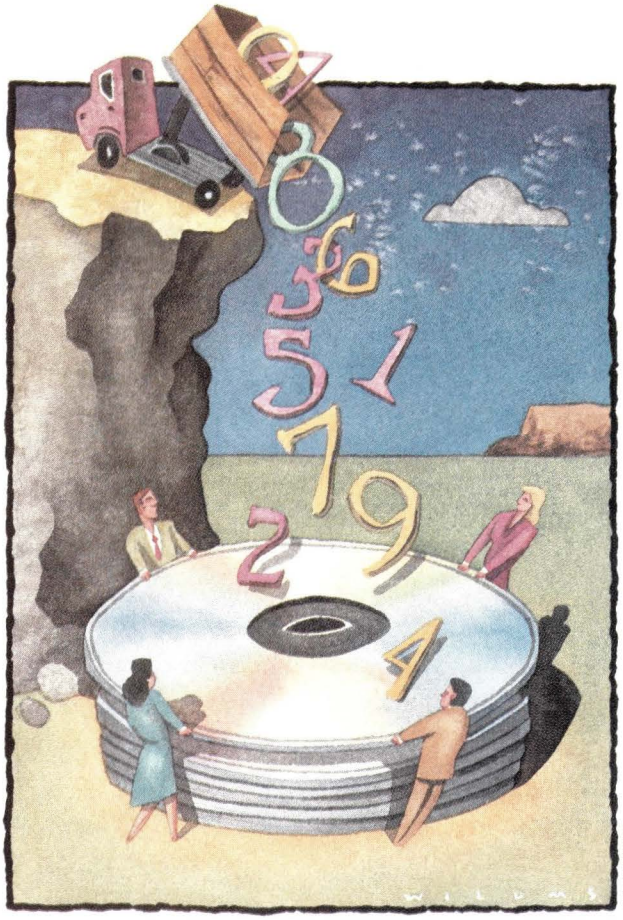

Backing Up to Disk

by S. LEE HENRY

There is no startling technology involved in backing your file systems to disk. If you've got the disk real estate, it's a practically trouble-free way to protect your users' files.

Although the `dump` command is almost exclusively used to back up file systems to tape, dumping to a file instead is straightforward. Replacing the name of the tape device with a file name is all that is required, with only minor caveats. For one, the file must exist before you try to dump to it. When I back up to disk, I use a script that touches the file first to ensure that it's there. If the file does already exist, the touch simply updates the access date and time, so there are no side effects. If the file doesn't exist, you'll get a "Cannot open volume" error from `dump`.

You must also provide parameters to the `dump` command that make it think that the whole file system will fit on one "virtual" tape; the `dump` command thinks it's working with a tape even though you're clearly creating a disk file. If you get a "Tape verification error XX feet into tape 1," you will know that you need to use a larger size parameter on your `dump` command.

Dumps to disk, like any `dump` commands, can use remote resources as easily as local resources, provided the host with the disk "trusts" the host with the file system. This is easy to check by running any `rsh` command (like `rsh boson date` where boson is the remote host). To dump to a remote disk, use a command like this:

```
fermion# dump 5usf 2000
boson:/backups/fermion.dump.home /export/home
```

In this command, the size parameter indicates your virtual tape is 2,000 feet long. Look for a line that looks like the following in your dump messages:

```
DUMP: estimated 7098 blocks (3.47MB) on .04
tape(s)
```

The dump file that was created with the `dump` command lives in boson's `/backups` file system. It can be used with the

`restore` command to recover a complete file system or selected files. Here's a `restore` command for recovering selected files interactively:

```
fermion# restore ivf
boson:/backups/fermion.dump.home
```

One of the primary advantages of dumping to disk is that when the inevitable oops happens and one of your users needs a directory that he removed in error, you don't have to go sprinting to your tape cabinet. As a matter of fact, you may not even need to be around. Unless your users are particularly OS-phobic, they are likely to find an interactive restore from disk a fairly painless procedure, barely more complicated than perusing their files in their favorite shell. In any case, instructions to issue the `restore` command and use the `cd`, `add` and `extract` commands to pick out files are easy to prepare and to understand.

The primary disadvantage of having your users restore their files is that they can restore files that they don't own. This can be a major security hole. If this is a problem, set up permissions so that only root can restore the files or, if each user has his own file systems, so that only he can read his dumps. This problem with restore permissions, by the way, is not exclusive to disk backups; it also exists with tapes, though tapes are often secured in that file cabinet you may or may not have to sprint to.

If you are backing up your file systems to ensure against disk failure, dumping to a different disk or a remote host is the only reasonable approach. If you're simply guarding against the mistakes that users make, on the other hand, backing up to the same disk provides something of a safety net; however, knowing that you're backing up files, your users may not be overly patient with you if both copies of files get lost when a controller starts garbaging your disk, so this is not the best strategy.

You should also try to run your backups when file systems are not in use. When you are backing up to a remote disk, you clearly cannot be in single-user mode. However, unless your site runs around the clock, you can easily schedule your dumps to occur at times when your users are likely to be home asleep.

Backing up selected files and directories with the `find` and `tar` commands is also a flexible approach to protecting volatile files.

If you're managing more than one type of UNIX system, you may still be able to set up a single dump host that they all use. Dumps from an SGI, for example, may not be readable on a Sun because of byte-ordering differences, but they can be written and subsequently read from the SGI. Dumps from 4.1.x and Solaris systems are in the same format, though the commands used to dump and restore are different. Sample scripts to dump file systems from a SunOS 4.1.x and an SGI (running IRIX 4.0) are provided in Figures 1 and 2.

Using find and tar

Backing up selected files and directories with the `find` and `tar` commands is also a flexible approach to protecting volatile files while allowing fairly troublefree (i.e., not requiring wizardly intervention) recovery. Like `dump`, `tar` can write files to disk as well as to tape. If the command is modified to dump the files to a remote host, the syntax is less

Figure 1. Dump to Remote Host (SunOS 4.1.x)

```
#!/bin/csh
#
#       incr2remote:  dump each local partition to remote disk
#
set HOST = `hostname`
set REMOTE = "boson"
set DATE = `date | awk '{print $1}'`
#
foreach local_part (`df | /usr/bin/grep "/dev" | /usr/bin/awk '{print $6}'`)
        /usr/bin/echo dumping $local_part
        set PNAME = `echo $local_part | tr "/" "."`
        if ($PNAME == ".") then
                set PNAME = ".root"
        endif
        rsh $REMOTE "touch /backups/$HOST$PNAME.$DATE"
        /usr/etc/dump 5uf $REMOTE:/backups/$HOST$PNAME.$DATE $local_part
end
```

```
#!/bin/csh
#
#       incr2remote:  dump each local partition to boson's hard disk
#
set HOST = `hostname`
set REMOTE = "boson"
set DATE = `date | awk '{print $1}'`
# foreach local_part (`/bin/df | /bin/grep "/dev" | /usr/bin/awk '{print $7}'`)
        /bin/echo dumping $local_part
        set PNAME = `echo $local_part | tr "/" "."`
        if ($PNAME = = ".") then
                set PNAME = ".root"
        endif
        rsh $REMOTE "touch /backups/$HOST$PNAME.$DATE"
        /usr/etc/dump 5uf $REMOTE:/backups/$HOST$PNAME.$DATE $local_part
end
```

Figure 2. Dump to Remote Host (SGI)

obvious and ought to be built into a script for most users to make it easy. Here's a one-line `tar` command that backs up mail files to a `tar` file on boson:

```
fermion# cd /var/spool
fermion# tar cvpBf - mail | rsh boson "dd
of=/backups/fermion.mail"
```

Depending on permissions, your users can issue commands like this as well to back up their own directories. A more flexible approach to backing up an individual's files is illustrated in the script shown in Figure 3. In this script, we combine a `find` command that prompts the user to enter an integer and then uses `tar` to back up all files modified within that number of days to a `tar` file.

You should modify this script to correspond to your own directory names. As with the `dump` command, the remote host must trust the local one and permission must be set up so that the user can create the backup file on the remote host.

Once the remote `tar` file is created, it can be read back in with a command similar to the one in the script that created

Figure 3. tar2file Script

```
#!/bin/csh
#
#       tar2file
#
set NEWFILES = ""
set DIRNAME = $1
if ("$DIRNAME" = = "") then
        set DIRNAME = `pwd`
endif
echo -n "Backup files modified within how many days?> "
set CTIME = $<
echo -n "Backup to which remote host?> "
set REMOTE = $<
echo $DIRNAME
foreach file (`find $DIRNAME -type f -ctime -$CTIME -print`)
        echo $file
        set NEWFILES="$NEWFILES $file"
end
echo -n "Hit return to back up files (ctrl-C to abort)> "
set ans = $<
tar cvpBf - $NEWFILES | rsh $REMOTE "dd of=/backups/`whoami`.newfiles"
echo "Created backup /backups/`whoami`.newfiles on $REMOTE"
```

it. The command shown below would restore all the files included in the `tar` backup:

```
fermion% rsh boson "dd
if=/backups/fermion.newfiles" | tar xvpBf -
```

Backups to disk are considerably less likely to fail than their tape counterparts simply because disk is a more reliable medium. Tapes wear out much faster than disks and can sometimes snag in tape drives. Other media, like read/write optical, are an even better choice than hard disk (if you have it) since the cost per megabyte is lower for this storage and the nature of backups instills a little patience in just about any user, especially when they're going after files they accidentally obliterated.

You can also compress both `dump` and `tar` files stored on disk and reap something like a 30% savings in space. As long as your scripts or users know to expect this (and decompress the files) and you have enough room to decompress the largest of your backup files in place, you should be OK. Large files, however, will take a while to compress and decompress.

In designing a backup strategy using disk media, you have the same decisions to make as with any dump strategy regarding what level dump to make, how often to dump, and how deep you want to stack your backups before reusing them. You also have to "label" your backups by giving them names that make sense to anyone using them.

You'll also want to make sure that your backup-to-disk strategy complements your backups to tape. Even if you have enough space to do complete and incremental backups to disk or optical, you should be sure to incorporate some method of replication so that you will not run the risk of losing your only backups if a disk, optical drive or controller fails.

If you sometimes forget to change the tapes in your backup drive or maybe sometimes even take days off, dumping to disk may be an appropriate way to guard your file systems without much extra effort. If you'd like to try out the scripts in this column, send me some mail. ⊷

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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BOPS and Beyond!

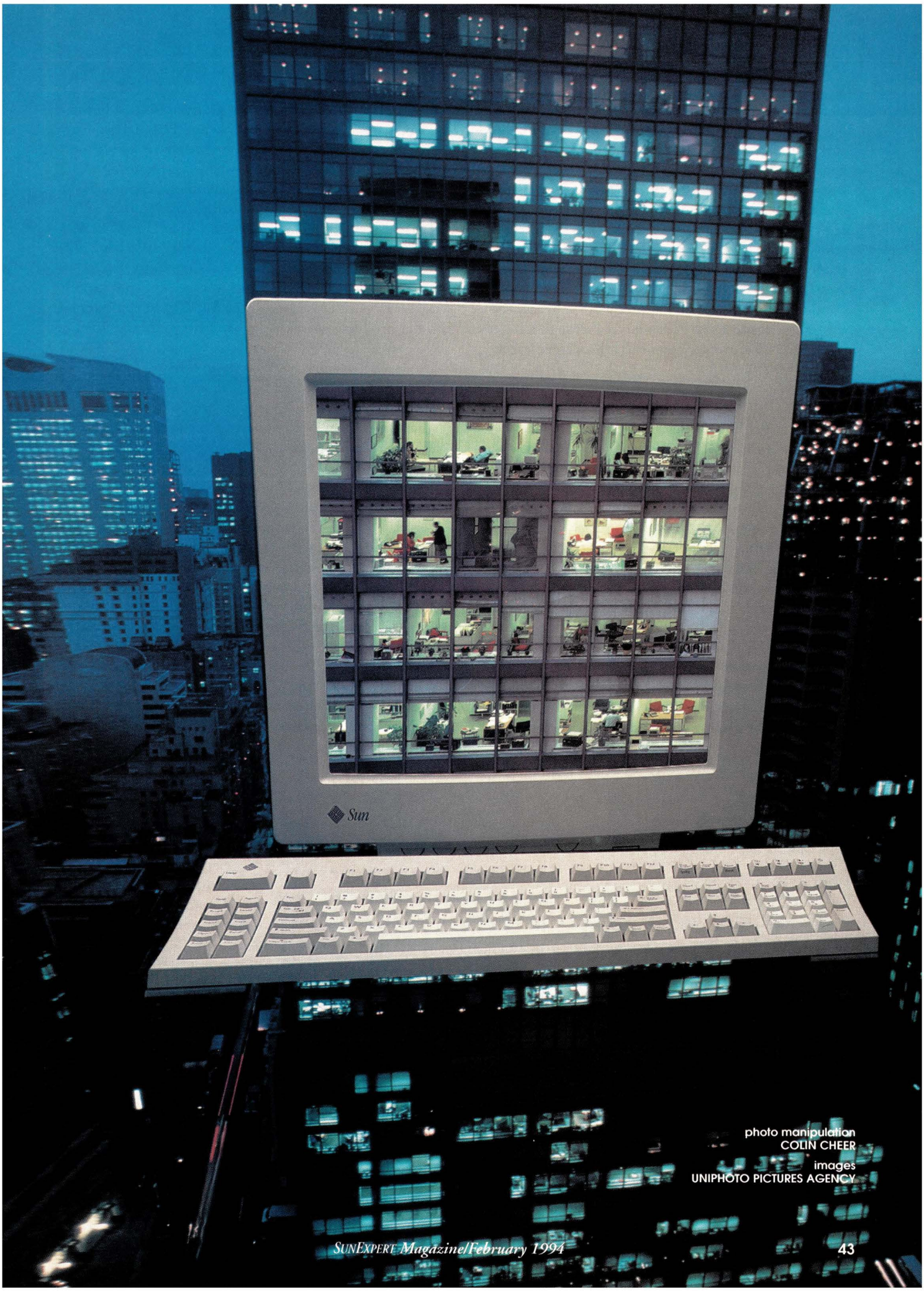
Business Office Productivity Systems have traditionally been the province of DOS, Macs and Windows. Could Sun, and UNIX, yet play a role there?

Are there places where Sun Microsystems Inc. has a front office role? Does UNIX have a part in business office productivity systems, or BOPS (not to be confused with billions of operations per second, also known as BOPS)?

Consider Blue Cross and Blue Shield of Florida. In particular, consider the group within it headed up by Hank Barnett, director of marketing sales administration, Greg Sutton, manager of proposal administration, and Eloise Erwin, publishing technology specialist.

"We have corporate responsibility for subscriber contracts," explains Barnett. "We work with our legal area to get them filed with the state [regulatory agencies], and then we work to turn those contracts into booklets that the subscribers can read." In addition, they also work to prepare bids for prospective customers.

by MICHAEL JAY TUCKER,
Executive Editor



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It is an immense task, involving documents that must be developed, planned, written, edited, approved and generally examined by large numbers of individuals. Many organizations facing such an application would consider a PC LAN-based solution...with all the trials and tribulations such a solution would entail.

But not Blue Cross/Blue Shield. "We have Sun workstations with each of the contract and proposal analysts," says Barnett, "and [XSoft Corp.'s] GlobalView as the centerpiece to drive our application."

Barnett's group is among the few commercial installations where UNIX in general, and Suns in particular, play a role in front office processing. Traditionally, when SPARC-based systems have found a role in commercial settings, it has been in the back office, as a mainframe or minicomputer replacement working for MIS.

The Law of Large Numbers

Blue Cross and Blue Shield of Florida has a particularly demanding application. The company must somehow manage very complex documents within tight parameters of time and cost. It requires, in other words, raw processing power beyond the ability of PCs to deliver. "The UNIX platform, at least in our opinion, has a lot more power," says Barnett. "And that, combined with the GlobalView product, gave us everything we wanted."

This makes it typical of the sort of places where UNIX finds a role in the front office. "Where networking is necessary, where processor power is necessary–that's where front office UNIX is happening," says Douglas Shaker, vice president of training and support at Qualix, which markets a number of front office products that run on Suns.

But what about more traditional front-office automation? What about the spreadsheets, word processors and personal databases that are the mass market, high-volume heart and soul of BOPS? Could Suns get a part of that business?

The answer, bluntly, is probably not. Personal productivity tools are, have been, and probably always will be the domain of DOS, Macintosh systems, and now MS Windows. "It's the law of large numbers," says Michael Goulde, senior consultant at market research firm the Patricia Seybold Group. "There are 40 million Windows seats. Just 2.5% of the Windows installed base is all of the Sun installed base."

He sees no way that any vendor of personal productivity tools can buck those kinds of odds. "If your application is office productivity, you'd have to have your head examined [to go with UNIX]."

And relatively few vendors stay in business long with diagnosed cases of mental instability. Even die-hard UNIX enthusiasts, like Uniplex with its OnGo line of smart document management tools, have come to terms with Windows. "Uniplex has a UNIX legacy and a UNIX mind-set," says Michael Friedel, the company's director of business development. "But, from a commercial perspective and front office perspective, we have to acknowledge that Windows is the prominent desktop."

The worst part of this state of affairs, from UNIX's perspective, is that it didn't have to happen that way. "A couple of years ago, we thought UNIX on the desktop had a serious shot at winning corporate America," says Peter Harris, chief executive officer of Bristol Technologies Inc., which offers a series of both server and client products. But, then the UNIX community wasted valuable time in standards fights. "And Windows got good...and Windows networking got better."

Adds Uniplex's Friedel, "A year ago, we had great hopes that Novell's buyout of UNIX System Labs would bring the marketing muscle to allow UNIX some success on the desktop, but now it looks like there's still internal struggle. Looked at from an MIS perspective, you'd have to say that UNIX still hasn't got its act together, even with COSE in place."

On the other hand, UNIX continues to hold tight to its role as server OS in commercial environments. "UNIX is ideally suited for back office services," says Uniplex's Friedel. And, at the moment, there are no real rivals for the role. "Maybe NT," says Bristol's Harris, "but certainly not OS/2."

As such, most of the industry is betting that where UNIX has an OA role, it will be in association

That's Still Entertainment

If it seems improbable that Suns should have a role in office automation, consider how much more unlikely a pairing is workstations and entertainment.

Yet, for Dux Software Corp., that's a marriage made in heaven. The company originally came about to provide personal productivity tools for Sun and other workstations. It still does quite a lot of business in that area. "We have a product called Ta-Dah!," says Dux President Bob Adams. "It is a business presentation package."

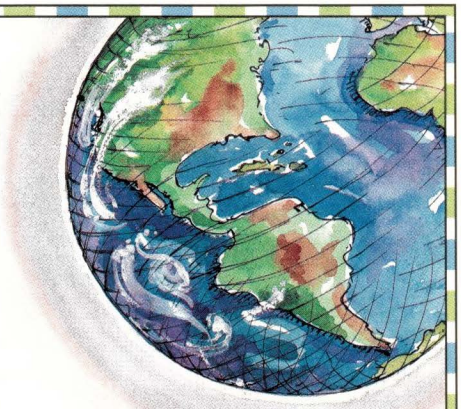
But Dux is also in the games business. It recently began marketing a Sun version of the famed personal computer game Sim City.

That could seem a strange product. Suns aren't home computers, after all. They are workplace systems. It would seem that business managers would take a dim view of their employees knocking off work for a while to play games at company expense.

Yet, Sim City for Suns has been selling quite well, thank you very much. "I think that entertainment will become very important by the end of the decade, even in the workplace," says Adams. "Even the government is getting more lenient about letting games into their offices."

Why? It seems that companies are beginning to relearn what many cultures never forgot–i.e., workers are more productive if they take short rests now and then.

Guess Who's Got The World's Most Popular TCP/IP Network Software For PCs?



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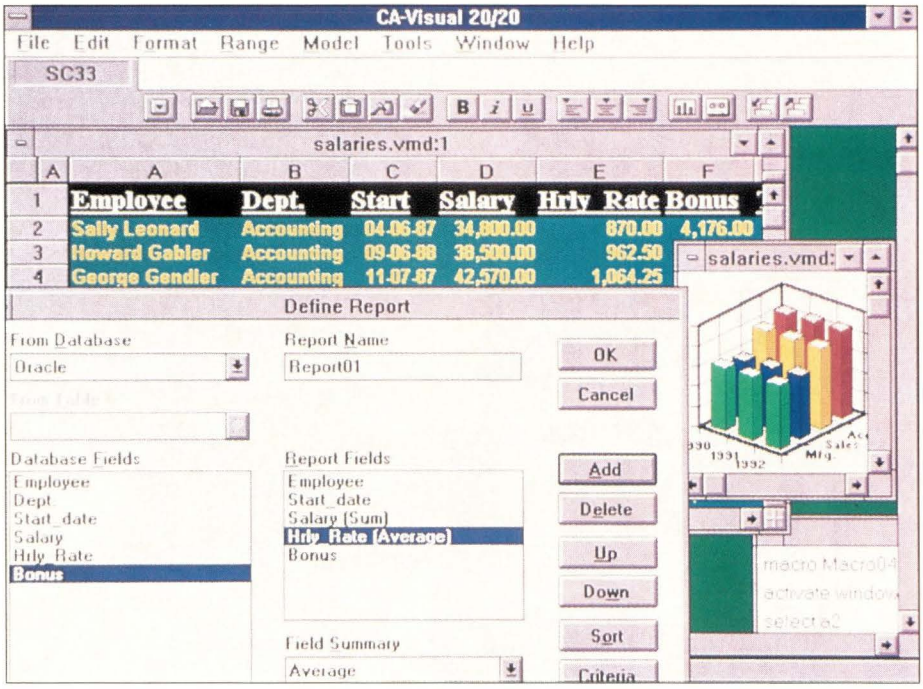


Spreadsheets, such as Visual 20/20 from Computer Associates, are widely available for Sun workstations. Spreadsheets would seem to be a PC product exclusively, but they have been on UNIX since their earliest days.

with some Windows application. "The real advantage is in a hybrid," says Chip Drapeau, vice president of Project Software and Development Inc., which offers a variety of scheduling, calendar and project management tools for UNIX, MS-Windows and even mainframe systems. "You use PC tools, then store the data on the Sun, and then, when you have to do some particularly demanding analysis, use specialized tools on the Sun itself."

Sorry Charlie

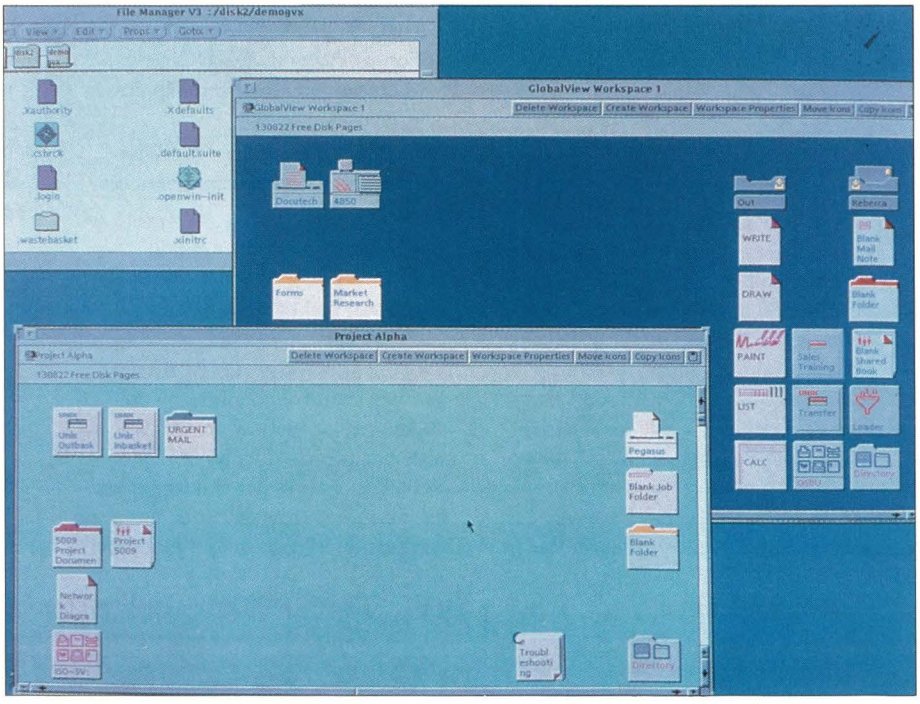
Even so, a number of companies continue to offer productivity tools on Suns–including DOS giants like Lotus Development Corp. and WordPerfect Corp.

Why, given what would seem to be any number of good reasons not to play in the Sun market, do vendors still offer OA product on Suns? The answer to that seems to vary from company to company. Among companies that have already made their place in DOS, for instance, marketing seems to be the chief motive. "What I heard from the PC software people is that their major accounts are making corporatewide buys," explains Nina Lytton, editor of the *Open Systems Advisor* newsletter. "They want to have their applications run on all the machines they have."

In other words, companies now routinely run heterogeneous networks–DOS and Windows will be in the commercial side of the house, but they'll also have Sun systems in design and engineering departments. In an attempt to maintain some degree of compatibility across all those devices, the companies may decree that no OA software can be purchased for any one type of their machines unless it runs on all of them. "UNIX may be only 5% of the installation," says Lytton, "but if you don't have it, you don't have the business. They say, 'Sorry Charlie, we want them all.'"

Thus, for example, when Lotus ported its Ami Pro word processor to UNIX, it didn't do so in expectations of volume sales into Sun-specific sites. "The driving force that caused us to bring our products to UNIX was solely the market," explains Joyce Reynolds, product manager for Ami Pro on UNIX at Lotus' Word Processing Division. "We have a number of key customers who wanted us to have native UNIX implementations. They had a number of different environments and, for

Document management is one of the places where UNIX has found a role in the front office. Products like GlobalView, from XSoft, allow organizations to cooperate on large documents that may be critical to business survival.



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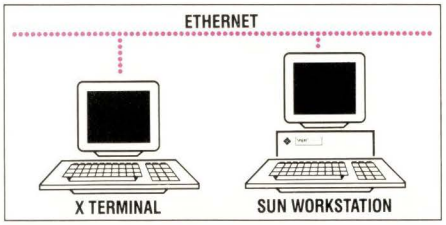

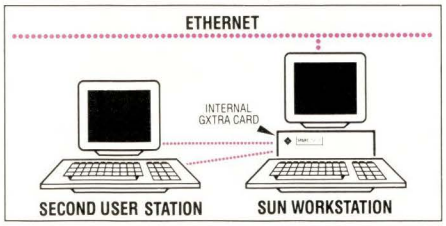

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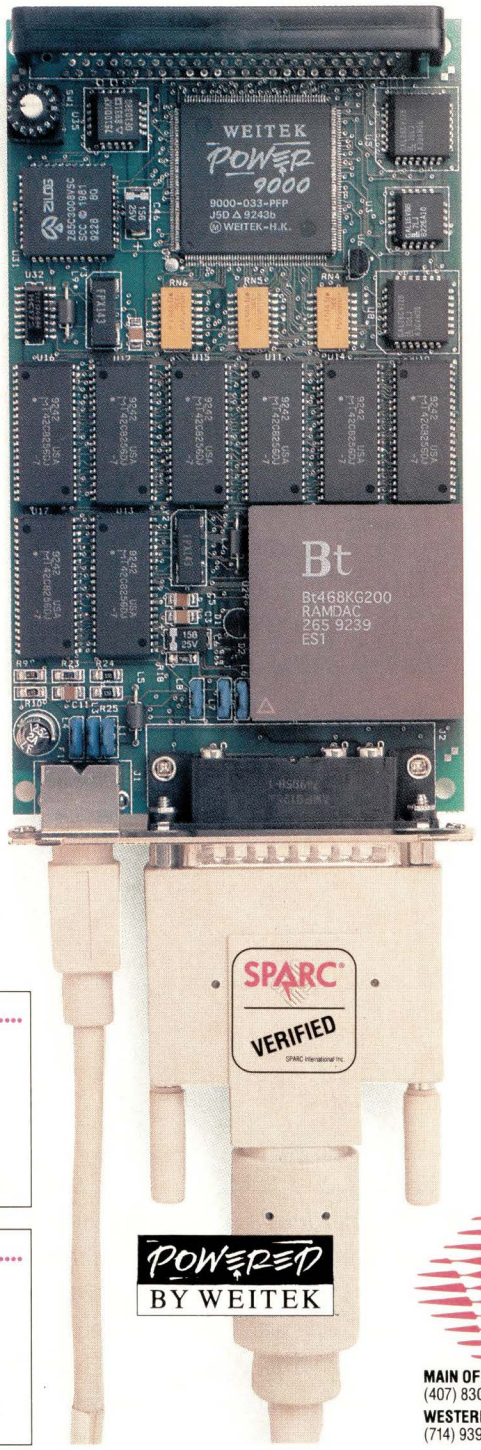

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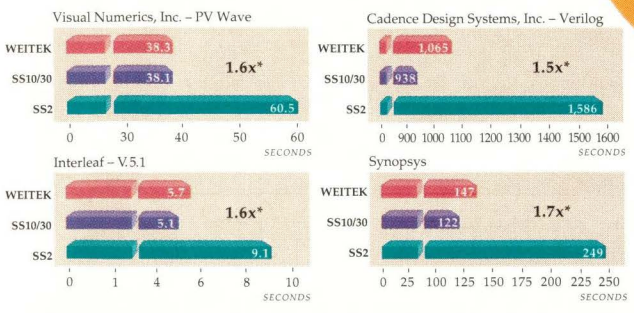

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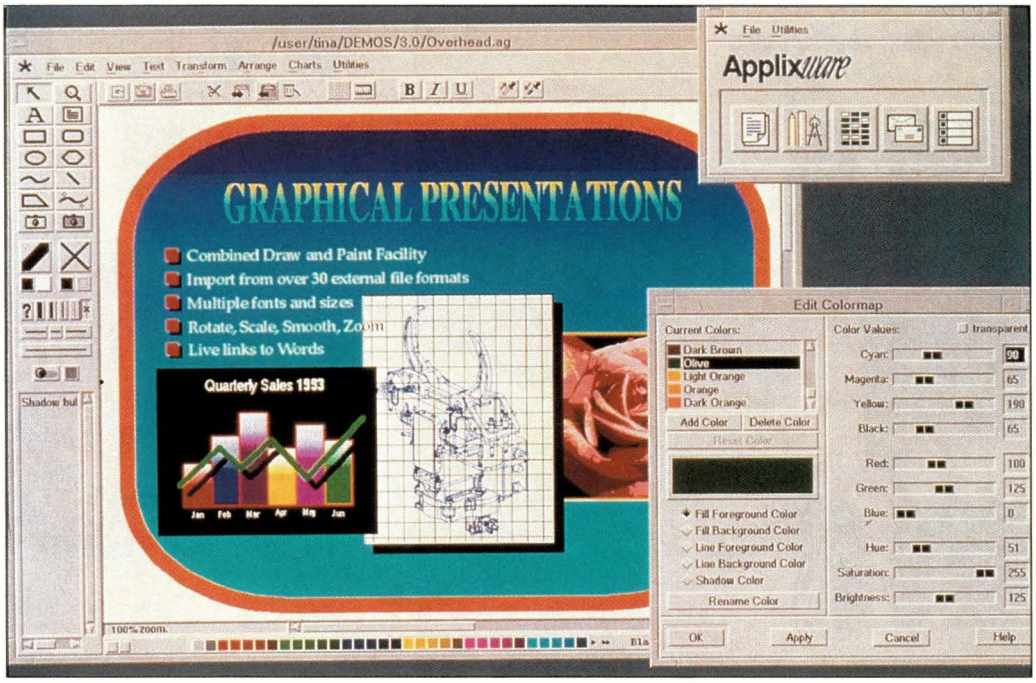


Applixware, from Applix, allows organizations to combine desktop analysis with corporate data. Increasingly, MIS wants to be able to link personal productivity tools with centralized databases.

sharing files and cutting costs, they wanted to have their workstations run Ami Pro as well as their PCs."

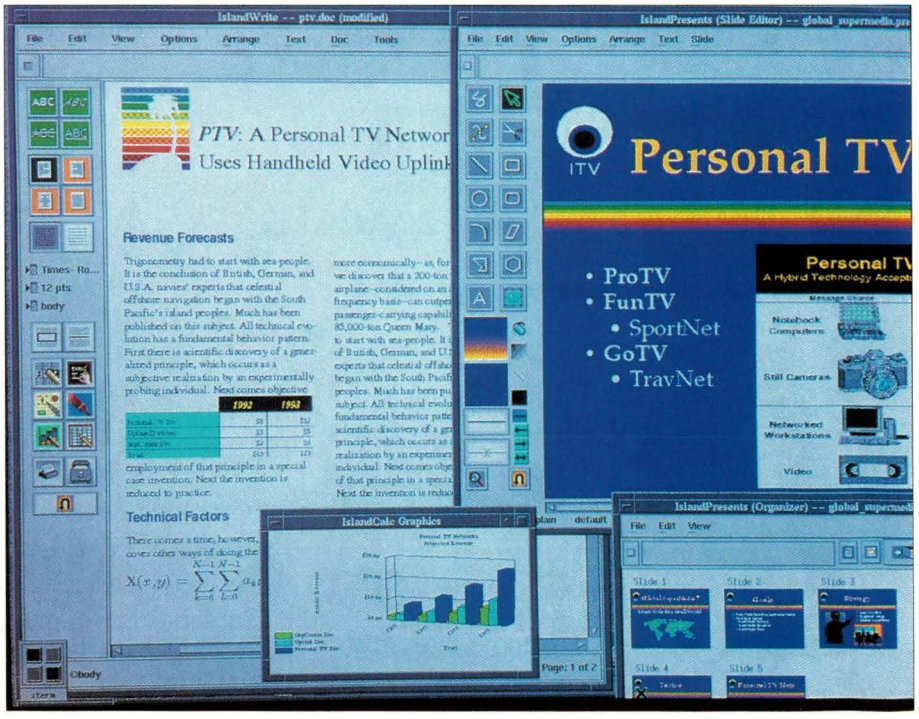
But that's not to say that these tools aren't being used. Just because Ami Pro got onto UNIX as part of a larger, networkwide buy doesn't mean that the workstation user won't ever touch it. "Everyone," says Reynolds, "has to write a memo occasionally."

In fact, there seems to be a real, if limited, market among workstations for personal productivity tools as useful afterthoughts. Engineers, scientists and other technical computer users will almost certainly regard their workstation as a platform for one or two specific technical functions–CAD/CAM, perhaps, or software development. But then, they also put OA tools on them to assist with the nontechnical aspects of their jobs. "Not everyone works at [Scott Adams' comic strip character] Dilbert's company," jokes the Seybold Group's Goulde. "Most engineers are expected to be productive employees."

They're also expected to be employees who use products that don't cost an arm and a leg–something that hasn't always been easy in UNIX. The lack of low-priced OA products has meant that users have sometimes had to jury-rig expensive alternatives. "We've seen people using sophisticated publishing packages as memo writers," says Lotus' Reynolds, "simply because there was nothing else to use. People are now turning to tools that are more suited for their needs."

Thus it is that there is an increasing number of players in the UNIX OA market. Companies like Lotus, WordPerfect and Ashton-Tate either have or will port their product to Suns. Other firms, such as Dux Software Corp. and Island Graphics Corp., have come into being expressly to provide UNIX word processors, paint programs, charting programs and so on. "People talk about the lack of software in the UNIX market," says Steve Unger, manager of office applications for Xerox division XSoft. "But I

SunExpert editors use Island Graphics' word processor and table and charting programs, which are now being offered as a bundled package containing IslandWrite, Draw and Paint; IslandPresents; and IslandCalc. So to some degree SunExpert practices what it preaches.



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don't think they realize the extent of the UNIX offerings available to them.

Deep Integration

But just as you start thinking that everything about how UNIX and Sun show up in the front offices is simple–i.e., that the only people who use either are engineers trying to reproduce a PC on their workstations–things start to become complex. Other kinds of customers are showing up as well.

For example, people forget that OA on UNIX isn't new. In fact, in the early 1980s, UNIX was a minicomputer operating system, and it participated in the minicomputer and multiuser microcomputer boom of the same period. Along with the likes of Theos and Pick, and on platforms as diverse as NCR Corp. Towers and Altos multiuser systems, UNIX was a player in front office automation for several years.

In fact, it still is. ICL Inc., for example, has long provided OA to legal offices through its SPARC-based systems.

Yet, in the confusion attendant upon the PC's colonization of the business desktop, and as UNIX became increasingly (indeed, excessively) identified with the workstation, the industry lost sight of UNIX's OA origins. But, now, as MIS shops downsize, those origins are beginning to re-emerge.

"What you had in the minicomputer market was people with VAXes, Data General systems, Wangs...and midrange UNIX systems," explains Jay Yesselman, director of marketing for Computer Associates International Inc., which now markets the 20/20 spreadsheet for VAX and UNIX systems. "Many of those people were using those machines for front office solutions, and a lot of them turned to 20/20."

Originally marketed by Boston area-based Access Technologies, 20/20 was a 1-2-3-like spreadsheet that displayed on character terminals. As minis began to perish, the product dropped from sight as far as the industry was concerned.

But it didn't go away. It continued to sell reasonably well, even as its company was purchased by a series of bigger firms, finally culminating in Computer Associates. Moreover, as its users began to switch to Sun and other RISC-based systems, they turned again to 20/20. CA plans shortly to introduce Visual 20/20, a version of the product for graphical interface displays. "I think the opportunity for Visual 20/20 is much stronger in the UNIX market than it ever was," says Yesselman.

In fact, the downsizing movement could remake UNIX, and indeed Sun. "There is, you see, more than just downsizing going on," explains Tom Axbey, director of marketing for Applix, which markets its line of Applixware products for Sun and other RISC-based systems. "There is the whole question of business process automation as well. There are now far fewer people doing far more work."

In other words, "downsizing" doesn't just mean smaller machines, it also refers to layoffs, smaller staffs and longer worker hours. Increasingly, companies are flattening out, with middle managers–whose job was chiefly the collection, analysis and transmission of information–being

Companies Mentioned in this Article

Applix Inc.
112 Turnpike Road
Westboro, MA 01581
Circle 141

Bristol Technology Inc.
241 Ethan Allen Highway
Ridgefield, CT 06877
Circle 142

Computer Associates International Inc.
1 Computer Associates Plaza
Islandia, NY 11788-7000
Circle 143

DUX Software Corp.
4906 El Camino Real
Los Altos, CA 94022
Circle 144

ICL Inc.
9801 Muirlands Blvd.
Irvine, CA 92718
Circle 145

Informix Software Inc.
4100 Bohannon Drive
Menlo Park, 94025
Circle 146

Island Graphics Corp.
4000 Civic Center Drive
San Rafael, CA 94903
Circle 147

Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
Circle 148

Paragon Imaging Inc.
400 W. Cummings Park
Suite 2000
Woburn, MA 01881
Circle 149

Project Software Development Inc.
20 University Road
Cambridge, MA 02138
Circle 150

Qualix Group Inc.
1900 S. Norfolk St. #224
San Mateo, CA 94403-1151
Circle 151

Uniplex Integration Systems Inc.
600 E. Las Collinas Blvd.
Suite 1400
Irving, TX 75039
Circle 152

WordPerfect Corp.
1555 N. Technology Way
Orem, UT 84057
Circle 153

XSoft
A division of Xerox Corp.
3400 Hillview Ave.
Palo Alto, CA 94304
Circle 154

squeezed out of the organization entirely. But, *something* has to take their place.

Many companies are counting on computers to be that something. But, says Axbey, "you just can't do that with PCs."

What MIS officers want, then, and what Suns and UNIX may be uniquely well positioned to provide, is something that goes far beyond OA or BOPS. "It's deep integration," says Qualix's Shaker. "It is not just using the workstation as a faster PC...it is integration between office automation and what used to be mainframe applications."

The image, then, is that of a powerful, RISC-based system on the desktop of the business professional communicating, in real time, with corporate data. That data might be on a mainframe, or it might be on a network. ("That's what is going to take the place of the mainframe," says Shaker, "workstation farms.") Either way, the executive would be less like a traditional manager, whose decisions are based on aged data and whose effects may not be apparent for months or even years, and more like the financial specialists, commodities traders and even military strategists whose actions are rewarded or punished in seconds–and who have been been traditional workstation users.

Indeed, some of the UNIX packages originally developed for exactly such roles in the military are even now eyeing the commercial market–such as Slate, a multimedia front-office environment originally developed by BBN and which is now being marketed by Paragon Imaging Inc. "Our hope is bringing image reporting and briefing communications to the desktop, so that we can reach not only the war fighters but go all the way to the national command," explains Pamela Gazley, the marketing specialist at Paragon Imaging who has overseen Slate since its BBN days. "Once Slate has reached that level, then we're going wholeheartedly into the commercial world."

No Simple Documents

It isn't certain that UNIX, or Suns, will be able to land the role of executive information system. The very same market and technological forces that impede both in the OA role may keep them out of EIS as well.

Yet, there are intriguing signs. In certain applications–applications that are already getting close to the EIS concept–Suns are doing just fine. "It's where you have information in a document that is shared by groups of people...and that information is critical to the business," explains XSoft's Unger. "It may be, for example, proposal management for an insurance company, or internal systems documentation for a software company–where documents have high value and are not simple."

It may be, then, the very future of UNIX, and of Sun workstations, in the commercial environment can already be read in the subtle signs of a new and emerging technology: smart documents. Next month, *SunExpert* will examine the place of smart documents as a technology and as a business, so stay tuned. ⊸

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Three Thumbs Up

by **BARRY SHEIN,** Technical Editor

This month, *SunExpert* is wowed by three dynamic products: Tatung Science and Technology Inc.'s flexible SPARCserver 10-compatible, IBM Corp.'s hot new PowerPC-based RISC System/6000 and a winning set of integrated visual data tools that really do turn data into answers.

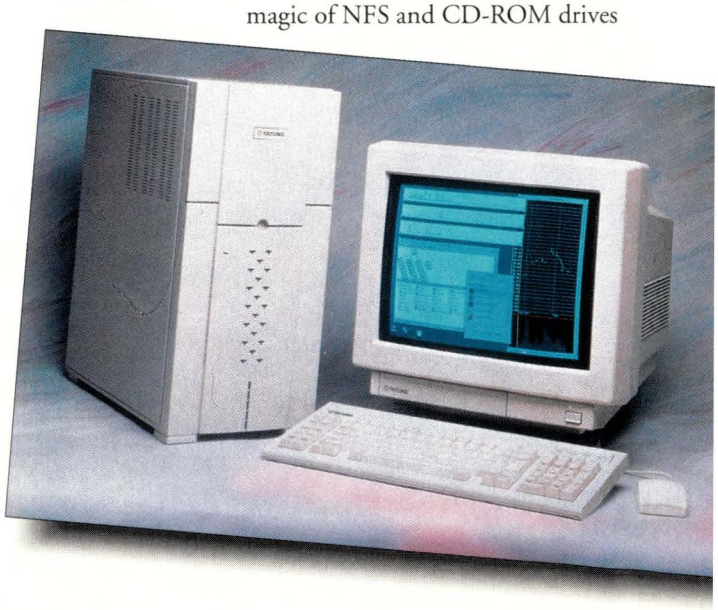
Tatung's SuperCOMPserver 10

by **BARRY SHEIN,**
Technical Editor

In recent years, just about every SPARCstation introduced by Sun Microsystems Computer Corp. has been followed by a bevy of clones. This is no accident. Sun has generally encouraged this by opening its architecture and allowing clone vendors access to essential pieces like the CPU, the Solaris operating system and associated software, and other technologies. Tatung Science and Technology Inc. is not new to this particular business. Previously, they've introduced clones of the SPARCstation 1+ and 2. This latest box from Tatung is a clone of the SPARCserver 10.

The box is a small, slightly squat tower configuration. Not something you would put on your desk, but certainly easy to fit alongside your desk on the floor. The front cabinet has a swing-away door that reveals a power switch, floppy drive and half-height bays for three disks or other paraphernalia. The rear has numerous ports, including knockouts for six SBus slots (one taken up by the frame buffer in the model we reviewed), Ethernet/audio (standard "new" Sun cabling scheme), external SCSI, RS-232, etc. The model we reviewed came equipped with two SuperSPARC CPUs, 64 MB of memory, a Seagate 2.1-GB SCSI disk and audio box. Our server unit arrived headless, but I'm happy to report that a Sun monitor from a Sun X terminal in the lab at the time worked just fine. Compatibility has its benefits.

The software was pre-installed, a standard Solaris 2.x operating system release. Unfortunately, this meant we had no compiler or really anything interesting to play with, but we soon fixed that. There was no CD-ROM on this configuration, but through the magic of NFS and CD-ROM drives



The SuperCOMPserver 10 offers a lot of options: It runs up to four CPUs, can hold up to nine drive bays and supports up to nine SBus slots. It can even drive two motherboards.

elsewhere on our net, I managed to mount the Solaris demonstration disk and a late-model Sun Catalyst CDWare disk that, among other prizes, had a copy of the GNU C/C++ compiler from Cygnus Inc. In no time, I was able to cure both the feeling of sensory deprivation and that perennial problem of idle disk space we all tackle so well when thus challenged.

Other than performance and compatibility, it seems irrelevant to comment much on the Solaris release we were supplied with since that's all standard issue. Needless to say, I ran into all sorts of little problems setting the system up, but I don't believe any of it was Tatung's doing. Just various disagreements between Solaris and myself. Here's one gotcha that might be worth mentioning: While the machine was booting multiuser, somewhere in the boot scripts the `ps` command is used to get some information. Thus, if the `ps` command doesn't work, the machine may not be able to complete the boot. Somehow, and I believe it was during a futile attempt to attach a CD-ROM drive directly (this particular drive has hardware problems, so no complaints), a symbolic link was created in /dev by one of the standard system commands (`devlinks`, I believe), which pointed to dot, the current directory. This caused `ps` to go into an infinite loop (later discovered by running it under `truss`), which caused the boot process to hang somewhere before the machine had become something more than a self-warming doorstop. Well, nothing that a couple of hours of intensive investigation in single-user mode couldn't clear up (and people wonder why I don't pursue more hobbies).

As an initial and very informal test, I compiled Dhrystones 2.1, using my freshly installed `gcc`, and ran it. Using one million iterations (the register version never runs very differently on a SPARC), I can report about 68,500 Dhrystones per second, or about 50 MIPS. Tatung claims more than 100 MIPS per CPU under Solaris 2.1 using Apogee Systems compilers with a Kuck and Associates Inc. preproces-

Configuration Options

Main Memory

Standard: 32 MB using 16-MB SIMMs
Maximum: 128 MB using 16-MB SIMMs up to 512 MB using 64-MB SIMMs

Storage

Floppy disk: one 3½-inch 720 KB/1.44 MB
Internal hard disk: up to six 3½-inch disks (520 MB or 1 GB formatted); up to three 5¼-inch disks, which can include 150-MB QIC, 8mm, CD drives or 4mm.

Interfaces

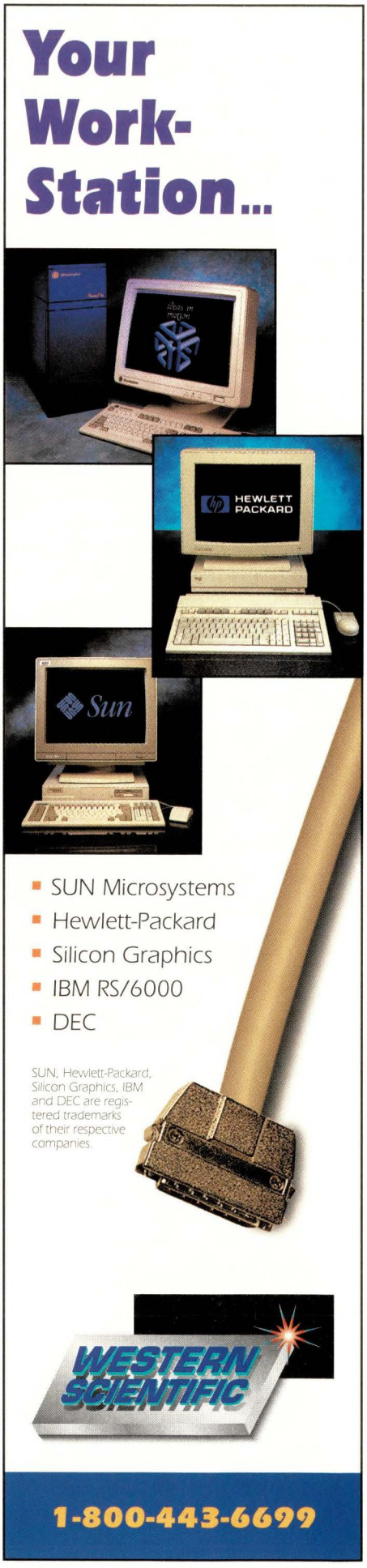
Ethernet: 10-MB/s twisted-pair standard (AUI available with optional adapter cable)
SCSI: 10-MB/s SCSI-2
Serial: two RS-232/423 ports
Parallel: Centronics-compatible
Audio: CD-quality 16-bit, 8 to 48 kHz
ISDN: dual basic rate at 144 Kb/s
SBus: Up to nine slots with optional expansion board
MBus: two 64-bit slots

Graphics

Monochrome: 17-inch or 19-inch at 1,152 by 900
Color: 17-inch or 19-inch at 1,152 by 900 or 1,280 by 1,024

Software

Operating System: Solaris 1.1 or 2.x
Windowing system: OpenWindows Version 3 or Mdesk Version 2 (X11R5 Motif)



sor and SunPro/KAP compilers. There is no reasonable way to test two CPUs with Dhrystone, but I think we can safely assume both CPUs are about the same speed. I wouldn't read too much from this result unless you tend to run applications that resemble Dhrystone a lot. On the other hand, I've yet to find a machine where the results of the fairly simple Dhrystone benchmark were grossly misleading when I investigated further. As another informal benchmark, I tried my nfsstones program locally (it can be run on the local disk for calibration) and got around 2,700 nfsstones, which is good. For comparison, on an IBM RS/6000 520H I got about 1,000 nfsstones, and on our big Solbourne Computer Inc. server (admittedly with 100 people logged in) it topped out at around 1,700, even on a 7,200-rpm Barracuda attached to a Fast SCSI-2 controller. So we'll call that result quite good, even if I'm not very satisfied with the comparisons. Measuring NFS performance is a tricky business that I didn't delve into for this review. Besides, these days most decent NFS implementations tend to just bottleneck the Ethernet when pressed.

I then ran many other applications, including the rather strange Sun demo CD-ROM, which contains, among many other things, a long audio segment of Scott McNealy and Ed Zander doing a "Solaris Late Night" TV show parody. It was amusing, but I'd recommend they not quit their day jobs quite yet.

Compatibility seemed about perfect; I ran into no inexplicable problems with any of the software I tried. I suppose that's not shocking, but if it were otherwise I would be remiss in my duties not to report back to you, dear reader. Performance was great. Current workstations are fast, and the SuperCOMPserver 10 is a fast one. Some of these demos do seem to require some computing and I/O power such as the ones that display simultaneous video and audio.

Overall, I was pleased and impressed with the amount of sheer computing power that comes in small packages these days. I'd guess that the SuperCOMPserver 10, as configured, would make a good departmental server and certainly an excellent personal machine.

SuperCOMPserver 10

Company
Tatung Science and Technology Inc.

Address
1840 McCarthy Blvd.
Milpitas, CA 95035

Phone
(800) 659-5902

Fax
(408) 383-0886

Best Feature
A good, fast SS10 clone without surprises.

Worst Feature
Mostly genetically inherited from OS.

Price
Entry-level pricing for the series begins at $12,890 for a 40-MHz model. The system we tested, with two 50-MHz chips, is in the mid-twenties price range

Circle 157

The New PowerPC-based RS/6000

by ANDREW HASKINS and JEFFREY COPELAND

We recently had the pleasure of seeing the new IBM Corp. RISC System/6000 Model 250 in action. This machine is the first model of the RS/6000 to employ the new PowerPC chip, designed by Somerset, the consortium formed by Motorola Inc., Apple Computer Inc. and IBM. The Model 250 runs AIX, IBM's UNIX operating system.

What We Saw

The 250 looks like the Model 220s we've been using for more than a year. It's a pizza box about 14 inches square by a bit less than 2 inches high. There are connectors on the back and a floppy disk drive hidden behind the front panel. The configuration we test drove had

- 32 MB of main memory–it can be stocked with up to 256 MB,
- a 2.88-MB floppy drive,
- a 1-GB hard disk–both 540 MB and 2 GB are also available in the same form factor,
- the GXT150 graphics card, which provides 3-MB VRAM onboard, to drive the display at up to 1.6 million vectors per second (more on the implications of this later),
- Ethernet network card,
- two serial and one parallel port,
- keyboard, mouse and tablet interfaces,
- SCSI-2 interface,
- two internal Micro Channel buses,
- two available slots for I/O cards–on our test machine, the token ring card was installed,
- and both 8mm and QIC tape drives connected via the SCSI-2 interface.

Also, the video connections are Sun-compatible, so you can swap a Sun Microsystems Inc. monitor in. From a manufacturing point of view, the whole package is completely modular. It shares complete subsystems, such as cards and disk drives, with the Model 220 and PS/2. In fact, to upgrade your RS/6000 Model 220 to a 250 would be a 20-minute operation that replaces the motherboard and some other components, and we were left with the impression that IBM would actually be encouraging users to do so.

A quick aside on nomenclature: The new machines are based on the PowerPC 601 chip, using the POWER architecture (that's Performance Optimization With Enhanced RISC, by the way). The PowerPC architecture is intended to allow implementations ranging from battery-powered laptops to high-end number crunchers–or "palmtops to teraFLOPS," as the IBM press releases breathlessly note–while the original RS/6000s were built from a multichip set. (Someday, we'll see an end to computer product names with capITAl leTTers SprinKled ThroughOut. Of course, someday, the Cubs will win the World Series.) The 601 processor chip is

about 2.8 million transistors, with both FPU and 32 KB of cache on-board, in a package a bit more than a centimeter square. (IBM sold a 601 processor once before: It had tubes.)

It's also worth noting that at the same time IBM announced the PowerPC-based RS/6000s, they also announced three high-performance machines based on the POWER2 chip set, which was designed solely by IBM engineers. The POWER2 is on eight chips, with dual fixed and floating arithmetic units. To simply state that our test system was loaded with the AIX operating system would be somewhat vague and misleading, since the AIX operating system is actually a tangled web of lots of optional software components IBM calls Licensed Program Products (LPPs). The system we tested was installed with the AIX Base Operating System (BOS) LPP, the X11 run-time environment LPP (referred to in IBM-speak as AIX Windows), and IBM's XLC (C compiler) LPP. Since this is a graphics-intensive machine, and we had expressed an interest in trying out the new Softgraphics feature, it also had AIX Windows 3D feature installed. We put not only the Softgraphics features but the other graphics options through their paces in our test drive.

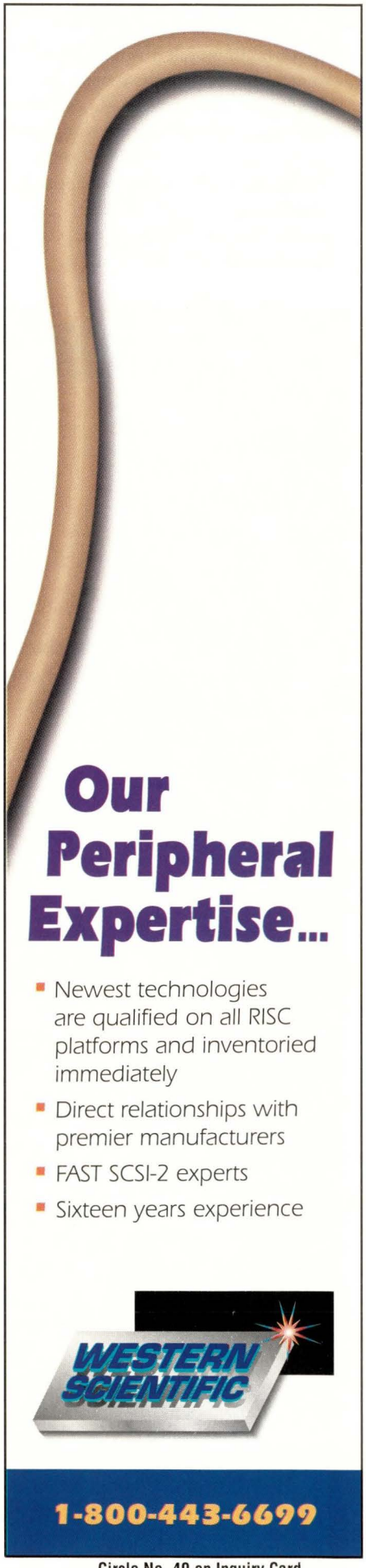
AIX 3.2.5

What's AIX? The Advanced Interactive Executive, or IBM's version of UNIX. It was named thus to distinguish it from PC/ix (the Personal Computer Interactive Executive, which ran on the PC/XT) and VM/ix (the Virtual Machine Interactive Executive, which ran in a virtual machine on 370XA hardware). PC/ix and VM/ix were virtually identical systems based on AT&T System III, but running on very different platforms. AIX was based on System V.2 and originally ran on the RT/PC platform. Now, within IBM, most UNIX products are based on the AIX code base. AIX Version 3 is a direct descendant of the original RT/PC version. Contrast this with Solaris 2.x, based on System V.4, and representing a Vulcan mind-meld of AT&T and BSD technology. Most of AIX's BSD features were grafted on in Releases 2 and 3.

The 250 comes installed with the AIX Version 3.2.5 operating system. There are actually two items of interest to explore when discussing AIX 3.2.5. The first is the compatibility of 3.2.5 with previous releases of AIX, especially on the PowerPC platform. The second is the myriad of additional software options that come along with AIX 3.2.5. IBM's claim is that AIX 3.2.5 on the PowerPC is binary compatible with AIX 3.2.4 on other POWER platforms. During our test drive of the 250, we successfully used several applications that had been compiled on IBM 520 using AIX 3.2.3 extended, and we found nothing in our testing to dispute the claim. Furthermore, IBM claims that recompiling software on the PowerPC platform will result in code that is better optimized for the PowerPC while retaining binary compatibility with other POWER platforms. We actually tested two compilers during our test drive. The production compiler that was shipped with the initial release of AIX 3.2.5 compiled and executed our test programs as expected. A beta copy of new compiler expected to hit the market in early 1994 had some minor problems with one public domain software package, but we expect these to be ironed out in beta test. Because we did not end up with binary executables from the beta compiler, we were not able to compare performance and optimization.

AIX 3.2.5 is a "point release" of the operating system, primarily released to handle the new PowerPC and POWER2 hardware architectures. Another change that comes with AIX 3.2.5 is a simplification of the software installation and upgrade process. As we said, the machine we tested came with AIX preloaded, and so we had no opportunity to see what improvements have been made; but having had extensive experience with loading AIX upgrades in the past, we can note that any improvement in this area would be welcome.

In addition to the AIX 3.2.5 base operating system, IBM is offering several new software options. Space does not permit a full exploration of these



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options, but we felt it would be useful to mention some of them here. For developers, IBM has brought out three new integrated software development environments: C++ POWERbench Version 2 for object-oriented application development, FORTRAN POWERbench for scientific application development, and COBOL POWERbench for commercial application development. Also, the AIX Interface Composer tool can now generate C++ code in addition to generating C code.

For systems administrators, there are two new developments. The AIX System Management Interface Tool (SMIT) has been expanded to use Remote Procedure Calls (RPCs) to manage a network of AIX workstations from a single platform. We've actually had some exposure to this Distributed SMIT (DSMIT) product, and within a homogeneous network of AIX workstations, it's actually a reasonable tool for doing systems administration tasks. It's been architected so you can perform tasks such as adding a user for a single machine or a group of machines in a single operation. Additionally, DSMIT has been enhanced to allow remote management of Sun workstations running SunOS 4.1 and Hewlett-Packard Co. workstations running HP/UX 9.0 from IBM AIX workstations. However, it's not clear to us that Sun or HP systems administrators familiar with the native sysadmin tools would want to switch over to DSMIT. DSMIT does not provide an interface for all sysadmin tasks that need to be done on Sun or HP machines, but only for those tasks that map to similar AIX tasks.

The idea of having a single interface doing systems-administration tasks for a network of heterogeneous machines is good, but DSMIT is so ingrained with AIXisms it will probably fall flat for most experienced Sun or HP users. (If it's a hard pill to swallow, and it doesn't cure all my ills, why take it at all?) A second tool that may prove useful for systems administrators is the Visual Systems Management (VSM) tool. VSM is a tool that allows an administrator to handle administrative tasks, such as adding users, managing devices, handling security, etc., by using a graphical drag-and-drop approach.

What We Tried

We ran a series of "Gosh, what happens if I do this?" tests on the machine. Our goals were to convince ourselves that the machine was binary compatible with the original POWER architecture, push the limits of AIX, and to play with the new graphics options. We think we achieved all of these. Firing up the X Window System was an adventure. By default, the AIX X server did not include all of the extensions we wanted to test, so we couldn't use our accustomed `xinit`. In

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order to start the X Server with the PEX extensions and OpenGL extensions (and a couple of other miscellaneous extensions), the full command was: `xinit --x GLX -x mbx -x abx -x PEX`. Of course, customization of our environment would make this transparent.

We began by unloading the floppy disk of executables and sources we brought with us and immediately ran into trouble in the form of a file system that was too small. IBM's Virtual Resource Manager and SMIT came to the rescue, and we were back on course about three dozen keystrokes later.

We fired up our usual background processes, and yes, `xfishtank` ran nicely. We had obtained a tool for graphically displaying some key performance metrics, such as CPU utilization, which proved to be very helpful for getting a feel for performance.

We actually pegged the CPU load meter a couple of times, as we'll explain below in our discussion of 3D graphics. We also wanted to try out `kdrill`, an X-based Japanese kanji character drill game. This turned out to be a good choice: It's public domain software (written by Philip Brown and available in Volume 20 of `comp.sources.x`); it uses a lot of memory to hold a dictionary of kanji readings in hiragana and translations in English; it uses 16-bit characters, so we could test the internationalization of X11R5; and it makes nice use of the X display. On the other hand, it is not a CPU hog, so running `kdrill` didn't stretch the abilities of the 250. Again, the binary and its data files were "plug and play." Once we loaded the new resource definitions with `xrdb`, we typed `kdrill` and were set.

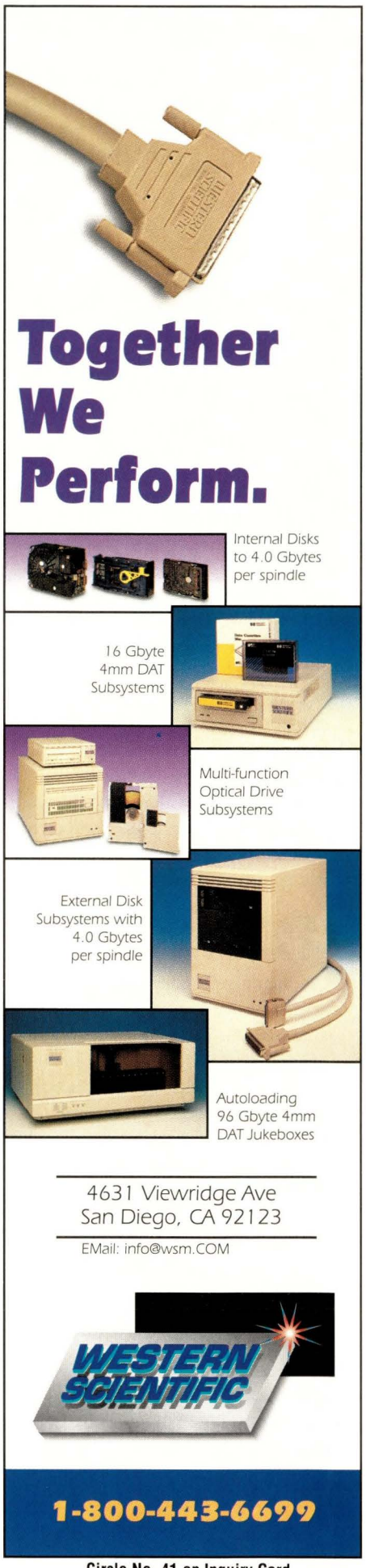
We also wanted to run the compiler through its paces, to which end we had the sources for `kdrill`. This, however, required a little adjustment: IBM continues to install `imake` in `/usr/lpp/X11/Xamples`, so we had to fix our paths and environment variables. As we discussed earlier, we had a choice of two compilers, so we tried the compilation twice: once with a beta version of the compiler that should be completed and shipped by the time you read this, and once with the existing production compiler. The production compiler completed the `make` in 30 seconds, compared with just over a minute on our unloaded Model 550 at home. For comparison purposes, the 550 is a midrange server. Ours is at the hub of our LAN and supports the bulk of the development work done by the 10 folks in our office. As we expected, the fully compiled code ran correctly.

Great Graphics

The graphics performance of the POWERstation 250 is quite impressive, considering what you get for under $10,000. The graphical displays in the AIX Windows (X Window) environment were extremely responsive, and you can tell by interacting with it that it had quite a bit of horsepower. There are two reasons for the performance boost of the 250: new high-performance graphics accelerators and the implementation of a shared memory transport for the X server.

The PowerPC uses one of two new graphics accelerators designed and optimized for the PowerPC architecture. The accelerators, the GXT100 and the GXT150, attach to an internal 601 local processor bus and do not require a Micro Channel slot. Since the accelerator sits on the motherboard, there's no bus latency getting bits to the VRAM. IBM claims that the GXT150 performs at more than 1.6 million X11perf 10-pixel lines per second, and has an Xmark rating of 10.3, which is 20% higher than the published Xmark rating of its closest competitor. Both the GXT150 and GXT100 are 8-bit, single-buffered accelerators, the difference being that the GXT150 has more VRAM and supports a wider variety of display resolutions.

However, the new graphics accelerators don't get all the credit for the increase in graphics performance. Part of that comes from the fact that the AIX X Window server now uses a shared memory transport for communication between local X clients and the X Server. Until now, the communication link between X clients and the X server used a socket transport mechanism, either UNIX sockets for local clients or Internet sockets for



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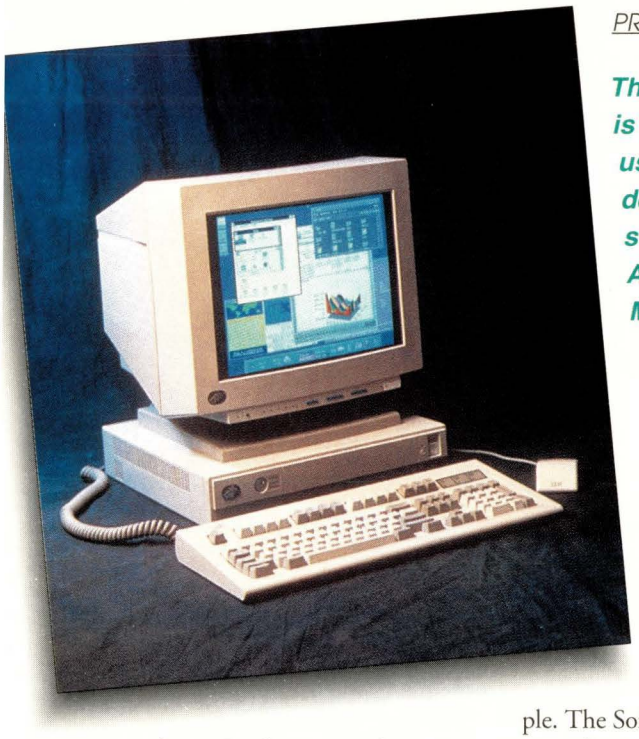


The RS/6000 model 250 is the first system to use the PowerPC chip designed by the consortium that includes Apple, IBM and Motorola.

remote clients. Implementing the transport mechanism in shared memory greatly increases performance for local X clients. (Sorry folks, this does nothing to enhance the performance of remote X clients.) To use the shared memory transport, simply set the DISPLAY environment variable to ":0" (or ":0.0"). Continuing to use DISPLAY values of "<hostname>:0" or "unix:0" will revert back to the socket transport, and you will not see the performance boost.

IBM Banzai Across the 3rd Dimension

Remember the days when you absolutely had to have 3D graphics accelerators even to think about doing 3D graphics? We can now ask that nostalgic question with the introduction of Softgraphics, part of the optional AIXWindows 3D feature. Softgraphics is a software-only implementation of the three most popular 3D graphics APIs–OpenGL, PEX and PHIGS–and it delivers advanced 3D function to the entire range of POWERstations, enabling 3D applications to run on 2D workstations. This option is not intended to replace 3D graphics adapters for those users who are serious about 3D graphics performance, but it does give casual to mid-level 3D users the option of having 3D graphics without having to buy the more expensive 3D graphics adapters. So how does Softgraphics work? The concept is really pretty simple. The Softgraphics option is enabled at application run time by setting a process environment variable; no recompilation of the application is required. Once enabled, the graphics software intercepts all graphics requests and makes a quick determination as to whether the hardware will support the request; supported graphics operations are passed to the hardware, and unsupported operations are performed in software.

Our test machine had the GXT150 2D graphics accelerator installed, and to test the Softgraphics option, we compiled an OpenGL demo program that displays a 3D OpenGL logo, complete with shading and lighting. Prior to enabling Softgraphics, the program would not run, because the 2D hardware does not support the graphics operations; with Softgraphics enabled, the program ran as expected. In our test drive, we also compiled and ran some of the 3D PEXlib demo programs that come with IBM's installation of PEX, and we compiled and ran an example program from the O'Reilly and Associates Inc.'s PHIGS programming manual. In each case, the programs ran as expected when Softgraphics was enabled.

That's all well and good, but how about performance? After all, the reason that 3D graphics accelerators exist is precisely because software implementations of the required algorithms are too slow. Going back to the OpenGL logo demo, the program allows the user to rotate the logo around two axes, and in our test run, each redisplay of the logo required less than a second of rendering time. While this is not lightning fast if you are used to 3D graphics hardware rendering and 3D animation, it is acceptable performance for entry- to mid-level 3D applications. The combination of fast 2D accelerators, optimizations such as the shared memory transport, and fast CPUs and FPUs allows Softgraphics to be a win for many applications, and the performance will increase as processor speeds increase.

Price vs. Performance

From almost any point of view, the 250 is a price/performance winner. Compared with the Model 220, the X performance of the 250 ranges from 1.8 times as fast for drawing dots to 10 times as fast for drawing rectangles to 17 times as fast for 80-character lines. The 550, which has a list price twice that of the 250, performs compilations only half as fast.

With a price beginning at $7,600 for a full configuration, and SPECint92 and SPECfp92 ratings of 62 and 92 respectively, the Model 250 is at least five times as cost-effective as the top-of-the-line Model 990 using the POWER2 chip set. The 990 costs $127,000 and only gets a SPECint92 rating of 126, and a SPECfp92 rating of 260. For comparison purposes, consider the competition: The Model 250

RS/6000 Model 250

Company
IBM Corp.

Address
Contact local sales office

Best Feature
Fast 3D graphics.

Worst Feature
AIX system-management tools.

Price
$7,595 entry level

Circle 158

with a GXT150 graphics accelerator scores 10.3 Xmarks. The HP 9000 and Digital Equipment Corp. 3000 both score about 8, and the Sun SPARC 10 Model 40 scores 5.1. On SPECint92 performance, the Model 250 is within a couple of points of the DEC 3000 and the SPARCstation 10. On SPECfp92 tests, the 250 outscores the Sun by 10 points and ties the DEC. On both benchmarks, it outperforms the HP 9000 Model 715. In other words, the Model 250 is at least as good in performance as machines with base prices starting $2,000 higher. One of the important points of this announcement from IBM is that it sets a new price point in the downward curve of CPU power vs. dollars. Eight years after the pricing debacle at the introduction of the RT, IBM seems to have caught on to the idea that machines have to be priced competitively in today's market.

In summary, it's a great machine. We'll be buying some the next time we need desktop standalone graphics workstations.

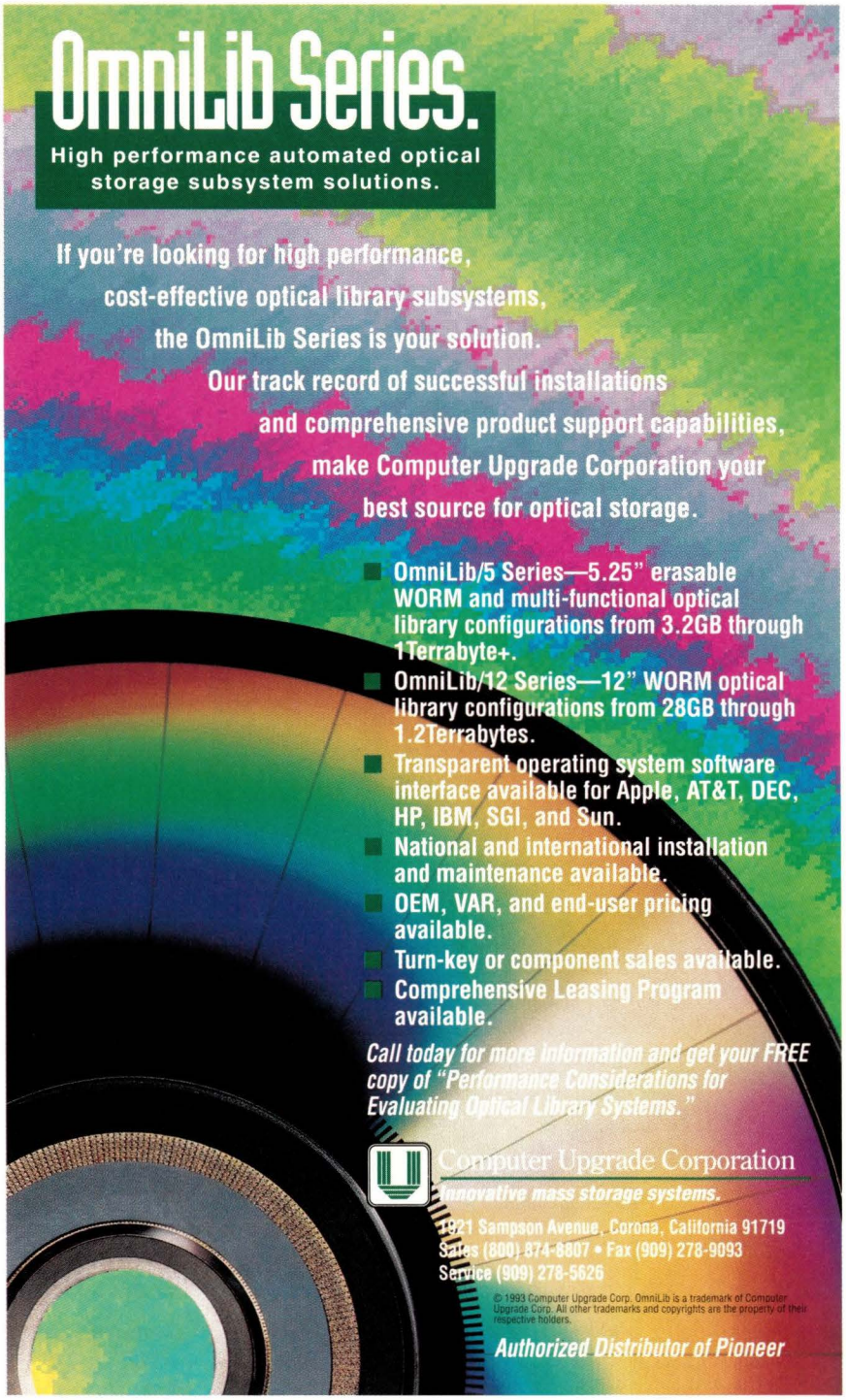
Andrew Haskins (andrewh@aus.shl.com) is currently a technical architect for SHL Systemhouse in Austin, TX, where he has been involved in a number of AIX development projects. His technical interests include X11 and graphics program development. **Jeffrey Copeland** (jeff@aus.shl.com or copeland@alumni.caltech.edu) also works for SHL Systemhouse where he manages projects. He is interested in typesetting systems and standards and is a regular columnist for *RS/Magazine.*

Prosperity is Just Around the BBN/Cornerstone

by BARRY SHEIN
Technical Editor

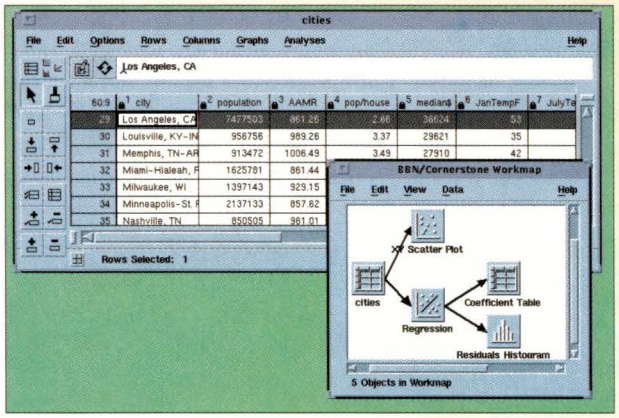
Wow! If you do data analysis, and I mean data analysis–regression, ANOVA, visualizations, graphical analysis, etc.–Cornerstone is a product you gotta see! Basically, BBN Software Products has taken the spreadsheet paradigm and expanded it with statistical analysis, graphics, data management and a whole lot more. I'm impressed. It's also all sitting in an absolutely seamless GUI interface that we just haven't seen in this sort of product before. I mean things like tool palettes that can select out items from scatter-plots, tag them, relate them back to the original spreadsheet-style data rows and columns and let you reintegrate them into further analyses.

OK, this is not a stocking stuffer for amateurs. But it is a very slick and impressive tool for engineers, statisticians, scientists and others. Areas of expertise that come to mind are government environmental research,



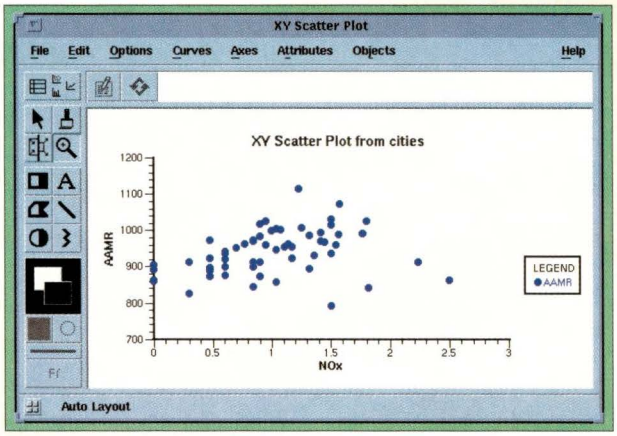
Circle No. 8 on Inquiry Card

Using Cornerstone



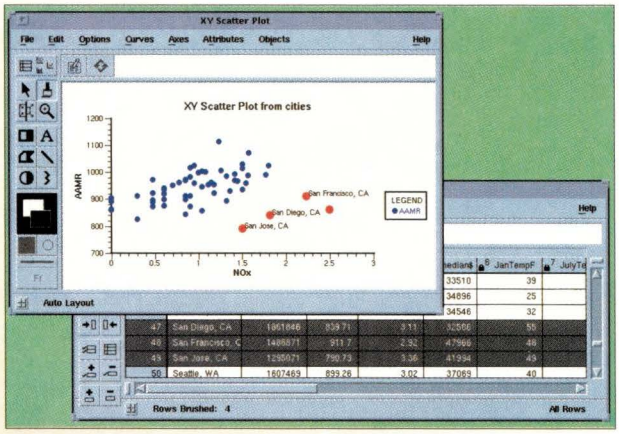
Step 1.

Picking variables from a spreadsheet-like interface.



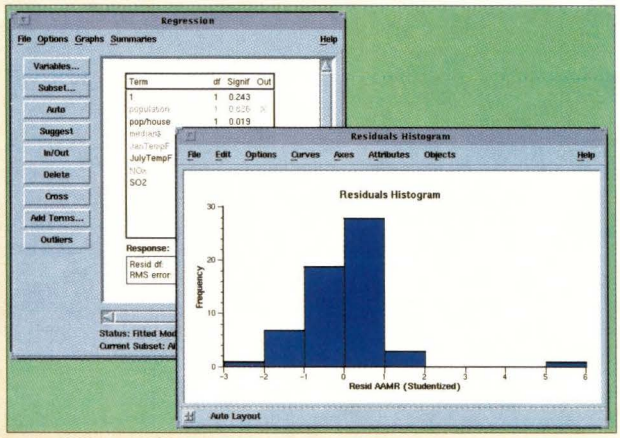
Step 2.

Bringing up an XY scatter plot.



Step 3.

Popping up a tools palette and choosing outliers.



Step 4.

Getting the results from a regression window.

industrial quality control, materials engineering, chemical engineering, social sciences. I could go on, but you would stop reading.

Here's the gist: You start the product up and open (or create) a data set and you see a spreadsheet-style interface (see "Using Cornerstone"). Let's take one of BBN's examples: In it, cities are on the rows, and variables like sulfur dioxide and nitrogen dioxide concentrations on the columns. So you click menu to bring up "XY scatter plot," choose two variables and up pops a nice scatter plot. You notice a few points are outliers, so you pop up the tools palette (resembling the sort of palette you might see in a drawing program), choose the outliers and ask what cities they're in. The corresponding spreadsheet rows and columns are highlighted. So you open a regression window, ask for the results, and another window pops up with the statistical analysis info. Easy as pi. Not enough? OK, let's ask for the distributions and another histogram plot pops up, we choose help and ask for interpretation. An explanation of how to read the chart scrolls into view nicely. We're still curious, so we request a coefficient table to investigate to see how much change in a variable we can expect with each unit change in a predictor. It just goes on and on. Did I mention that you can put text tags onto the graphs to make notes to yourself or others? Save them and/or print them out in PostScript format? Box plots? Contour plots? Variance analysis? Optimizations?

If that's not enough on a lowly SPARC IPC, the software was downright zippy. Even seemingly complicated analyses took only several seconds. The documentation seems excellent and well organized. It won't teach you a whole lot about what all this is used for; that takes hard work (but that's why you earn the big bucks, right?). The paper documentation along with the on-line help will jog your memory about how to proceed with common analyses.

This is not a tool I can do justice to in just a few paragraphs, but here's

what I am going to suggest if this is the sort of thing you might be interested in: Either get a demo copy to play with, you'll get the idea in 30 minutes experimentation, or just beg them for a copy of their excellent tutorial book, which comes with the package. You can read through it even without the program and get a good idea of what this software is all about. It has to be the best tutorial guide I've ever used, right down to telling me "look below the X-axis" just when I was looking at the screen unable to find something being talked about. Really.

If you do this sort of work, even just sometimes (especially if you only do it sometimes!) check out Cornerstone. As you may have gathered (and as I think I mentioned), I was impressed. But then again, why should I be surprised when one of the world's foremost engineering and scientific companies designs a great engineering and scientific tool? ⊸

BBN/Cornerstone

Company
BBN Software Products
A division of Bolt Beranek and Newman Inc.

Address
150 Cambridge Park Drive
Cambridge, MA 02140
Also, international and other national U.S. offices.

Phone
(617) 873-5000

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Circle 159

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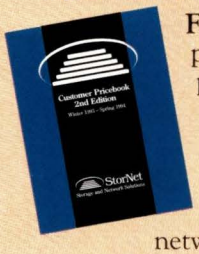

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Circle No. 28 on Inquiry Card

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.

Sun Sells Own Enterprise Tools

The SunIntegration Services organization within Sun is marketing a series of tools developed to help customers migrate from mainframe-based MIS systems to client/server solutions. The tool suite, called Sun Enterprise Toolset, was developed by Sun as part of its own downsizing effort.

There are five distinct modules within the Enterprise Toolset. SunDANS, for Distributed Administration of Network Software, allows an organization to distribute and manage software products across a network. SunRAI, for Remote Application Interface, allows direct communication between UNIX-based applications and those located on mainframe systems. Sun Paperless Reporter provides a secure general-purpose distribution method for on-line information. Sun ConsoleServer allows systems administrators to control multiple, local and remote systems from a single location. Finally, Sun DataCenter Scripts are a set of programs that help automate and customize data center administration tasks.

The five will be sold as a package or individually. SunDANS ranges in price from $200 to $250 per user; SunRAI is $20,000 per application-to-application connection; Sun Paperless Reporter is $750 per user; Sun ConsoleServer is $4,500 per console, and the DataCenter Scripts source code licenses range from $10,000 to $18,000.

SunIntegration Services
Sun Microsystems Computer Corp.
2550 Garcia Ave.
Mountain View, CA 94043-1100
Circle 101

Embedded SPARC Board

A microSPARC-based processor board for the embedded-system market has been announced by Tadpole. The TP91 embedded platform controller is a single-board device combining the microSPARC, a memory bus that supports up to 128 MB of DRAM and multiple I/O devices. There is, for example, a master I/O device that provides an Ethernet controller, a parallel interface and a SCSI bus controller. A slave I/O device, meanwhile, offers an interrupt controller, a four-channel serial controller (which offers two RS-232 interfaces), a floppy disk controller, counter timers and gateway to an 8-bit expansion bus.

The TP91 also supports four SBus expansion slots. An optional SBus card, the TP201S, fits into one of those slots. This device supports PCMCIA cards–either two Type I/II or one Type III card. This means the device could make use of the large variety of PCMCIA cards developed for the notebook PC market.

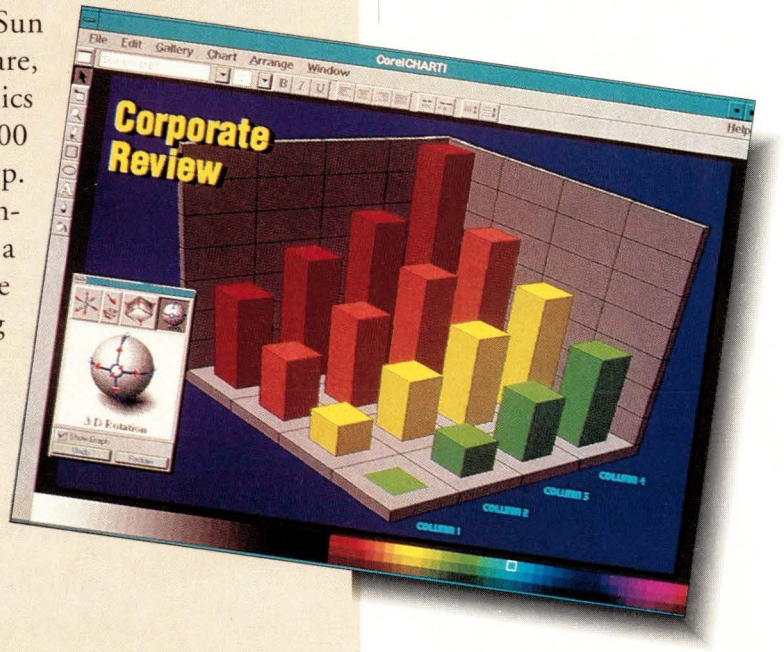
The company says the TP91 is

Corel Ships for UNIX

Corel has announced CorelDraw 3 for UNIX. This graphics software, based on the best-selling CorelDraw for DOS products, gives users a suite of drawing, editing and illustration packages. The product includes CorelDraw, a vector-based illustration program; CorelChart, a charting program; CorelPhoto-Paint, a bit map editor; CorelShow, a presentation package; CorelTrace, a batch auto-trace utility; and CorelMosaic, a visual file manager.

The product is available for the Sun SPARCstation, Novell Inc. UnixWare, IBM Corp. RS/6000, Silicon Graphics Inc. Indigo, Hewlett-Packard Co. 9000 Series 700, Digital Equipment Corp. Alpha, Intel Corp.-based systems running SCO UNIX, and the Data General Corp. AViiON. It is available on CD-COM, QIC and DAT. Pricing begins at $595 for tape; $545 for CD-ROM.

Corel Corp.
The Corel Building
1600 Carling Ave.
Ottawa, Ontario
Canada K1Z 8R7
Circle 100



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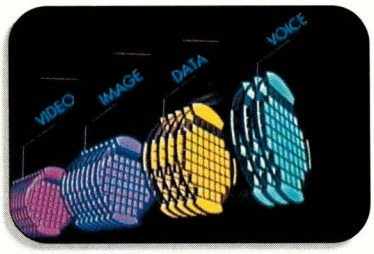

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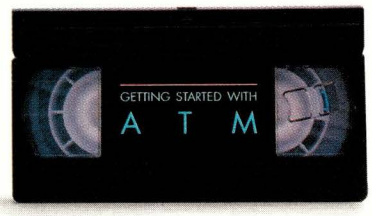
At last, a powerful educational video that brings to life the most promising networking technology in history.

Getting Started With ATM will save you hours of research and analysis through its comprehensive and impartial overview of Asynchronous Transfer Mode. You'll see how it solves today's complex business and networking challenges. And understand the options for moving to ATM if you decide it's right for you.

Learn from animated sequences that clearly illustrate the technical concepts of ATM and explain the components of a complete solution. Share the experiences of early adopters who are moving to ATM to increase network performance, reduce costs, and enable a new generation of high bandwidth applications that integrate voice, image, and video as well as data. Interviews include: *Mike Armstrong, Chairman/CEO, GM Hughes Electronics; George Buchanan, Director Hughes Business Communications, GM Hughes Electronics; Jeff Marshall, Sr. Managing Director, Bear, Stearns & Co.; Martin Adler, Consultant, ARCO.*

Hear leading industry authorities provide the keys to building a business case for ATM in your organization. Interviews include: *E.W. Bud Huber, Chairman, Enterprise Network Roundtable; Dr. John McQuillan, President, McQuillan Consulting; Dr. Robert Kahn, President, Corp. for National Research Initiatives; Sam Shuler, Principal, The Yankee Group.*

Sponsored by more than 35 of the leading ATM vendors, *Getting Started With ATM* is the essential tool in your evaluation of ATM. And the best way for both business and technical management to learn when, where and how ATM fits in your future. If you plan, implement or approve networking solutions, this is one resource you won't want to be without.



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meant for such embedded applications as medical imaging instrumentation, factory floor controllers, telecommunications equipment and high-end printers and copiers. Price is $1,995.

Tadpole Technology Inc.
12012 Technology Blvd.
Austin, TX 78727-6208
Circle 102

NCD Shows Entry-Level X

X terminal vendor NCD has introduced a line of entry-level models called the Entry Color X Terminal (ECX) series. The line consists of three

systems that take the place of the company's earlier low-end products. The new terminals are the 14-inch ECX14 at $1,795, the 15-inch ECX15 at $1,995 and the 17-inch ECX17 at $2,595.

The devices have a resolution of 1,024 by 768 pixels and a performance of 52,000 Xstones. They also have a PCMCIA slot and a parallel port. In addition, the machines support a local file system with up to 20 MB of flash memory for system software, fonts or configuration data.

Network Computing Devices Inc.
350 N. Bernardo Ave.
Mountain View, CA 94043
Circle 103

T3 Board for SBus

An SBus board that delivers T3 speed networking has been introduced by ADAX. The APC-SBX/DS3 is a controller board that gives an SBus system T3 throughput, that is, 45 Mb/s. T3 speeds allow a WAN to support such things as full-motion video.

The board supports a separate and interchangeable coprocessor dedicated to each channel for LAPB and LAPD error correction and flow control, and HDLC processing. Each coprocessor can be configured to support frame relay or SDLC link level protocol in the transparent mode. The board supports multiple protocols up to DS3/E3, including X.25, frame relay and SNA.

Pricing on the product is approximately $5,000 in quantities of 10. There is also an EISA version that is similarly priced.

ADAX Inc.
614 Bancroft Way
Berkeley, CA 94710
Circle 104

Rcrypt for Solaris

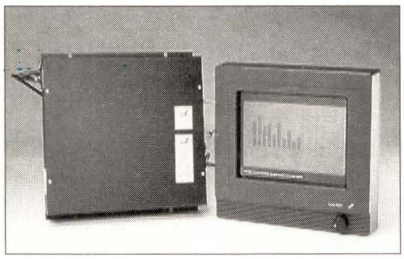
Software that provides data encryption and tamper detection for SPARC systems running Solaris 2.X or SunOS 4.1.X has been released by Ciphergen Research. The company says that the product, Rcrypt, offers single and multiple key encryption, up to 1,000 character (128-bit) reusable keys, file integrity verification and automatic error correction.

Rcrypt can be a standalone product, or it can be incorporated into other applications. Pricing begins at $750 per license.

Ciphergen Research
P.O. Box 3201
Columbus OH 43210
Circle 105

A Terminal that Doesn't Explode

A full-sized touch display terminal that is "intrinsically safe" in combustible or explosive environments has been brought to the market by Deeco



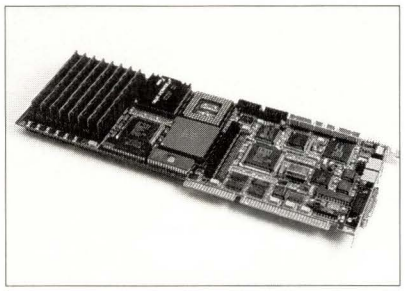
Systems. The Intrinsically Safe Terminal is a ruggedized flat-panel touch terminal that emulates the Digital Equipment Corp. VT320 text terminal. What makes the device usable in dangerous areas, though, is that it comes in two parts–a controller section, housed in a safe area, and the display itself, which is used in the hazardous area.

The display, which houses a reflective LCD flat panel, connects to the controller via a fiber-optic cable for display and copper wiring for the touch screen commands and power. As a result, the company says, the device doesn't require large gas-filled protective packages or explosion-proof outer boxes. Pricing, in volume quantities, is $5,895.

Deeco Systems
31047 Genstar Road
Hayward, CA 94544-7831
Circle 106

SPARC for PC/AT

A coprocessor board that allows an ISA-based device to run Sun applications has been introduced by Opus Systems. The SPARCard 2X is the



newest in the company's long line of PC coprocessors–a line that stretches almost to the beginnings of the PC industry and which has included almost every 32-bit processor known, including the Fairchild/Intergraph Clipper and the Motorola 88000. The SPARCard 2X, however, is based on an 80-MHz SPARC. Opus says that with the card, a PC can run SPARC applications at speeds equivalent to that of a SPARCstation 10.

The SPARCard 2X comes with 16 MB of RAM (expandable to 64 MB), plus Ethernet, SCSI and serial ports. It also has two SBus expansion slots. A PC with the product installed can run SPARC applications on the SPARCard while running DOS and Windows applications on the native Intel Corp. processor. The user can then switch between the two environments via the company's own Incognito software.

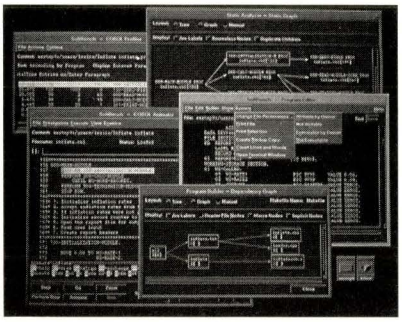
The company says that the SPARCard can be plugged into any

ISA or EISA system with two adjacent slots. Pricing begins at $5,995.

Opus Systems
Coronado Drive
Santa Clara, CA 95054-3203
Circle 107

COBOL on SoftBench

HP has produced two COBOL versions of its SoftBench CASE environment. These are the COBOL SoftBench and the COBOL/C SoftBench,



and the company says the two products are meant to assist business-oriented COBOL programmers in converting from mainframe to open-systems environments.

The COBOL SoftBench product combines HP's SoftBench environment with COBOL compiler and development tools from Micro Focus. The COBOL/C product has the same features, plus the HP-UX C Developers kit, which allows programmers to developed mixed C and COBOL programs and to learn C while they are still working in the older language.

Pricing for a COBOL SoftBench license starts at $2,795; the COBOL/C license at $3,195.

Hewlett-Packard Co.
3000 Hanover St.
Palo Alto, CA 94304
Circle 108

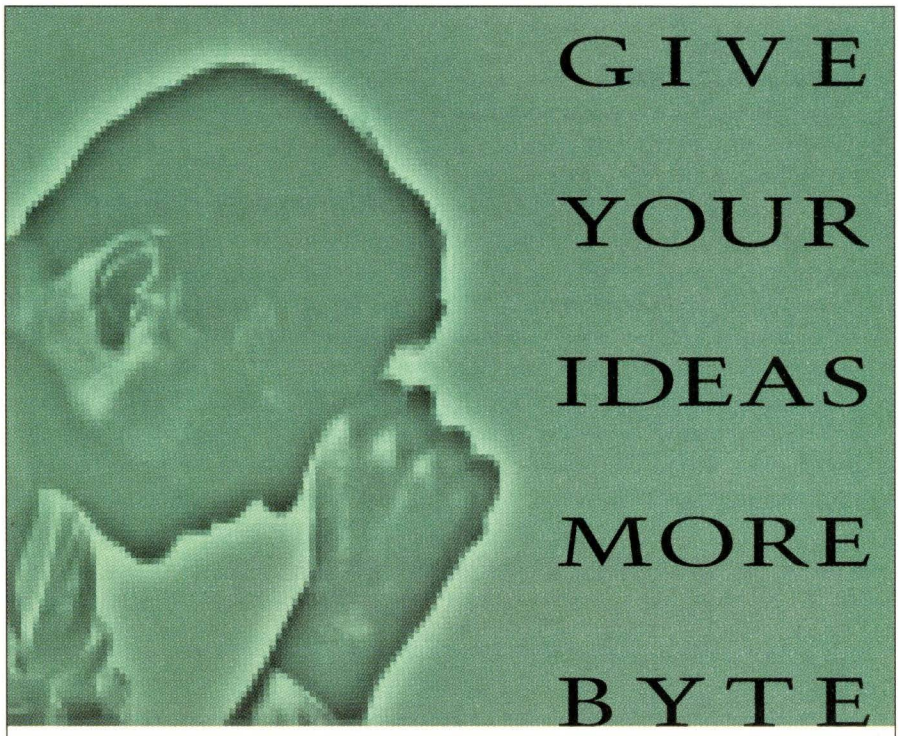
Perlan's Got the Connections

Thanks to a 10Base-T transceiver unit from Perlan, users of workstations, PCs and Macs can now connect their equipment to LANs using twisted-pair cables. The PTT-1001 also allows the interconnection of bridges, routers, hubs and terminal servers using twisted pair. The transceiver is fully compatible with the IEEE Ethernet 10Base-T specifications.

The unit fits any type of data terminal equipment (DTE) with an AUI connector and connects to 10Base-T wiring using an RJ-45 connector.

Perlan also introduced a fiber optic miniature transceiver in support of Ethernet LANs. The PTF-1000 can be attached directly or via AUI cabling to PCs, workstations, bridges, routers, terminal servers, etc. The PTF-1000 extends cabling connections up to 2 kilometers between devices and is capable of supporting single and multimode fiber. It meets IEEE 802.3 10Base-FOIRL specifications.

Both products offer a monitoring feature that provides six colored LEDs



RICOH

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Schaumburg, IL 60173
TEL: 708-519-1060
FAX: 708-519-1248

Circle No. 9 on Inquiry Card

indicating link, power, collision, jabber, transmit and received activities.

Volume buys are priced at $35 for the PTT-1001, and the PTF-1000 is $199. Distributor and OEM inquiries are welcome.

Perlan Inc.
1181 North 4th St.
San Jose, CA 95112
Circle 109

Aries Shows New SPARCalike

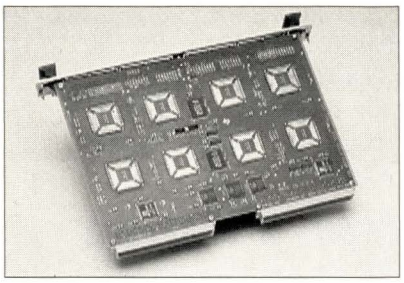
Aries Research has introduced a new SPARCstation 10 compatible–a SPARCalike–which the company says is 20% less expensive than Sun's original. The Matrixx ds is feature-for-feature compatible with the SPARCstation 10. It has two Texas Instruments Inc. 50-MHz SuperSPARC processor modules with 1 MB of external cache. It comes with a floppy disk, 64 MB of RAM, 1.05 GB of internal hard drive, a keyboard and a Solaris RTU license with documentation and media.

The Matrixx ds can be expanded to up to four processors. The product can also run Solaris 2.3, and with that OS the Matrixx ds can make use of Fujitsu/Ross HyperSPARC processors. It has two MBus slots, four SBus slots and comes standard with on-board Ethernet and ISDN interfaces. A variety of industry standard I/O ports and peripherals are also supported. Pricing begins at $26,200.

Aries Research Inc.
46791 Fremont Blvd.
Fremont, CA 94538
Circle 110

Eight-way DSP Board

An eight-processor DSP board for VME that requires no daughtercards has been announced. Mizar's MZ 7772 provides eight Texas Instruments Inc. TMS320C40 DSPs on a single-slot 6U VME card. The company says this may be the first VME card to offer so many C40s without daughtercards or other expansion methods.



Each C40 processor is a 50-MHz device capable of 50 MFLOPS. The total performance of the board is thus 2.2 billion operations per second. Each DSP is configured with six 20-MB/s communications ports and a six-channel DMA coprocessor. Two of each DSP's communication ports, or a total of 16, are routed to the 7772's front panel to provide 320-MB/s data I/O. Each C40 also has its own 100-MB/s expansion interface, for up to 800 MB/s of memory or I/O expansion. The board, meanwhile, has a VMEbus interface that supports 60-MB/s block transfers over the VMEbus.

Upgrades, Enhancements, Additions...

• Command Corp. has introduced Version 2 of its IN3 Voice Command speech-recognition system for SPARCstations. The new version has what the company calls a "smart" interface for Solaris that automatically tracks active windows focus and dynamically activates associated voice commands. **Command Corp. Inc.**, 3775 Crestwood Parkway, P.O. Box 956099, Duluth, GA 30136-9502. **Circle 111**

• The Bristol Group has announced a version of its IsoFax product that allows users of Delrina Corp.'s WinFax Pro to use fax modems attached to UNIX-based servers. With Isofax/win, users of the WinFax Pro PC fax software don't need individual fax-modems. Instead, they can create the faxes and then dump them upstream to a server equipped with a fax modem and Bristol's Isofax software. **The Bristol Group Ltd.**, 100 Larkspur Landing Circle, Suite 200, Larkspur, CA 94939. **Circle 112**

• Aurora has provided workgroup-oriented features to its Socrates OCR for SPARC systems. The new release allows the device to be controlled by command-line interfaces–meaning that it can be accessed by any terminal, PC or workstation in a network. **Aurora Technologies Inc.**, 176 Second Ave., Waltham, MA 02154. **Circle 113**

• The GXTRA SBus graphics accelerator cards and GXTRAstation SBus connect terminals from Tech-Source now run under Solaris 2.2. The GXTRA accelerator is a graphics device that allows a SPARCstation to drive a second monitor and hence support another user. The GXTRAstation is the same hardware bundled with a monitor. Tech-Source argues that such a device is, in effect, an X terminal that happens to attach to a bus rather than a network. **Tech-Source Inc.**, 442 S. North Lake Blvd., Altamonte Springs, FL 32701. **Circle 114**

• Xoftware/32, AGE Logic's PC X Window server software, is now available for Windows NT systems. There are, in fact, two versions of the product–one for Intel Corp.-based PCs and one for MIPS processor-based systems. **AGE Logic Inc.**, 9985 Pacific Heights Blvd., San Diego, CA 92121. **Circle 115**

• BBN Systems and Technologies has introduced Release 3.1 of its Probe time-series data-analysis tool. The new version features a number of enhancements in the way that the product takes large data sets and attempts to find themes or trends within them. For example, Release 3.1 enhances its data-reduction and signal-processing capabilities by incorporating IEEE filter design software. **BBN Systems and Technologies**, 10 Moulton St., Cambridge, MA 02138. **Circle 116**

• Version D.01 of Maestro, Unison-Tymlab's workload-management software for UNIX and heterogeneous networks, has been released. The new version has improved support of TCP/IP. The product is said to allow system administrators to run important processes on UNIX systems while farming out other tasks as slave processes to Hewlett-Packard Co. MPE systems. **Unison-Tymlabs**, 675 Alamanor Ave., Sunnyvale, CA 94086. **Circle 117**

Each C40 can be linked to as much as 8 MB of RAM, while the board itself has one megabyte of Flash EEPROM and one kilobyte of RAM for system configuration data. Pricing on the MZ 7772 begins at $18,700.

Mizar Inc.
2410 Luna Road
Carrollton, TX 75006
Circle 118

MiLAN Shows Full Duplex

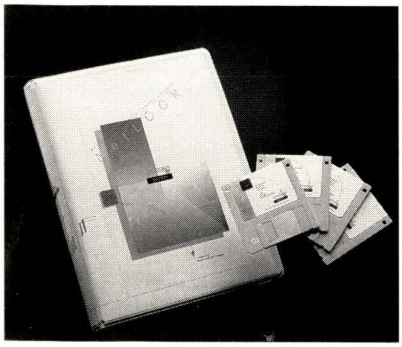
A device that connects fiber-optic cable to full-duplex ports on Ethernet switching hubs has been unveiled by MiLAN. The Fiber•Twist Model 150 is a palm-size device that allows a system or network administrator to connect a full-duplex 10BaseT port on a switching hub to 10BaseFL fiber-optic cable.

Full-duplex Ethernet doubles the 10-MB/s throughput of traditional Ethernet by simultaneously transmitting and receiving data on the same port. While it has not been adopted as an IEEE standard, it is supported by a number of Ethernet hub vendors. However, relatively few options exist to connect duplex Ethernet hubs with fiber rather than twisted pair. The Fiber•Twist does so, and the company says it may be among the first such products on the market. Pricing begins at $495.

MiLAN Technology
894 Ross Drive, Suite 101
Sunnyvale, CA 94086
Circle 119

Network Security from Hughes

If you've been reading too much cyberpunk fiction, or should you believe your network traffic is in danger of falling into the wrong hands (or



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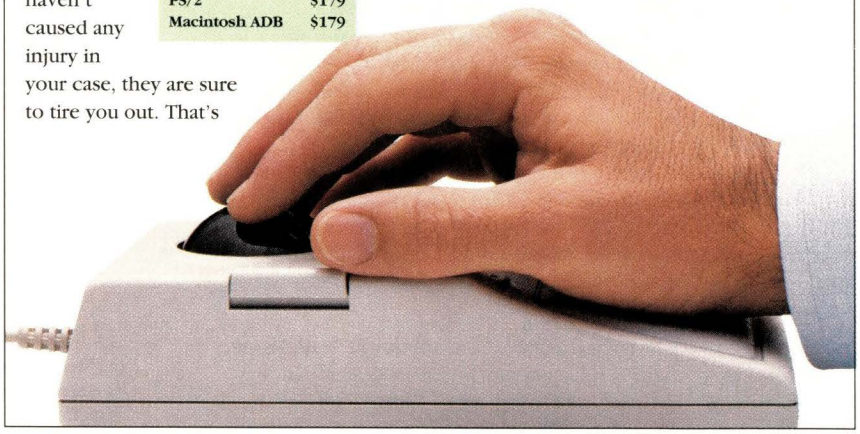

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nodes, as the case may be), Hughes Information Security Products has introduced a product designed to help you sleep a little better. Netlock is software meant to ensure the privacy of data communications in LANs and WANs. Netlock is a commercialized version of software developed by Hughes' parent company, Hughes Aircraft Co., for security-conscious federal and military groups.

NetLock encrypts data packets via a variety of standard methods, such as DES. It then uses a system of checks to ensure only the intended recipient can even look at the packet. A workstation must have a certificate to obtain the message and a key to decrypt it.

The company says that the product comes with facilities to automatically manage shared keys and certificates. Pricing begins at $3,995 for a ten-user license.

Hughes Information Security Products
1901 W. Malvern Ave.
Bldg. 618, MS K325
Fullerton, CA 92634-3310
Circle 120

Pmake Promoted

A parallel `make` utility, Pmake, has been introduced by Tarek Parallel Systems. The company says that Pmake executes `makefile` over multiple UNIX workstations in parallel, thus reducing the total `makefile` execution time. Terek says this is particularly useful for companies that build software releases.

Pmake is compatible with GNU and UNIX `make`. It runs on Sun, IBM Corp., Hewlett-Packard Co. and several other UNIX systems, including Solaris X86. Pmake requires 2 MB of disk space and is priced at $1,500.

Tarek Parallel Systems
P.O. Box 360098
Milpitas, CA 95036
Circle 121

UPS with Diagnostic Display

A UPS system with a diagnostic front panel has been introduced by Computer Power. The Computersave Mark II features LED indicators that show the battery-charge level and load capacity. In addition, it can have four optional user-definable alarm locations.

The Mark II's capacities range from 900VA to 19KVA. Pricing begins at $1,600.

Computer Power Inc.
124 W. Main St.
High Bridge, NJ 08829
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USI ***Uni Solution, Inc.***

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SynchroWorks is currently available for Solaris 1.0 and 2.3 for SPARC and will also support SunSoft's distributed object computing environment (Project DOE).

Oberon is compliant with the Object Management Group's specifications for distributed object computing and provides an interface for accessing IDL-compliant objects. Future releases will provide direct support for CORBA and IDL standards scheduled to ship concurrently with SunSoft's Project DOE. A single-user trial license will sell for $995.

Oberon Software Inc.
1 Cambridge Center
Cambridge, MA 02142
Circle 123

Token Ring on the Go

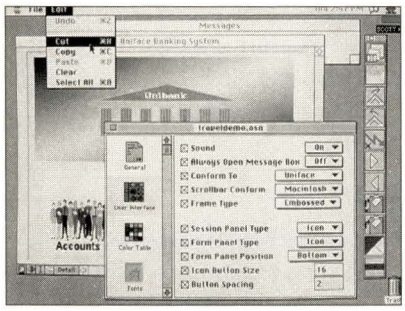
Adapters that allow portable computers to connect to token-ring networks have been introduced by Xircom. The first is the CreditCard Token Ring Adapter. This allows a portable computer to link to token ring through its PCMCIA Release 2.0-compliant card slot.

The second product, the Pocket Token Ring Adapter III, connects a portable system to a token-ring network via the parallel port. Both adapters are priced at $599.

Xircom Inc.
26025 Mureau Road
Calabasas, CA 91302
Circle 124

Client/Server on Mac

For integrators building client/server networks based on SPARC-based servers and Macintosh clients, Uniface has introduced a Macintosh version of its development environment. The Uniface 4GL and development environment allows programmers to quickly build applications atop leading RDBMSs, such as Ingres, Informix and Oracle. Uniface for the Macintosh allows developers to front end a system on a Mac, with all the familiar end-user personal productivity tools, and then query a database on a UNIX server.



Uniface for Macintosh supports major System 7 features, such as Apple menus and Balloon Help. It supports MacTCP and DECnet networking protocols. A single Mac development license is $4,400.

Uniface Corp.
1320 Harbor Bay Pkwy., Suite 100
Alameda, CA 94501
Circle 125

DataViews With Live Video Views

V.I., the manufacturer of DataViews, and Parallax, a manufacturer of video cards, have combined forces to enable DataViews to integrate live video feeds. Video integration is possible via Motif Object Dynamics (MOD), a new feature of DataViews that makes Motif development easy by complying

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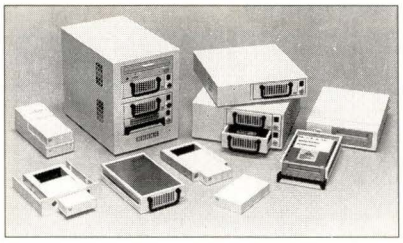
with industry standards. MOD allows them to manipulate objects rapidly with a programming layout and design most familiar to them. Developers can create animated graphics widgets that ensure portability and future compatibility with X software platforms.

DataViews with Video has been selected by The Texas Transportation Institute to build real-time graphical interfaces for a next-generation computerized traffic-management system. A development license is $17,700.

V.I. Corp.
47 Pleasant St.
Northampton, MA 01060
Circle 126

The Phoenix in Storage

The Phoenix line of storage subsystems can enhance any workstation configuration by meeting demands for mass storage requirements. Sun, Digital Equipment Corp. and Silicon



Graphics Inc. equipment are supported as well as Macintosh and PC platforms.

Phoenix designs can be platform internal, desktop external or rack-mounted and will handle any standard 3½- or 2½-inch form factor device from multigigabyte disks to DAT drives. External units can also accommodate 5¼-inch devices with removable media such as CD-ROM, rewritable optical, tape, cartridge and hard-disk drives. Prices range from $700 for a 240-MB internal unit to $4,600 for a four-bay 21-GB unit.

MDB Systems Inc.
812 W. Southern Ave.
Orange, CA 92665
Circle 127

Fax-a-CAD

Formtek has come up with something architects, engineers, draftsmen et al. have been awaiting. Cadfax, a new software application, allows users to fax large-format drawings directly from their UNIX workstations to conventional fax machines. Such large drawings as J-size roll and well logs can be sent in overlapping strips or pages or scaled down to fit the width of the destination fax. Cadfax prints an overlap on each strip or page, as well as optional registration marks, to ensure easy reassembly.

Cadfax operates directly on the native CAD file, eliminating the fax-scanning process and creating a high-quality printout. Output is precise and to scale because the fax image is constructed directly from the CAD model using the exact resolution specified in the CCITT Group 3 fax standard for fine resolution.

A Motif GUI with pop-up windows guides users through procedures. Context-sensitive on-line help is provided. Transaction logs track faxing and can be used for transmission verification and billing purposes. Email systems are also integrated for confirmation or failure notification.

One server and a commercial fax modem support an unlimited number of client workstations.

A starter kit (one client and one server) costs $1,999; additional clients are $399 each.

Formtek Inc.
661 Andersen Drive
Pittsburgh, PA 15220-2746
Circle 128

Plotting Software

Quickplot from Apropos is aimed at simulation, text and data-acquisition environments in which users generate large numbers of plots to validate models and document system characteristics. Quickplot is a generic tool that provides a fast, flexible means for plotting large quantities of data.

A free demo is available via ftp from `world.std.com` in the directory `/pub/Apropos`. Pricing starts at $295 for a single-user license.

Apropos Software & Associates
2353 Mulberry Ave.
Lancaster, CA 93535
Circle 129

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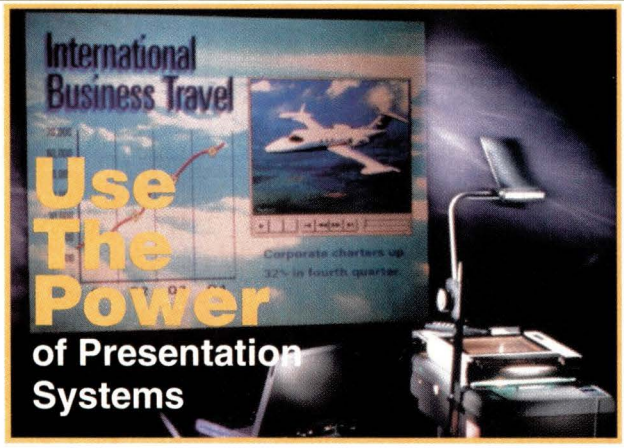

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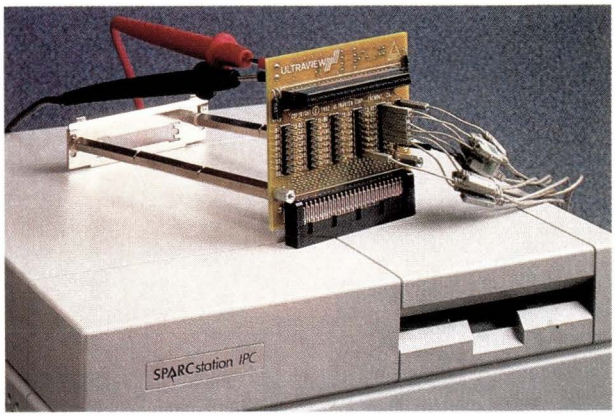

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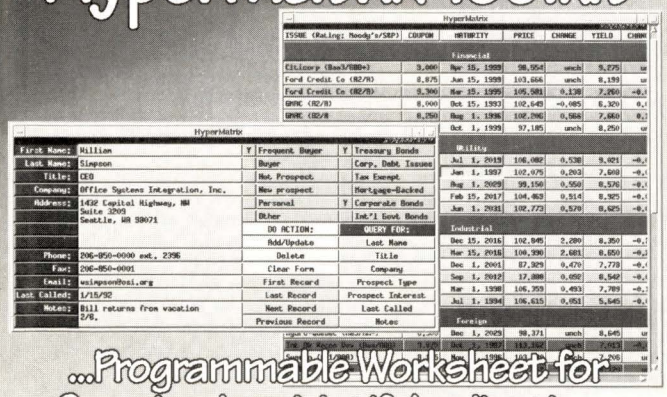

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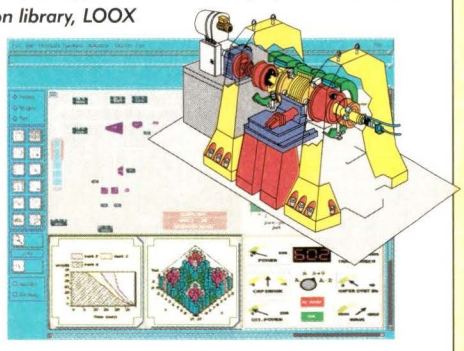

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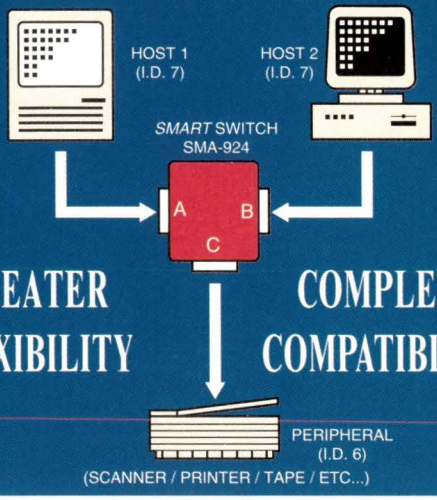

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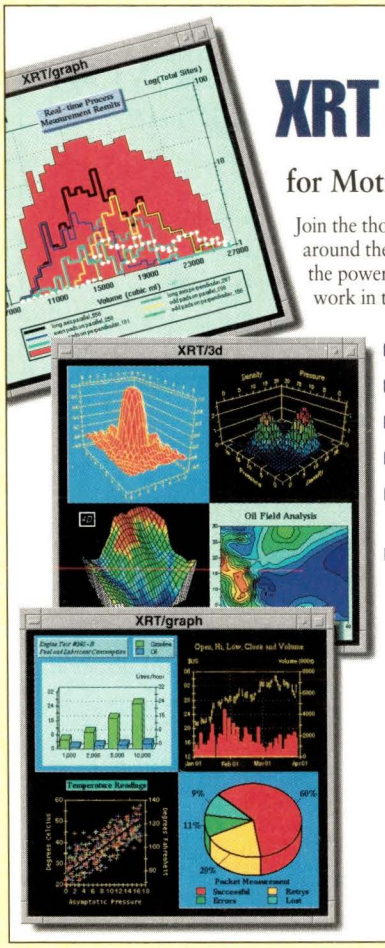

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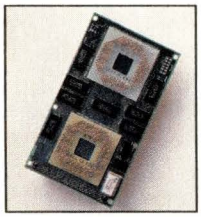

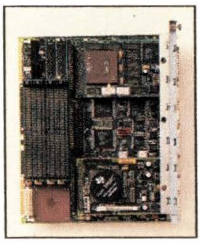

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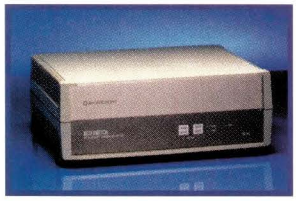

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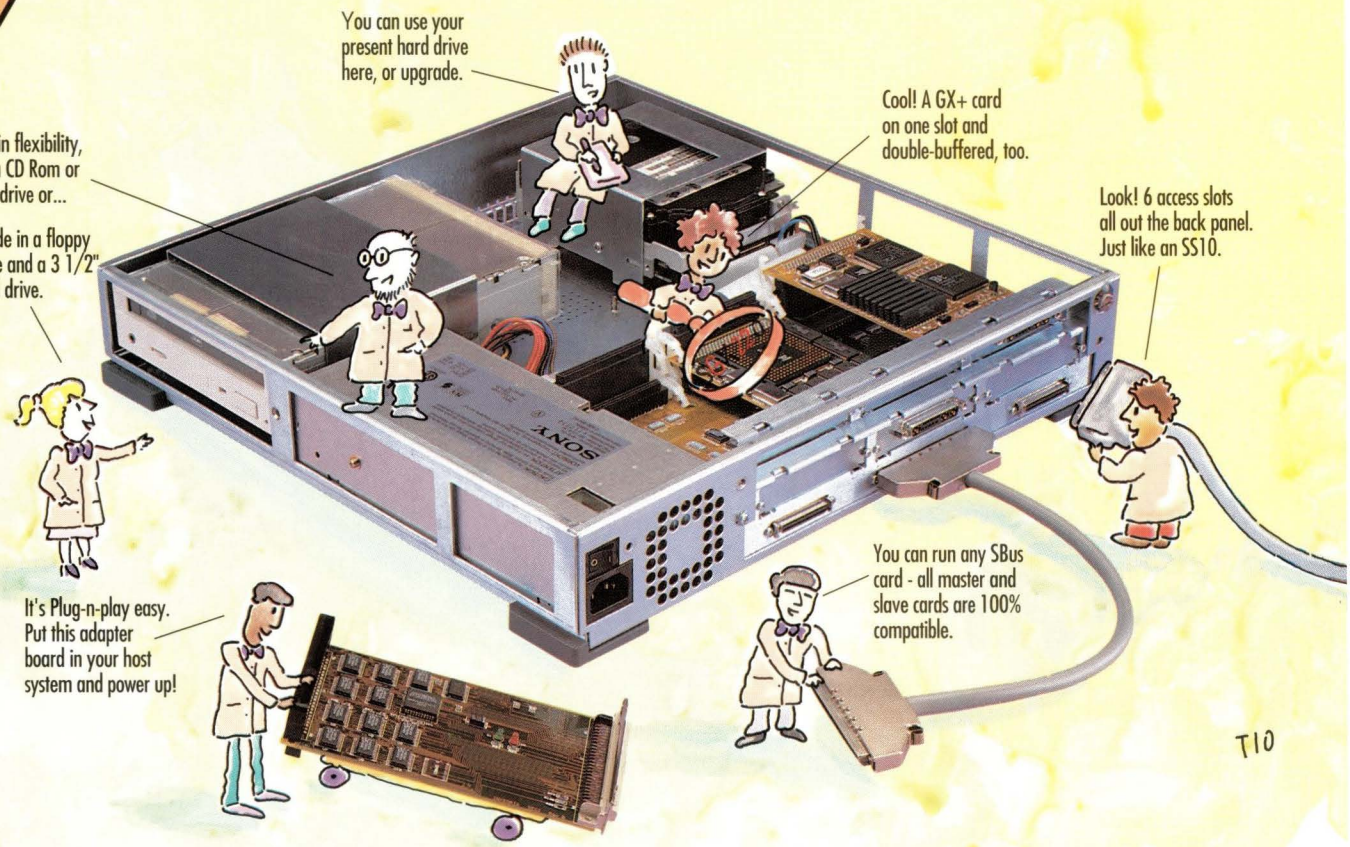

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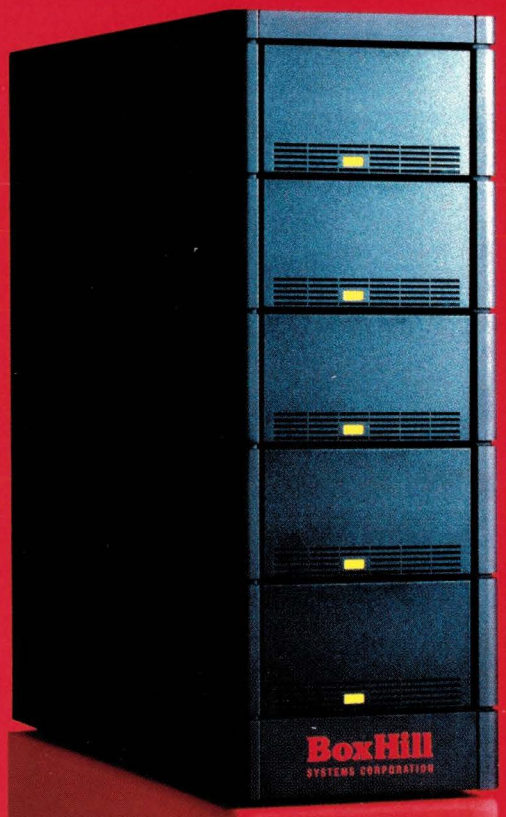

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