SUNEXPERT

An Independent Forum for Open Systems

SEPTEMBER 1992 Vol. 3 No. 9 $4.50

Field of Dreams

Can SPARC Score in Commercial Markets?

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Next-Generation SPARCalikes

News: UNIX Training

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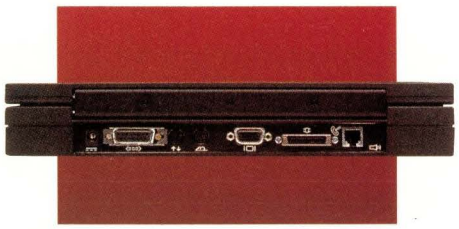

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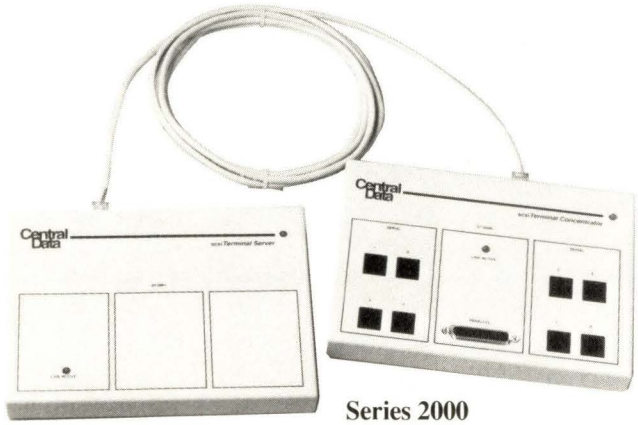

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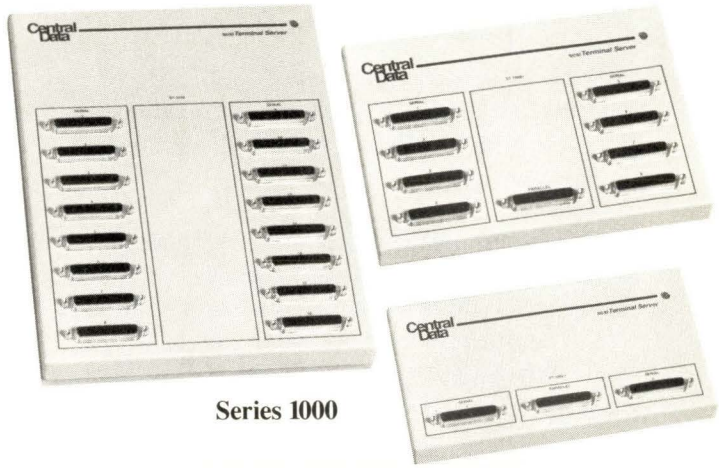

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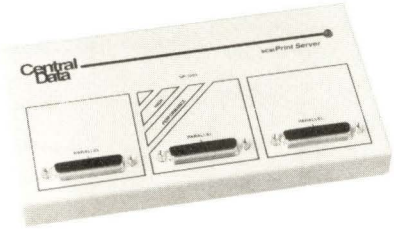

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Photograph of the field by Susan Bliss

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

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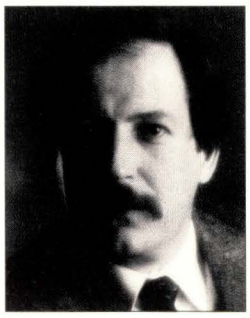
Editorial

Touching Base

In this month's cover story, "Field of Dreams...and Realities," our Fearless Reporter, a k a Michael Jay Tucker, catches up with some commercial Sun users, both great and small, who are betting the company on Sun systems. You often hear about the big early adopters on Wall Street who have some of everything, such as J. P. Morgan, but in this story you'll also discover a few companies on Main Street where Sun and client/server computing are quietly changing the business–and you may have fun, too.



Many of the illustrations for this story include well-known baseball gear–see if you can find Babe Ruth's bat among them. We can't turn the Babe's bat around because we don't own the merchandising rights to the name. Thanks to the National Baseball Hall of Fame and Museum, Cooperstown, NY, for access to some of the artifacts of the boys of summer.

Also this month, Mary Jo Foley takes a look at the SPARCalikes of summer in "(Somewhat) Rested and (Sort of) Ready." Many vendors have just gotten SPARCstation 2 compatibles out the door. But, in May, Sun's SPARCstation 10 announcement ratcheted up the performance and changed the architecture required to compete for new or upgrading customers. The SPARCalike vendors are rushing to put finishing touches on their SS10-based and yet-unannounced Tsunami-based systems. But it seems the compatibles vendors have learned a lesson from trying to keep up with Sun in the past. This time they are apparently ready to ramp up. The only holdup for the SPARCalike companies (and Sun, as well) has been the lack of production quantities of the Texas Instruments Inc. Viking chip.

Doug Pryor

Doug Pryor

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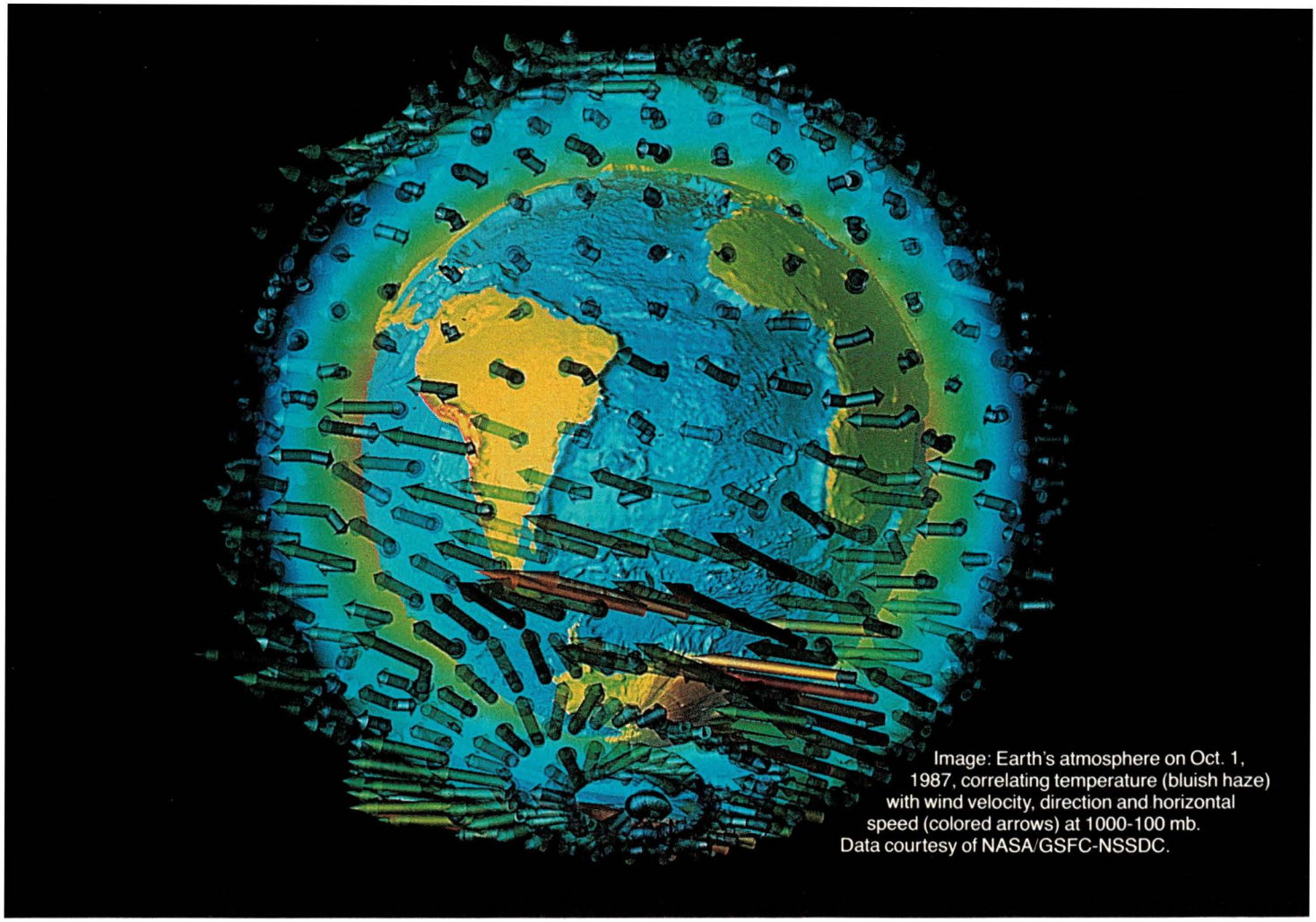

Image: Earth's atmosphere on Oct. 1, 1987, correlating temperature (bluish haze) with wind velocity, direction and horizontal speed (colored arrows) at 1000-100 mb. Data courtesy of NASA/GSFC-NSSDC.

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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

Yesno, Maybe

Dear Peter Collinson:

I appreciated your UNIX Basics column in the June *SunExpert* [Page 28] since I am a beginner at shell programming. However, I had a question about your `yesno` function. Where should that go? Should it be in the same file as the shell that calls `yesno`, or can it be in a separate file? I can not get it working in either case, since the function is not understood by the shell. My first line is `!/bin/sh`.

Thanks for your help.

Lloyd Martinson
`lmartins@shearson.com`

Mr. Collinson replies:

It should go at the top of the file. And, whoops. Yes, I used the ksh form... Start with

```
yesno() {
```

and things should work.

And the Answer Is...

Dear Editor:

Barry Shein's feature entitled "Parallel Universes," (*SunExpert*, June, Page 82) discussed how users of large programs may someday be able to take advantage of parallel processing on their Sun workstations. We have available today a parallel linear algebra library that allows scientific and engineering users to get the high performance of parallel processing on their existing hardware.

DSSLIB is a library of parallelized and optimized subroutines that is based on LINPACK and levels 1, 2 and 3 of the Basic Linear Algebra Subprograms (BLAS). DSSLIB is 100% compatible with LINPACK and BLAS and does not require any code modifications, so users can parallelize their programs simply by relinking with DSSLIB. When the user calls a subroutine, the work is spread over machines in the network that have idle cycles available, and so a given computation can run much faster than it would using only one machine.

Mike Boucher
`mboucher@silver.sdsmt.edu`

Shell Programming Basics

Dear Peter Collinson:

I just wanted to thank you for the great June article in *SunExpert* [Page 28]. I have been writing shell stuff for years, but your basic article answered a bunch of questions I couldn't glean from UNIX documentation. Your article was well written, easy to follow and covered just the topics I wanted to understand more clearly. Thanks!

Walt Prue
`prue%ISI.EDU`

Nonunique Ethernet

Dear Mr. Protocol:

Why are some vendors allowed to provide the facilities to do this? I do realize that in your virtualness you're not necessarily familiar with each vendor's hardware details, but try this on for size: I'm under the impression that DEC provides the user with the ability to modify his Ethernet address. I'm not sure "how" this is accomplished (curious, though) or why they need to provide this "feature." Any notion? Is this legal (in the eyes of the NIC)?

Sean Murphy
`sean@gerbil.applix.com`

Mike O'B. for Mr. P:

The Assigned Number Authority for Ethernet gives Ethernet addresses out in blocks to different manufacturers of Ethernet hardware, and those addresses are wired (well, all right, programmed in ROM) into each interface as it is manufactured.

Mr. P. has not heard that DEC is manufacturing Ethernet address-agile interfaces, but if they are, he thinks this is a) silly, b) dangerous and c) useless. Practically speaking, Ethernet addresses exist solely to be placed into ARP tables, so that equivalent IP addresses may be looked up there, so that Ethernet encapsulations can be built around IP packets. Now, it is certainly true that changing the IP address is as easy as changing an entry in a table, but changing an Ethernet address is a different matter altogether. If DEC does allow this, Mr. Protocol would love to know why.

Overlooking GUI Tools

Dear Editor:

We were very excited to receive the May issue of *SunExpert* with the Special Report on GUI tools. Unfortunately, we were disappointed to find that Bluestone was omitted from the "Guide to GUIDEs" on Page 68.

Bluestone is committed to providing a complete set of products and services in the UNIX and open systems market with a special focus on graphical user interfaces. These products and services include Motif, UIM/X, Onyx, XRT/Graph as well as technical support, training, integration and consulting services.

Bluestone has announced the first release of Onyx, a GUI translator for character applications and the only UIM/X integrated with XRT/Graph. In addition, Bluestone has recently come to an agreement with Science Applications International Corp. to resell SAIC VUE. We feel these nicely complement our line of products: UIM/X, XRT/Graph, Motif and Motif development libraries, and the X Window System.

Chris Baeckstrom
Senior Consultant
Bluestone Consulting Inc.
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Mount Laurel, NJ 08054

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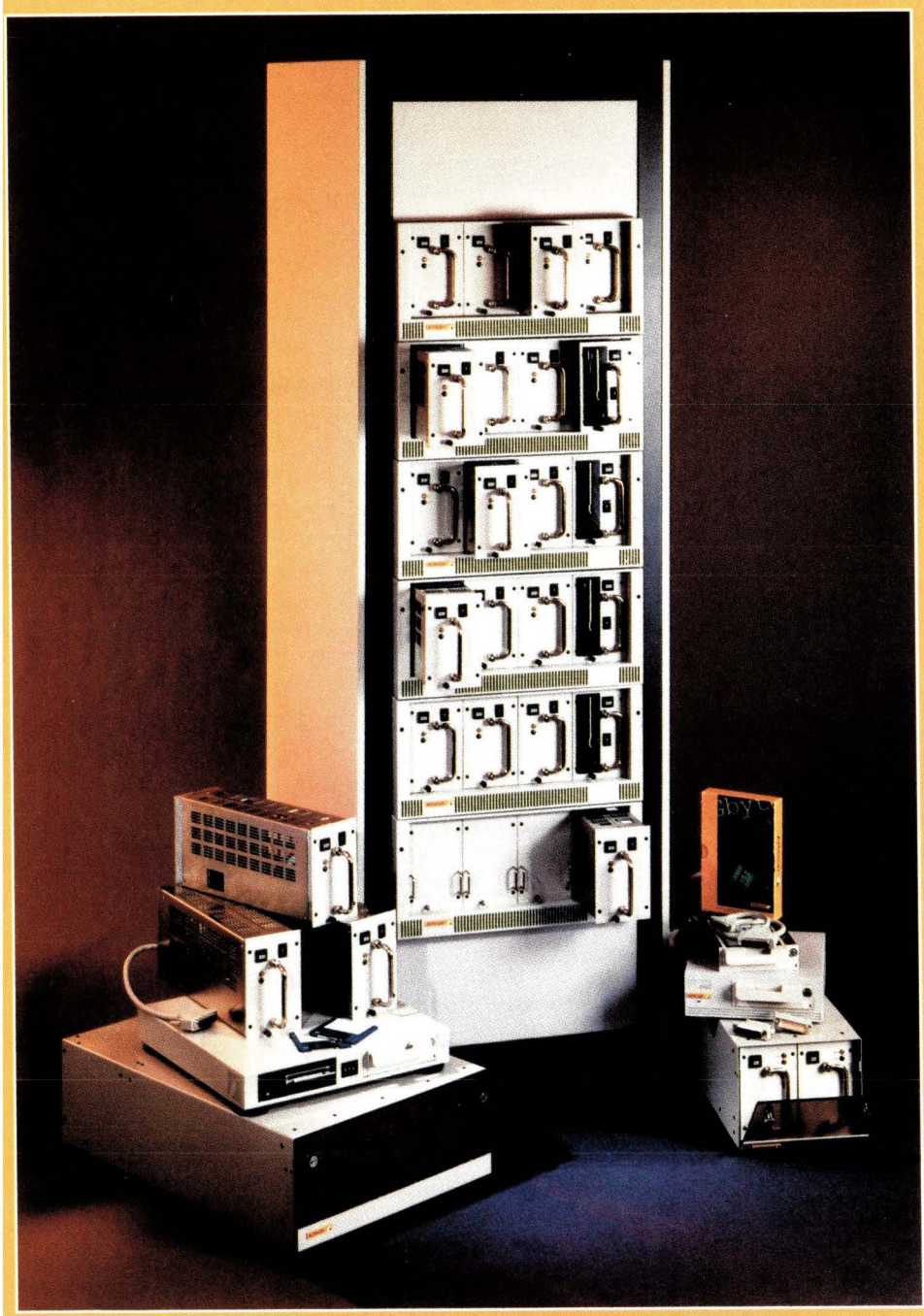

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SunPro and Con

Dear Editor:

We would like to clarify a few details concerning our SPARCworks development environment. In the article "Oh, Say, Can You C" (*SunExpert*, July, Page 20), there was some misleading commentary regarding product availability and platform exclusivity.

In September of last year, SunPro announced SPARCworks Professional, a new family of development tools for the Solaris 2.0 operating environment. We announced that SPARCworks would be available by mid-1992, and that these tools would be ported to the Intel platform, along with Solaris.

As planned, SunPro began shipping SPARCworks for Solaris 2.0 in July. A month earlier, at PC Expo, we previewed an early version of the Intel tools running on a non-SPARC system.

Contrary to the statements in the article, SunPro is the first compiler/programming-environment vendor to deliver products for Solaris 2.0. And we are committed to porting our environment to other platforms, like Intel.

Joe Keller
Manager, Product Marketing
SunPro

OSI Woes

Dear Editor:

I think that Peter Salus (*SunExpert*, July, Page 50) was much too charitable toward OSI. From my experience, trying to make seven different X.400 implementations (primarily X.400 gateways from proprietary mail software) work together, there are at least two other major problems: lack of real interoperability and lack of support for OSI products from the vendors.

To be fair, we had a relatively small number of problems below layer 7. There were a few problems getting addressing right and a number of problems we caused ourselves, but once we got the various products set up right, they worked (over a WAN)–and worked well at the lower layers. But they don't interoperate well at all. This means that either the vendors didn't implement correctly or the standards are loose enough so that conformance doesn't mean interoperability. Examples of problems are that between some of the binary combinations you can't reply to a message, that others received a message as one long line (no carriage control), that some of the packages have "weird" addressing–using their own domain-defined attributes instead of relatively normal addresses (you know like first name, middle initial and last name together with one or more organizations and/or organization units). I could go on and on.

Our relatively incomplete testing (we had only 15 tests for interoperability) showed that there were far too many holes (failures) in the pairwise tables we constructed. These holes represent frustrations to our users and to the help desk, which must answer "Why won't this work?"

Secondly, it seems that as major vendors (such as IBM and DEC) have sold so few OSI products (with even fewer in use), their normal support channels don't understand how to help with OSI. IBM required us to talk to engineers in Rome, Italy, for support, for example. DEC never seemed to have anyone who understood OSI at its customer support center, at all. The smaller vendors like Retix were better in this regard, by the way.

To end with a positive comment about X.400, I can say that it seems as though it is the best way to do what we want to do; no matter how flawed and difficult it is to work with. We have up to a dozen different mail systems in my company that need to be tied together. X.400 in theory looked like the perfect way to interconnect these. In practice, though it is far from perfect, we haven't discovered a better way.

David L. Hanson
Naperville, IL

They Do Alpha-Windows, Too

Dear Michael Tucker:

I write in response to "Alpha Terminals: Last Gasp or First Hurrah?" (*SunExpert*, May, Page 8).

First, may I congratulate you on such an objective, clear and comprehensive treatment of the Display Industry Association and AlphaWindows technology. I should however like to clarify one misconception regarding the development of an AlphaWindow manager for Sun and IBM RS/6000, viz. "Summitpoint Technologies Inc., Fremont, CA, has introduced an AlphaWindow manager for a Sun host and another for the RS/6000. 'I am not aware of anyone else working in the same area,'" says Prakash Sharma, vice president of products at Summitpoint. 'Most of the rest [of the members of the DIA] are concentrating on PC UNIX.' "

As one of the founding members of the DIA, JSB has played a leading role in the development of just such a product, MultiView Mascot, which is already the preferred window manager for most of the AlphaWindow terminal managers. Reflecting the company's focus on the traditional UNIX, rather than the PC UNIX market as suggested in the article, JSB has concentrated on making the Mascot available for traditional UNIX servers such as the Bull DPX/2, DEC Ultrix machines and HP 9000/800, to name but a few. Furthermore, this product is already available on a number of platforms, including the IBM RS/6000, and it will be available on the Sun SPARCstation/server from September.

May I thank you for your time and attention.

Sarah Lakeman
Marketing Communications Manager
JSB Computer Systems Ltd.
Macclesfield, Chesire
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SBus Follow-up

Dear Editor:

The July issue (*SunExpert*, Page 12) contains a letter I wrote discussing the "shell game" Sun plays with its customers and third parties. In that letter I refer to an SBus hardware timing issue that threatened many existing SBus products. Since then, there has been an interesting development.

The issue, a proposed change to the SBus' capacitive load limits, is no longer a threat. It has been removed from the SBus specification that the P1496 (IEEE) working group is now developing. This group received a strongly negative response to its first "draft" ballot, in large part because of this matter. Based on evidence derived from many sources, including real data from real devices in the real world, the working group concluded that the proposed change is not technically viable. In the words one of Sun's own representatives to the P1496 group, "It appears we [Sun] have been too aggressive."

There is a lesson here that I hope Sun heeds. I would also like to offer the following advice to those considering the purchase of an SBus-based product: Beware of any machine that offers four (or more) 25-MHz slots. Unless there are configuration limits or separate buses (i.e., two buses with two slots each) then it probably is not fully SBus compliant.

James D. Lyle
Vice-chair
P1496 Working Group

It's In the Mail

Excited, confused, inspired or irritated by something you read in *SUNEXPERT Magazine*? We would be happy to hear from you. Our email is always available to answer questions directed at our columnists: Michael O'Brien, Peter Collinson, Richard Morin, Peter Salus and S. Lee Henry. For the sake of brevity and type fit, we may edit letters, but we will try to respect the ideas. So, let us hear from you at dpryor@expert.com.

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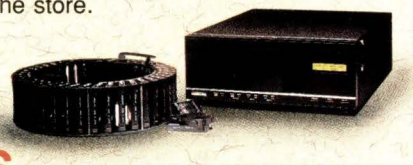

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NEWS

Heading Back to UNIX School

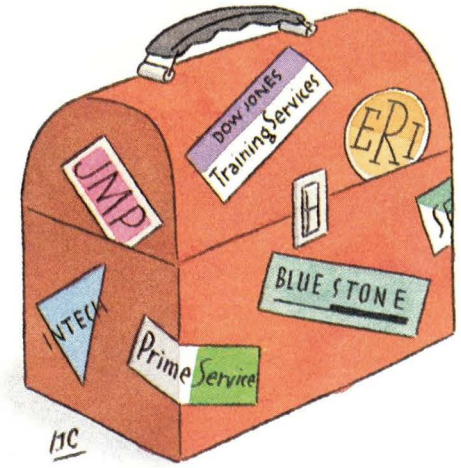
Whether you put stock in the theory that the pool of UNIX users is becoming more knowledgeable as their experience with UNIX grows, or less sophisticated as the OS gains a foothold among the unwashed masses, one thing is certain: More and more individuals are receiving UNIX–specifically, Sun Microsystems Inc.-related–training than ever before.

Sun itself, under the auspices of Sun Microsystems Computer Corp.'s worldwide customer support organization, claims to have trained 33,000 individuals in the past year at its more than 66 centers in 20 countries. It trained users in subjects ranging from the fundamentals of SunOS to desktop hardware maintenance–in more than 50 different topics, all told. While most courses last five days, "We [SMCC] will provide customized training on-site and tailor courses for customers' needs," says Cynthia Williams, the worldwide customer support strategic marketing manager.

SMCC has also contracted with seven educational partners in the United States to expand the geographic reach of its training effort. (Outside the United States, SMCC has partnered with various third parties to provide course registration, billing and delivery.) The U.S. partners are Barrios Technology Inc. (Texas), Bell Atlantic Business Systems (Wisconsin), Electro Rep Datacom Products Inc., or ERI (New York), JMP & Associates Ltd. (Georgia), Metters Industries Inc. (Virginia), New Horizons Computer Learning Center (California) and PrimeService (Massachusetts). SMCC manages course registration and provides course materials; the partners provide the instructors and facilities.

There is also a rapidly expanding pool of independent, third-party UNIX trainers offering Sun-specific courses, with Dow Jones Training Services, Princeton, NJ, the granddaddy among them. To boot, there are more and more third-party firms specializing exclusively in TCP/IP, network-management and/or business-oriented UNIX topics.

Live-instructor, hands-on training is just one of many education options. There are many good UNIX training videos (see *SunExpert*, April, Page 38) and self-paced workbooks. Computer-based training (CBT), which has been touted for years but has yet to fulfill its promise, is gradually gaining a toehold in the training marketplace. SMCC's first CBT showcase was slated to ship this summer: multimedia training software based on Gain Technology Inc.'s hypermedia, object-oriented software. The new software, combining text, graphics, sound and animation, is designed to give users on-line information on how to use Sun hardware and software.



GREG CLARKE

In spite of live training's higher cost, it remains the most popular educational choice. And it is where the bulk of third-party training providers are earning their bread and butter. Quite a few trainers are positioning themselves as being not only cheaper, but also more flexible, than SMCC.

For most, this increased flexibility entails performing training at customer sites. PrimeService, the Bedford, MA-based business unit of Prime Inc., finds that 30% of its customers have PrimeService's seven Sun trainers come to their sites to do training, according to Cynthia Born, manager of OS training for the customer education group. PrimeService uses its Dearborn, MI, facility to do training for SMCC; at its three other facilities, PrimeService also performs MIPS Computer Systems Inc., Prime, Solbourne Computer Inc. and PC/Mac training. But Sun training remains PrimeService's specialty, and Sun systems administration and SunOS fundamentals its most popular course offerings, Born says. PrimeService's "incestuous relationship" with Sun differentiates it from the training pack, Born says, noting that Computervision has been a strong Sun ally ever since it ported its CAD/CAM software to Suns in the mid-1980s.

East Providence, RI's Integrated Technologies Inc. (InTech) reports that 80% of its training is done at customer sites. InTech trains users on Suns, IBM Corp. RS/6000, Silicon Graphics Inc. and Unisys Inc. platforms, among others. "But Sun is where we cut our teeth," acknowledges company President Tom Aldous, and 80% to 85% of InTech's business is focused on training for the Sun platform. InTech's top three offerings are introduction to SunOS, systems administration and shell script programming, in that order. But the company also offers training in applications such as AutoCAD, FrameMaker and Wingz. "We'll go on site to train five people or more. Other companies require you to have 10 or more [who need training]," Aldous says. "And we can accelerate week-long courses to two days."

InTech also offers 30 days of free telephone support to anyone who has taken one of its courses. Hauppauge, NY's ERI, likewise, offers 30 days of phone support. But unlike many other Sun trainers, ERI has developed training as an offshoot of its primary business: systems integration. Manager of education services Brian DeMurley estimates that 70% of ERI's training customers are

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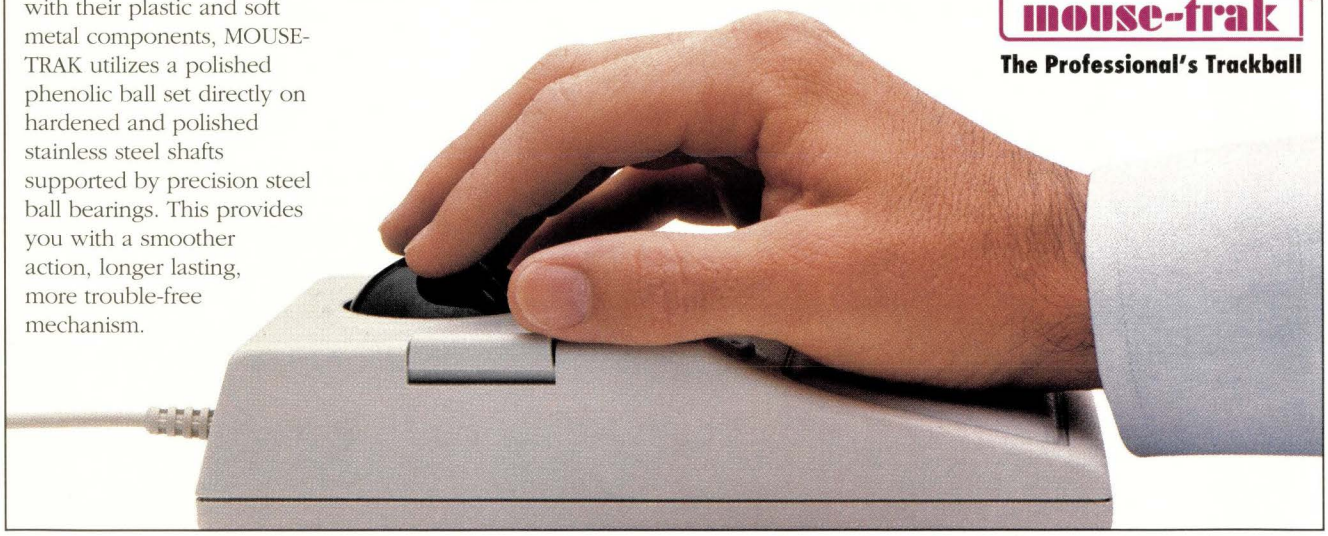

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people for whom the company has done integration work. As does PrimeService, ERI also acts as an educational partner with Sun, operating a training facility jointly with SMCC.

But Sun isn't ERI's only training platform. Sun-specific training generates nearly 60% of ERI's training business, he says, but customers are also employing ERI to perform IBM-, Hewlett-Packard Co.- and NeXT Inc.-related training, as well as PC and Mac training. Currently, 80% of ERI's training is done at customer sites.

"We're very, very flexible," DeMurley says. He notes that ERI, on occasion, has drummed up business throughout the various departments of companies in order to increase the number of course attendees, so as to spread the costs over more students. "We'll bring in experts [from other companies] to train [customers] in specific technologies, if needed, or will bring in people from other departments within ERI," to supplement ERI's five full-time and seven part-time UNIX instructors, DeMurley adds.

Bluestone Consulting Inc., Mt. Laurel, NJ, like ERI, offers training as one piece of its total service package. Almost all of Bluestone's courses are Sun-related, says company President Mel Baiada. Bluestone operates two centers and employs 15 to 20 UNIX trainers, he says. As opposed to the focus of most Sun trainers' classes, Bluestone's "programs are for programmers, large ISVs [independent software vendors] and large corporate staffs," Baiada explains. "They're not really for end users."–*mjf*

Wooing Apollo Users

Not content to allow archrival Hewlett-Packard Co. to win business without a fight, Sun Microsystems Computer Corp. has launched an aggressive trade-up program, aimed at the large HP/Apollo Domain user base. SMCC estimates there are 140,000 potential trade-up customers "who are running out of horsepower and are looking to move to UNIX/RISC." But to qualify, customers must hurry, since the last order date is October 31, 1992, and last shipment date is December 31, 1992.

Under the program, HP/Apollo customers can trade up to either a SPARCstation IPX or SPARCstation 2. Then, when the SPARCstation 10 begins shipping, they will be allowed to upgrade for a very attractive price. "In fact," according to a recent SMCC SunFlash posting to the net, "the SPARCstation 10 that results from a SPARCstation 2 to SPARCstation 10 Model 41 'two-step' upgrade will be about 25% less than the SPARCstation 10 Model 41," bought at current list price.

To qualify, Apollo and/or HP customers need only to trade in the any of the following systems in working order: DN2500, DN3000, DN3500, DN3550, DN4000, DN4500, DN5500, DN10000 and/or HP/Apollo 9000 Series 400. SMCC's trade-up customers don't need to turn in their equipment in order to begin

HP/Apollo Trade-Up to SPARCstations

SPARCstation IPX

Description	Order Number	List Price	Same Day Service Price
From HP/Apollo 9000-400 19-inch color monitor, 16-MB RAM, 424-MB disk with pre-installed Solaris, 1.44-MB 3½-inch internal floppy drive, microphone	SUG-400-IPX-D2S	$7,995	$125
Not including HP/Apollo 9000-400 19-inch color monitor, 16-MB RAM, 424-MB disk with pre-installed Solaris, 1.44-MB 3½-inch internal floppy drive, microphone	SUG-IPX-D2S	$8,995	$125

SPARCstation 2

Description	Order Number	List Price	Same Day Service Price
From HP/Apollo 9000-400 19-inch color monitor, 32-MB RAM, 424-MB disk with pre-installed Solaris, 1.44-MB 3½-inch internal floppy drive, microphone	SUG-400-SS2-D2S	$9,495	$140
Not including HP/Apollo 9000-400 19-inch color monitor, 32-MB RAM, 424-MB disk with pre-installed Solaris, 1.44-MB 3½-inch internal floppy drive, microphone	SUG-SS2-D2S	$10,495	$140

Source: Sun Microsystems Computer Corp.

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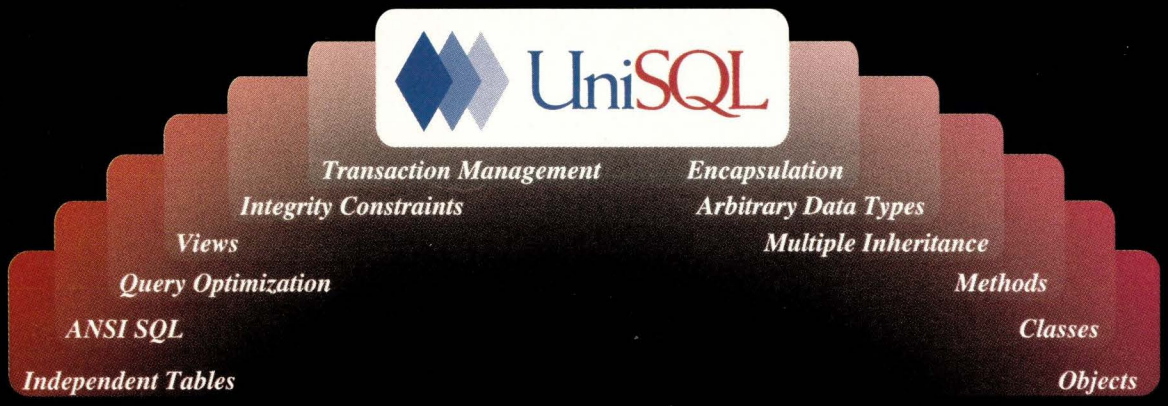

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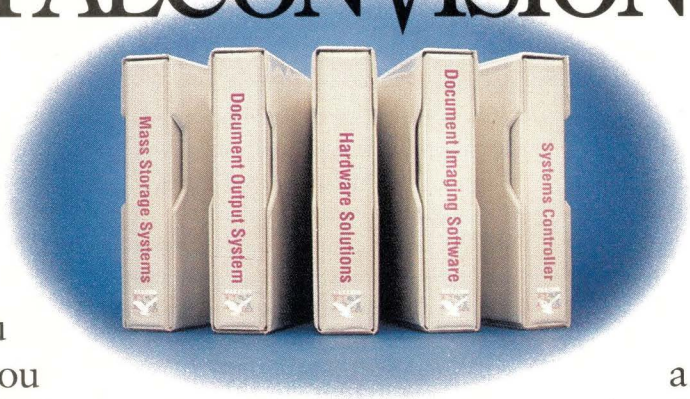

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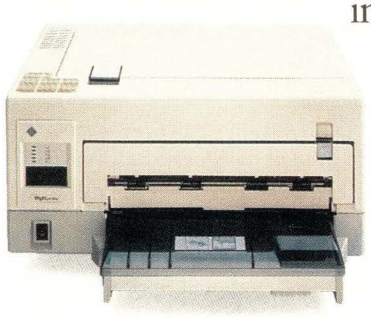

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the trade-up process; they must do so within 30 days of taking delivery of Sun systems. All trade-ups come with Solaris 1.1 Version A pre-installed for no added charge.

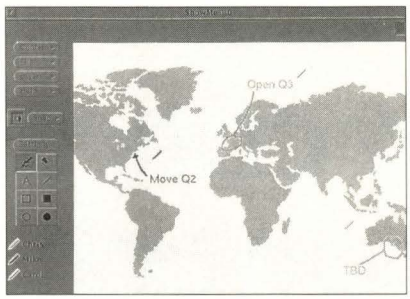
SMCC claims that its trade-in values better those offered by HP by as much as 50%. HP isn't standing still, however. Right on the heels of Sun's trade-up program launch, HP retaliated with its own trade-up offering for both Apollo and SPARC users. HP is offering Sun and Apollo users a 44% trade-up credit toward HP/Apollo 9000 Series 700 or Series 400 workstations. Customers need only have a minimum of 20 SPARCstation, Sun 3 or Apollo Domain systems that they wish to trade in before January 1, 1994 and take delivery of by March 31, 1994.–*mjf*

SunSolutions Shows Off ShowMe

ShowMe, the computer-conferencing software package that made its debut as an integral part of the SPARCstation 10 rollout demonstration, is now shipping. The application, which was developed by SunSolutions–a "product development venture" within Sun Technology Enterprises–allows SPARC users to conduct on-line meetings and interactively collaborate on documents, graphics, spreadsheets and other images over any TCP/IP network.

There is no limit to the number of people that can simultaneously conference using ShowMe. ShowMe relies on on-screen "markers" to annotate shared documents. It employs the patent-pending active window technology, which allows users to move seamlessly from the whiteboard area to the conference window and make changes by simply clicking in the active window. The package features an Open Look-based user interface that is "very intuitive," says Byron Ryono, director and general manager of SunSolutions. ShowMe runs on SPARC-based systems running Solaris 1.0 and OpenWindows 3.0.

ShowMe is SunSolutions' first product. SunSolutions' mission is to create and market "interactive, collaborative software products." The venture will



SunSolutions' computer conferencing ShowMe software sports an intuitive user interface.

take technologies developed by various parts of Sun Microsystems Inc. (especially by SunLabs) and/or third-party developers and turn them into "commercial-grade solutions," Ryono explains. Already, SunSolutions is working on the next versions of ShowMe, which will incorporate audio and video technologies–as does ShowMe's No. 1 competitor, Communique! from Insoft Inc.–and will make use of ISDN, which is supported by the SPARCstation 10.

ShowMe is a shrink-wrapped product that sells for $349 per single-user, floating network license. A 10-user, floating-license package sells for $2,870, and a 25-user floating-license package goes for $5,975. The product is being distributed by Sun Microsystems Computer Corp., SunExpress, Sun master VARs Access Graphics Inc. and Arrow Electronics Inc., and software publisher and distributor Qualix Group Inc.–*mjf*

Optimally Optimizing Compilers

Although Apogee Software Inc. may not be a household name when it comes to SPARC compilers, it soon may be. Sun Microsystems Computer Corp. used the Apogee-C and Apogee-FORTRAN products to run the Dhrystone and SPEC benchmarks it ended up publishing for the SPARCstation 10 systems. Campbell, CA-based Apogee plans to make its Solaris 1.0 compilers publicly available in October and its Solaris 2.0 compilers before the end of the year.

The Apogee products are optimized for the SPARCstation 2 and SPARCstation 10. According to both Sun and Apogee, "these [Solaris 1.0] language products helped SMCC's new SPARCstation 10 workstation–which uses the new SuperSPARC RISC processor–achieve outstanding performance that is two to four times faster than previous Sun systems" by taking full advantage of the three instructions per clock cycle generated by SuperSPARC. The Apogee-C and Apogee-FORTRAN products also incorporate preprocessor technology from Kuck & Associates Inc., Champaign, IL. (At press time, it was undetermined whether the KAI preprocessors would be bundled or offered as standalone options.)

As Apogee President Milton Barber explains, in the workstation market, "competitors can be so closely matched in hardware performance that the degree of optimization available in the compiler may be more important in determining user-available performance than the hardware itself." Yet building such a compiler is tough, he says. It is a large project, requiring a number of programmer-years to complete. And CISC compilers don't always port well to RISC. Finally, new technologies, especially in the area of global optimizations and instruction scheduling, are emerging rapidly. These areas affect the extent of optimizations and speed of compilation and are difficult to keep up with and implement well, he says.

Apogee was formed in the fall of 1988 to produce highly optimizing RISC compilers. The four founders, Barber among them, trace their roots to a start-up called Cydrome Corp., where they developed a FORTRAN RISC compiler for a minisupercomputer company. As Apogee, the team developed a multilanguage, multiarchitecture suite of compiler components, i.e., C and FORTRAN front ends, intermediate representation builder, compiler core, interprocedural analyzer, alias analyzer, global optimizer, back ends for target machines, compiler driver and FORTRAN I/O library. Among the target systems, besides SPARC, for which Apogee has developed compilers are the Intergraph Corp. C300 and C400; Motorola Inc. 88000 and 68000; IBM Corp. S/370, PC and PC-RT; Data General Corp.

TGV NEWS

FOR IMMEDIATE RELEASE

July 17, 1992

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TGV's MultiNet Is Alpha-Ready

Digital's OpenVMS And Cross-Development Tools Ease MultiNet Porting Effort

SANTA CRUZ, Calif. – TGV, Inc., has completed porting of MultiNet® V3.1, TGV's TCP/IP connectivity solution for DEC's VMS operating system, to operate with Digital Equipment Corporation's OpenVMS™ for DEC's new Alpha computing architecture. TGV engineers credit the quality of the development tools DEC made available for making the MultiNet port quick and easy.

"DEC has invested a lot of time and money developing OpenVMS for Alpha and, based on the initial enthusiastic reactions from our engineers, they seem certain to recoup their investment," said David Kashtan, President of TGV. "I want to congratulate DEC for making the Alpha and VAX implementations of OpenVMS so compatible. That is what made the MultiNet port to Alpha so easy."

"We were very impressed with the quality of the development tools DEC made available," said Patrick Mahan, one of the TGV developers involved in the Alpha port effort. "We were particularly impressed with DEC's new Alpha compilers. With these kinds of development tools, third-party developers will find it easy to migrate their software to run on Alpha."

"DEC's Alpha architecture is blazingly fast," noted Gerard Newman, the newest member of the MulitNet development group. For MultiNet users, this additional speed means that many current TCP/IP applications, such as MultiNet NFS operations and FTP file transfers, will be faster and more efficient, making them even more practical for high-performance connectivity applications.

And since MultiNet V3.1 has been tested Alpha-compatible, current MultiNet users won't have to make modifications to their existing TCP/IP configurations as they migrate to Alpha. Even the MultiNet documentation will remain unchanged.

"The number of actual modifications we had to make to MultiNet's source would fit on a one-page printout," said Bruce Miller, a member of TGV's MultiNet Development Team. "Considering that MultiNet consists of more than a million lines of source code, the port could have been a lot more painful."

TGV will make MultiNet available to users in time for the Alpha field test.

TGV, Inc., designs, manufactures, markets and supports standards-based networking and application software for Digital Equipment Corporation's VMS systems. TGV, Inc., is located at 603 Mission Street, Santa Cruz, California 95060. Telephone: 1-800-TGV-3440, or (408) 427-4366.

-30-

MV/8000, Eclipse and Nova; Amdahl 470 and Cray Research X/MP systems.–*mjf*

Quorum Overcomes a Hurdle

Quorum Software Systems Inc., the Menlo Park, CA, developer of SPARC-Macintosh compatibility products, is free to move ahead once again with its development plans. In July, the company resolved its lawsuit with Apple Computer Inc. regarding Quorum's right to deliver software that enables Mac applications to run on RISC-based workstations, including SPARCstations, with native UNIX GUI support. Terms of the settlement were not disclosed.

Quorum had filed suit against Apple in May, seeking relief from Apple's assertion that Quorum had violated Apple's intellectual property rights. Additionally, Apple had revoked Quorum's privileges as an Apple Certified Developer. Since the settlement, Quorum has been reinstated in Apple's program.

Quorum has begun shipping its Latitude product to Mac developers. Latitude recompiles "well-behaved" Mac programs written in high-level languages (such as ANSI C) into native UNIX executable programs. The product relies on Quorum's Compatibility Engine, a portable implementation of the Mac Toolbox application programming interface (API), which itself becomes embedded into the recompiled Mac application and activates during its run time. At press time, the SPARC-target version of Latitude was shipping; versions for Silicon Graphics Inc.'s Indigo and IBM Corp.'s RS/6000 were in beta test.

Quorum is continuing to work on its Equal product. Equal, designed for end users, will allow customers to run shrink-wrapped Mac applications directly on RISC workstations. Like Latitude, Equal is based on the Quorum Compatibility Engine. The product will enable Mac "floppy disks" to run on workstations at speeds up to four times faster than conventional emulation, according to the company.

In related news, one of Quorum's competitors, Xcelerated Systems Inc., the San Diego, CA, developer of Liken, is shipping Version 1.2 of its product. Liken, an emulation package, allows users of SPARCstations to run shrink-wrapped Mac software in an X Window. Version 1.2 improves file sharing between Sun and Mac environments, enhances cut-and-paste functionality and includes more customizable setup features, according to the company.–*mjf*

Other Open Systems News

Digital Equipment Corp.

• In one fell swoop, DEC has changed the name of its flagship VMS operating system to OpenVMS and introduced 13 new "OpenVMS, Alpha-ready systems." The OpenVMS systems employ DEC's NVAX microprocessors and range in size from MicroVAX desktops to mainframe-class VAX systems. The "Alpha-Ready" program, designed to protect DEC's current and future customers' investments in hardware and software, encompasses services, lease programs, CSO programs and education and training, as well as processor trade-in programs, once DEC's 64-bit, 150- to 200-MHz Alpha chip becomes available.

• DEC also has added two more MIPS-based RISC systems to its stable. And it rolled out more than 12 new, prepackaged configurations and systems in the DECstation and DECsystem lines and slashed prices as much as 40% on its TURBOchannel graphics options. The Personal DECstation 5000 Model 33 is a 25.3-SPECmark, 33-MHz system based on the R3000A. The DECsystem 5000 Model 133 server is a 25.5-SPECmark, 33-MHz system. The reconfigured systems are members of the Personal DECstation 5000 line, Models 20 and 25. As part of the announcement, DEC also unveiled an R3000A-based CPU daughtercard upgrade board for its Personal

International Spotlight

Sun Among Olympians

The opening of the XXV Summer Olympiad in Barcelona marked the second Olympic event in which Sun Microsystems Inc. systems has participated. At Albertville during the Winter Games, Sun workstations were used for real-time surveillance of the Olympic site, in an application developed by Alcatel for the French Air Force. In Barcelona, a Sun 630MP and a SPARCstation 2 served as the platforms at "Image Kiosk," where Image+, a young French software company, constructed a digitized, high-resolution database of color photographs for access by the press at the site and by the New York-based staff of Antenne 2, a French TV station. A Sun spokesperson says Olympic journalists had their film developed, printed and put onto CD-ROM at Eastman Kodak, which had a facility at the site. The CD-ROM disk was then read at the Image Kiosk and put into the database. Antenne 2 journalists in New York, equipped with the same Sun system, interrogated the database, selected the desired photos, and had them transmitted in seconds, the spokesperson says. Telecommunications for the application was provided by a joint effort between AT&T and Telefonica. –*mwj*

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DECstation 5000.

• Ing. C. Olivetti has made it official: It will base future systems on DEC's Alpha chip. DEC will supply Olivetti with chips, system platforms and networking software. As part of its agreement with the Italian vendor, DEC has become an Olivetti shareholder by acquiring 4% of Olivetti's common stock. DEC has agreed to purchase another 4% from shareholders by the end of 1994 and an additional 1.9% on the open market during June 1993.

• DEC's new WANcontroller 720 is designed to take advantage of the 100-MB/s throughput that is possible with DEC's new TURBOchannel I/O interconnect. The 720 allows workstation users to transmit high-speed, network-intensive graphics, as well as to accelerate the usual WAN functions, like email communications, remote-application access and high-speed file transfer, DEC says. The controller supports the DECnet, OSI, TCP/IP and X.25 protocols and standards under the Ultrix OS. The product also interfaces with IBM's SNA. Purchase price is $2,500.

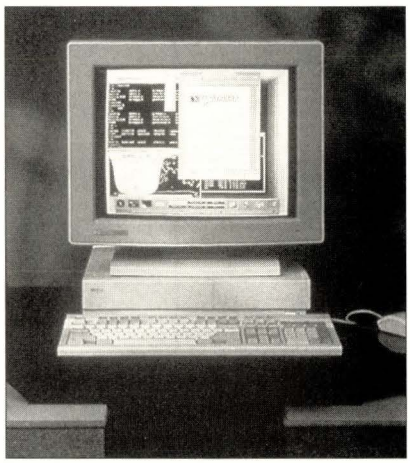
Hewlett-Packard Co.

• New 3D client/server graphics-programming products based on PEX 5.1 and PEXlib are available for HP's PA-RISC-based workstations. The PEX Server and PEXlib Client products run on the Apollo 9000 Series 700 workstations. The products are available to software developers and VARs this month. Pricing for the two applications bundled together is under $3,500. The PEXlib Client and PEX Server Run-Time bundle lists for less than $500.

• HP unveiled enhanced versions of its backup- and print-management products for Sun workstations. Both HP OmniBack, HP's network-backup management system, and HP OpenSpool, HP's print-management solution, are manageable from a single HP OpenView management workstation. OmniBack allows users to perform central file-system backup and recovery of their Suns to an HP-UX-based or HP Apollo Domain-based system. HP OpenSpool allows users to access shared printers and plotters across networks of HP-UX systems and Sun SPARCstations. HP OmniBack pricing begins at $1,500 and HP OpenSpool at $400.

• On the X station front, HP added a new model to its HP 700/TX RISC X station family. It announced new versions of its X server software for SCO Open Desktop PC and IBM RISC System/6000 AIX workstation host platforms, and cut prices by up to $500 on its existing HP 700/RX models. The new X station, the 19Ga,

Hewlett-Packard Co.'s 19Ga gray-scale X station.



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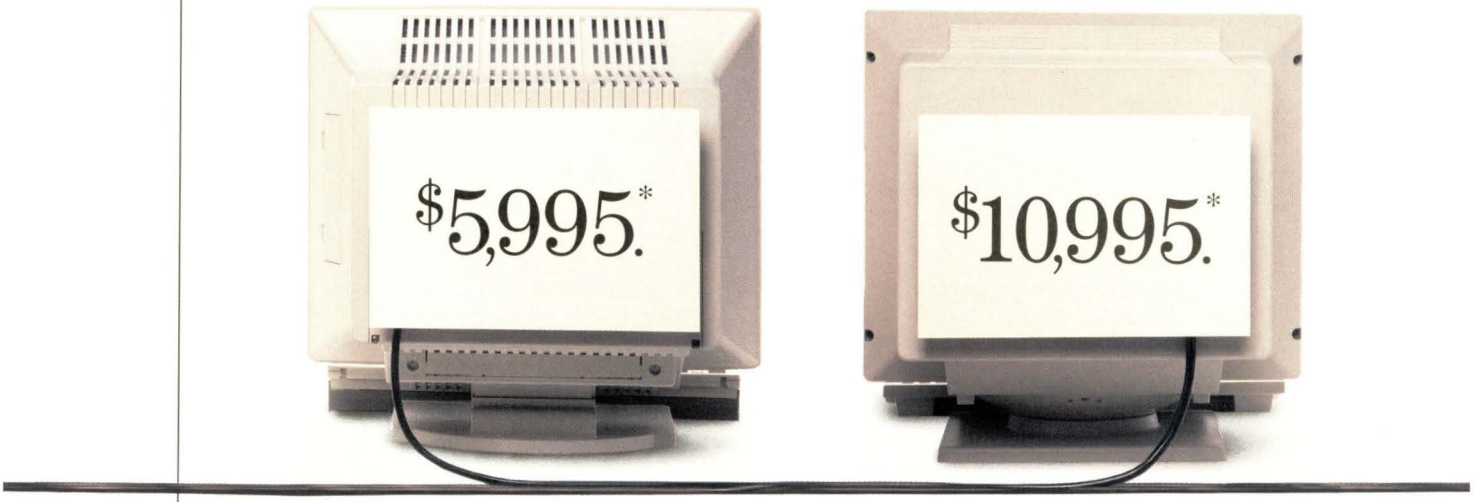

HP RISC X station.

Sun SPARCstation IPX.

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*Suggested U.S. list prices for 19" color models. Contact your local HP sales office for details. OPEN LOOK is a trademark of AT&T. MOTIF is a trademark of the Open Software Foundation. VUE stands for Visual User Environment. †IBM RS/6000 support available September, 1992. HP Vectra PCs running Santa Cruz Operation Open Desktop. CSPA001

Circle No. 21 on Inquiry Card

comes standard with 4 MB of memory and a 19-inch 1,280-by-1,024 gray-scale monitor. The system lists for $3,995. On the software front, HP's new versions allow SCO Open Desktop PC and IBM RS/6000 users to gain access to HP SharedX, MIT Client Authorization, Input Extension Support, SLIP and ANSI terminal emulation–features from which HP and Sun customers already benefit. Each version of the X server software lists for $695; only one copy is required per customer site.

• In a move that garnered a lot less press than Sun's recent decision to include an ISDN chip on SPARCstation 10 motherboards, HP unveiled a set of ISDN connectivity products, including workstation and PC ISDN interface cards and an ISDN server. The HP ISDN Link/S700 is an add-on card for the 9000 Series 720, 730 and 750 workstations and provides a connection to public or private ISDN networks. The card allows users to transfer information over one or two ISDN B channels at speeds up to 128 Kb/s. The HP ISDN Server connects a TCP/IP LAN to an ISDN. The server transmits over one or several multiplexed 64-Kb/s circuits, providing total bandwidth ranging from 64 Kb/s to 384 Kb/s. The HP ISDN Link/MS-DOS card connects HP Vectra PCs to an ISDN. McDonald's Corp., a strong ISDN advocate and user, is currently testing the various products at its Oak Brook, IL, home office. Pricing ranges from $2,590 for the MS-DOS product to $18,375 for the ISDN server.

IBM Corp.

• IBM is remarketing Inspire, a rewritable optical jukebox line, for its RS/6000 family. Inspire is a product of Alphatronix, Research Triangle Park, NC. Inspire attaches directly to the RS/6000 via a SCSI bus, and comes with its own storage-management software. The system allows customers to store data in standard AIX Journaled File System Format. The Inspire line includes systems ranging from single, 5¼-inch cartridge drives to 144-cartridge jukeboxes, allowing for up to 86 GB of on-line storage.

• A product designed to increase data sharing between mainframes and workstations through on-line access to MVS files from NFS networks is now available from J. Frank & Associates, Palo Alto, CA. MVS/NFS is a full implementation of NFS running under MVS. The product marks the debut of NFS on IBM and compatible mainframes. Sun Microsystems Inc. is a major customer for the product, according to J. Frank, and is using it to move applications and processing from mainframes to departmental servers and desktops. MVS/NFS supports MVS/SP, VMS/XA and MVS/ESA. Pricing ranges from $18,000 to $62,000, depending on the size of the mainframe.

• Systems Strategies Inc., New York, has introduced communications soft-

ware that gives RS/6000 and Sun SPARCstation users on Novell Inc. NetWare access to IBM mainframe data and applications via Novell's NetWare for SAA. The product, Systems Strategies Express 3270 for NetWare, provides 3270 emulation for IBM, Sun, SCO UNIX, Interactive UNIX and other System V-based systems on a NetWare network. The product emulates 3278/3279 terminals and 3287 printers. It enables TCP/IP network users to access interactively IBM host applications, such as CICS and TSO, retrieve IBM database information and print IBM-formatted EBCDIC files on local ASCII printers.

Silicon Graphics Inc.

• SGI has rolled out yet another new family of systems. This time, it's five Iris Indigo PCs based on the 50-MHz MIPS R4000SC chip. (The R4000 operates at 70 SPECmarks, 85 MIPS and 16 MFLOPS.) The five new systems range from the R4000 Iris Indigo Server at $11,395 to the R4000 Iris Indigo Elan at $32,000. All prices include 16-MB memory, color monitor, keyboard, mouse, 16-bit audio subsystem and bundled tools (Iris Showcase, Iris Explorer, Iris media mosaic tools and the Irix operating system). The R4000 CPU upgrade is available to existing customers for $9,000. SGI has also dropped prices for its R3000 Indigo Entry and Indigo XS systems, to $7,995 and $11,495, respectively, as well as for its Indigo memory by 40%.

• Two more CASEVision software-development products are available as part of SGI's suite of CASE products. CASEVision/ClearCase is a software configuration management and version control product based on Atria Software Inc.'s ClearCase product. The product offers enhanced version control, rule-based configurations, transparent access, binary sharing, build auditing and parallel building. CASEVision/Tracker is a bug and process tracking system. Tracker relies on a process description language to help users determine process parameters, and an X/Motif user interface. Tracker is available separately or integrated with CASEVision/ClearCase. CASEVision/ClearCase is priced from $3,000 per license; CASEVision/Tracker is priced from $1,600. The packages bundled go for $3,750.

• In a related announcement, SGI unveiled Iris Indigo DevStation, which the company is billing as "the industry's first desktop system especially configured for software developers." DevStation integrates SGI's Iris Indigo RISC PC with the aforementioned CASEVision family of software-development tools. DevStation comes preconfigured with the Iris Development Option, a package of development libraries and tools (including an ANSI C compiler and development environment; the X Window System development libraries; OSF/Motif tool kit, libraries and user-interface compiler; Iris GL development libraries; UNIX debugging and profiling tools; and Display PostScript development libraries) and CASEVision/Workshop, a programming environment developed by SGI. The Iris Indigo DevStation is priced from $11,995.

This Just In...

• In case you missed the fine print: If you're waiting around for **SunSoft** or **Sun Microsystems Computer Corp.** to automatically drop a copy of Solaris 2.0 on your doorstep, you better get off your duff. Solaris 2.0 is a "pull release," i.e., it will not be shipped automatically to existing customers. It is available only as an upgrade. Customers who do not have a software support contract must purchase an upgrade package (RTU, media and documentation/AnswerBook). Those with software support contracts will receive Solaris 2.0 for free.

• **Sun Microsystems Computer Corp.** has signed a reseller agreement with Auto-Grafica, one of the largest integrators and distributors of prepress systems in the newspaper and graphic arts industries. Auto-Grafica will sell Sun hardware bundled with software and peripheral equipment, into a number of international markets, especially South and Central America, Spain, Portugal and the Caribbean. Applications that Auto-Grafica will offer on Sun include electronic pagination, news wire reception, picture reception, scanner and color retouching and color/monochrome picture storage and retrieval. The contract is valued at $1 million annually. SPARCstations/servers will become the first UNIX hardware supported by Hackensack, NJ-based Auto-Grafica.

• **Network General Corp.**, the Sniffer company, has broadened its platform coverage to include UNIX. With its new product, SniffMaster for X, network managers can access network troubleshooting and monitoring systems from the Sun Microsystems Inc. workstations and/or X Window System-based workstations running SunNet Manager, Hewlett-Packard Co.'s OpenView and/or IBM Corp.'s NetView/6000, as well as from any X terminal. SniffMaster for X is part of Network General's Distributed Sniffer System, a product for monitoring and analyzing Ethernet and token-ring LANs and WAN links. Network General is based in Menlo Park, CA.

• The SunVision line of graphics, imaging and visualization software is now the proud property of **Advanced Visual Systems Inc.**, Waltham, MA. Sun Microsystems Computer Corp. transferred the rights to market and develop SunVision to AVS Inc. AVS' immediate plans include offering SunVision 1.2 to Sun users and migrating two components of SunVision, the imaging library (IPlib) and the volume visualization tool (SunVoxel) to Solaris 2.0, as well as to SMCC's new XIL imaging and video software foundation library. AVS also plans to integrate SunVision functions into its own Application Visualization System, AVS.

• The trio of **Sun Microsystems Computer Corp.**, **Tektronix Inc.** and **National Instruments Corp.** have formed an alliance to develop, market and sell a new line of integrated test and measurement systems. The alliance will create solutions based on SPARCstation/server systems from SMCC; VXI and GPIB instrumentation from Tektronix; and the LabVIEW graphical application software and instrument controller hardware from National Instruments.

Resulting products will be marketed under the name of Open Measurement Solutions. For more on the alliance or its products, contact Tektronix in Pittsfield, MA, at (800) 426-2200, ext. 111.

• The world's largest SPARC system is shipping. **Cray Research Inc.**, Eagan, MN, has renamed the former Floating Point Systems, which it acquired in December 1991, Cray Research Superservers Inc. and has released the Superservers division's first new product. The so-called Cray S-MP is a modified FPS 500. Cray says the system is designed to be a bridge between SPARC workstations and larger Cray supercomputers on the same network. The system, which can be configured with up to eight SPARC processors, will operate as a file server with a one-terabyte capacity. Pricing begins at $500,000. At press time, the company said it had nine orders, the largest of which was from the National Institute of Genetics in Japan.

• Lots of news on the Oracle Corp. front: After mucho delays, Oracle finally got Version 7.0 of its Oracle database out the door. As expected, the system now supports two-phase commit, referential integrity (with triggers), stored procedures and multithreading. Meanwhile, on the applications division side of the house, Oracle rolled out Version 9.0 of its financial, manufacturing and human resources applications. The division launched a new line of business productivity applications, including the Oracle Business Manager, a desktop environment including its own GUI. SMCC seemingly was impressed, as it announced that it had selected Oracle's manufacturing, CASE and financial applications for its installations worldwide in a deal worth multiple millions.

• Oasys has rolled out a suite of Native SPARC Tools, including Version 1.8.6 of the optimizing Green Hills Compilers (C, C++, Pascal and FORTRAN) and the multilanguage, X Window-based Multi debugger. The tools have been integrated with Sun's native assembler/linker. Oasys is headquartered in Lexington, MA.

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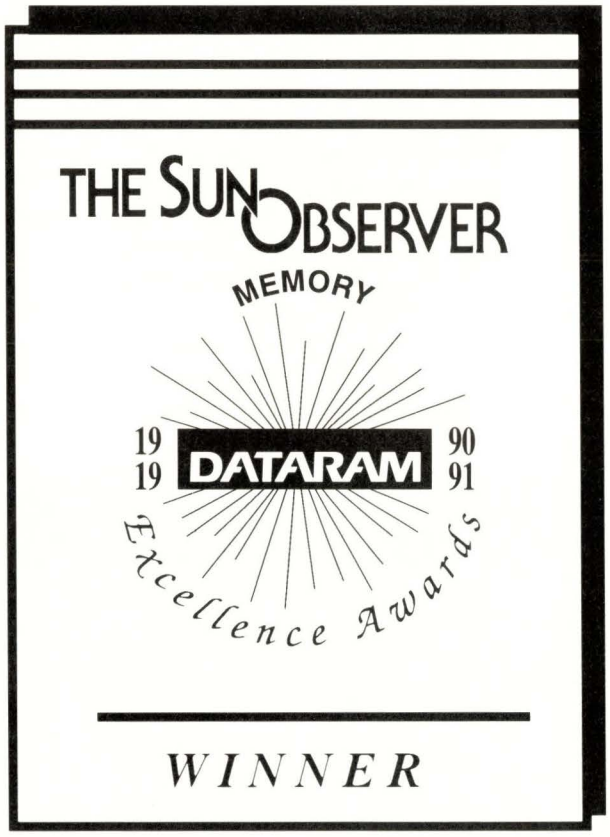

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Ask Mr. Protocol

TOM BARRETT

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by MICHAEL O'BRIEN

"160-bit addresses are daft."
–One well-known networker

"I strongly disagree with the overall recommendation presented."
–Another well-known networker

"There are, of course, many issues that must be resolved before CIDR and IPv7 can actually be deployed in the operational Internet."
–Someone with a gift for the obvious

"Battle not with monsters, lest ye become a monster."
–Nietzsche, and worth repeating

Q: I've heard a rumor that they're going to change the Internet to use 160-bit addresses. Are they nuts?

A: Up until recently, the answer to that question would have been, "not noticeably." Now, the answer is, "It all depends on who you ask."

The question you ask is very like questions that have recently been asked on the mailing list of the Internet Engineering Task Force, questioning a proposal to replace the IP protocol with something very like the ISO CLNP standard, which sports things resembling addresses that are 160 bits long. Seasoned network hands were rocked back by that one. In fact, a jihad was declared in some quarters, and given that the next meeting of the IETF was scheduled for Boston, a proposal was made to re-enact the Boston Tea Party, with those who made this suggestion being the guests of honor, playing the part of the tea.

First of all, let's look at some possible sources of outrage. That's always fun, especially during a presidential election year. Who cares if the number of address bits is 160, or even 1,060?

Well, those who must communicate over slow links, for one thing. Squirting 32 bits of source and 32 bits of destination over a 1,200-baud serial link, as some folks do now, takes considerable time. If addresses were 160 bits, things would not only be worse, but a whole big bunch worse. Increasing attention is being paid to so-called "mobile IP," meaning putting things on the network that communi-

cate by means of radio, perhaps via cellular phone. The Telebit Cellblazer modem is a commercial entry in this line that is available now. Sending 160-bit addresses over such a link would slow traffic down considerably.

Another argument in favor of insanity is the sheer size of such an address. Mr. Protocol has pointed out three times in as many columns that the first national network, the Arpanet, was designed never to have address-space problems. This was done by making the address so large as to be effectively infinite. "Infinity" was defined as eight bits, allowing 256 hosts on the network. Never, it was thought, could such a limit be exceeded.

hat this means is that the biggest problem to be addressed, so to speak, is routing and addressing, rather than address space, which can be grown arbitrarily (more or less).

In hindsight, of course, this looks silly. At the time of The Taking of the Cure, however, the reverse was true. A 32-bit address space, as provided by IP, looked just ridiculously large. Lots of people didn't want to convert to IP because it looked too huge and baroque, especially in the address department.

This fourfold increase in the size of the address would seem to be plenty, allowing as it does for a network address for every man, woman and child on Earth. Presuming that the address space were flat, and that we were in fact plugging in men, women and children without regard to race, creed, religion, nation of origin or previous condition of servitude, this would be a fine idea for many years to come. (This is a delightfully macabre thought, thinks Mr. Protocol in his deepest inner recesses. If strenuous objection is made to the notion of turning a Social Security number into a National ID, consider the resistance to the mandatory installation of the Social Interface Jack in the back of your head. Do you think rich middle-class whites would get better jacks than poor inner-city Latinos? Do you think some net addresses would be more "desirable" than others? Do you think Burkina Faso would have more desirable addresses than the United States?)

Of course, such is not the case. The 32-bit IP address is not flat, as we saw last month. It is divided into three classes, for three different kinds of networks of different sizes. One class is close to being exhausted, while the other two have plenty of addresses left. One possible solution, indeed, is simply to say, "Sorry, there aren't any Class B addresses left, but we can let you have 16 or maybe even 256 Class C addresses in a group. Would that be OK?" This, though, leads to a problem called "route explosion," meaning that network routers would have to store 256 routes for Class C nets instead of one route for a Class B net.

What this means is that the biggest problem to be addressed, so to speak, is routing and addressing, rather than address space, which can be grown arbitrarily (more or less). Actually, as we've seen, this assumption has its limits. Some are the limits of our current perspective, but limits on things like radio bandwidth are absolute and must be considered.

However, it is certainly true that the problems of routing appear more daunting, that we seem to have considerably more freedom in designing addressing schemes than we do in solving routing problems. There are those who think that if you solve the routing problems first, the "correct" addressing scheme will drop out in the wash. These people have at least a chance of being right, Mr. Protocol feels.

But can a routing scheme be proposed in a vacuum? At least some rough characterization of the network traffic would seem to be necessary to handle "real-world" routing conditions. If we give ourselves a leg up and pick a new IP that sports 160-bit addresses, say, what could the network do?

Mr. Protocol is glad you asked. If a 32-bit address is enough to give one to every man, woman and child on earth, 160 bits seems to be enough to give a separate address to every subatomic particle in the universe, at least by some calculations.

Of course, this isn't the way addresses get used. Some parts of the 160 bits might be chopped up by routing considerations; others would doubtless be used in some expansion of the Class A/B/C scheme now in use, to accommodate networks of different sizes.

It seems certain that the hierarchical nature of networks will continue and that the pervasiveness of computers in our daily lives will, sooner or later, be followed by the pervasiveness of a hierarchy of networks to tie them together, at least for management purposes. One recent conference sported the "Internet Toaster," which was a showcase for SNMP, the Simple Network Management Protocol. While it hardly seems likely that SNMP will be the complete network control system of the future, it does perhaps point to the way in which computers and nets will be organized and controlled in the future.

Mr. Protocol would like to put two and two together to make five, which is one of his favorite occupations. He will now proceed to stick his neck out and make some foolish extrapolations. Recovering from the inevitably ensuing humiliation will require a large number of chocolate chip cookies and Big Stuf Ding-Dongs, so keep those donations coming, folks!

What would a good extrapolation be without starting with Babbage?

Babbage built a mechanical device for calculating tables for the British Navy, whose hand-calculated tables were riddled with errors. No fool, he promptly did what any good modern researcher would do: He subverted the contract into paying for his own research. And, in fact, he came up with

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what he figured was a pretty neat idea: Instead of just putting numbers in one end, then (in his case literally) turning the crank to get numbers out the other, he figured he'd build a machine whose outputs could be hooked to its own inputs. Calculations could thus proceed in stages, with each stage's output being the next stage's input. Such genius was rewarded as it usually is. He overspent his contract, was shut off by the government and died penniless, embittered and sans machine.

Electromechanical relays came and went without materially altering affairs, except for the invention of the electromechanical calculator, which essentially represents Babbage's original idea of a nonprogrammable machine. About the time electron tubes started replacing relays, von Neumann came up with what seems in some ways an idea remarkably similar to Babbage's: computers that could store their programs and their data in the same memory store, so that programs could be operated on as data.

We've been flirting with this idea ever since.

The first computers had memories that were linear and directly addressed. Aside from various research machines, all computers since have had memories that are addressed as a linear array, but they have had address-mapping capabilities permitting a level of indirection. Mostly, this indirection is used to give programs the illusion that they are each running in their own address space.

Mr. Protocol finds it fascinating that in all the years since the von Neumann machine took over the world, no other attempt at managing an address space has shown signs of carving out any sort of niche for itself. Mr. Protocol being mostly concerned with networks (in fact if you discount sleeping and scarfing every Big Stuf Ding-Dong in the neighborhood, it's about all he concerns himself with), this must have an implication for networking. And it does.

Those who believe that hitting a computer with anything larger than a feather duster will instantly cause an explosion of nuclear proportions (which includes every screenwriter in Hollywood, or so it seems, despite the fact that every mother's son or daughter of them now uses a computer to write scripts on–trust me on this; I know what I'm talking about) do not find it a great stretch of the imagination to believe that if you take all the computers in the world and hook them up on a network, what you get is One Giant Computer (which as a necessary plot device will promptly develop sentience in about 25 seconds flat). In fact, Sun Microsystems claims "The Network Is The Computer!" Well, Mr. Protocol is here to tell you that The Network Isn't The Computer. It's The Problem.

Mr. Protocol earnestly recommends the view that encryption should be the goal of more than the old '60s radicals who eternally trumpet the evil of Big Brother.

And the problem is precisely the whole area of addressing, which we were discussing earlier. The architecture of the von Neumann machine is now well enough understood, particularly after various flirtations with variations on the architecture. Mr. P. remembers the "split I/D" architecture of the heftier brand of PDP-11, where in fact the program was not in the same address space as the data, but in a different address space altogether, with interesting implications for programmability and sanity. This expedient worked well enough in stretching an inadequate 16-bit address space, but the advent of 32-bit machines has thankfully relegated this notion to the dustbin of history.

Only it's back. Addressing nodes on a net is not like addressing cells in memory, because there isn't any particular ordering of the nodes based on address. They can be grouped, by network, but not ordered individually. And even the grouping by network is more hopeful than actual. They may be geographically dispersed, and if the net is a logical rather than a physical net, the router that passes traffic into the net may have to make decisions on a machine-by-machine basis, in the worst case.

The only current notion for how to handle such a beast is hierarchical. The international network (or networks) will have no notion as to how or where traffic is passed at the lower levels. In fact it is now felt in some quarters that the entire notion of having an end-node address contain routing information is a dead mistake, and that packet routing information should be kept separate from addressing. This in itself indicates one possible way in which the 160 bits of "address" might be carved up: some for real addressing and some for routing.

The real question is, how far down does the routing go? How many levels of indirection might there be? This could be very complicated, for social reasons as much as anything else.

Consider that when the first networks were constructed, the machines that they connected were already in place. Long-haul nets came first, because at that time computers were a scarce commodity, with one or two machines at most installations. Local-area nets came later, with the advent of personal workstations. In fact, thanks to some considerable farsightedness at Xerox, the personal workstation and the local-area net grew up together.

Now, consider the average home. Computers are ubiquitous. Cars as far back as 1984 have as many as three computers in them, and the total is soaring. Every piece of video and audio equipment in the place, as well as the microwave, is computerized. The telephone, the air conditioner, the furnace, the burglar alarm, and if you're a techno-freak and have X10 central control in your home, that too. The washing machine! There's a good one.

Mr. Protocol considers that the lowest level net will be that existing within a single machine, whether it be a multiprocessor workstation or a laser disk player. Or a dishwasher.

Above that will be local systems, such as your audio-visual center.

By the time you get up to your entire house, you're at a third-level net. The fire sensor detects water in the kitchen and asks the lawn sprinkler system outside the window if it happens to be on. Receiving a negative reply, it questions the dishwasher, which remarks it's a funny thing, but it's been filling for some time and still doesn't seem to have much of a waterline. Something, somewhere, with more brains than the dishwasher, figures out the obvious and tells it to shut off, then calls you on the phone. House beautiful, right?

Only maybe it doesn't call you on the phone. Maybe it sends you email. And maybe your email goes direct to your scrolling-display radio pager. Now, that part isn't science fiction. Those are available today. (And unless you're a dolt, you'll put some sort of filtering program in between your mailbox and your radio pager.)

The ruling principle is that most traffic is local nonsense and should stay local. Locally, you can get away with anything you want, such as sending Ethernet packets with 48-bit addresses, or old-style IP, or Point-to-Point Protocol, or SLIP, or even X10. When you get past that point, you have to speak the global protocol–or rather, your router does. Networks will be arranged hierarchically, and routing at each level of the hierarchy will be local, or up to a higher level, or down to a lower level.

The problem comes when one realizes that today, anyone who routes packets at the national or international level has the capability to monitor practically all the nonlocal traffic on the net...all 10 billion packets-per-month's worth. It's no great stretch to remark that with this sort of architecture, law-enforcement types with a warrant would be able to find out whenever you flipped a light switch in your home.

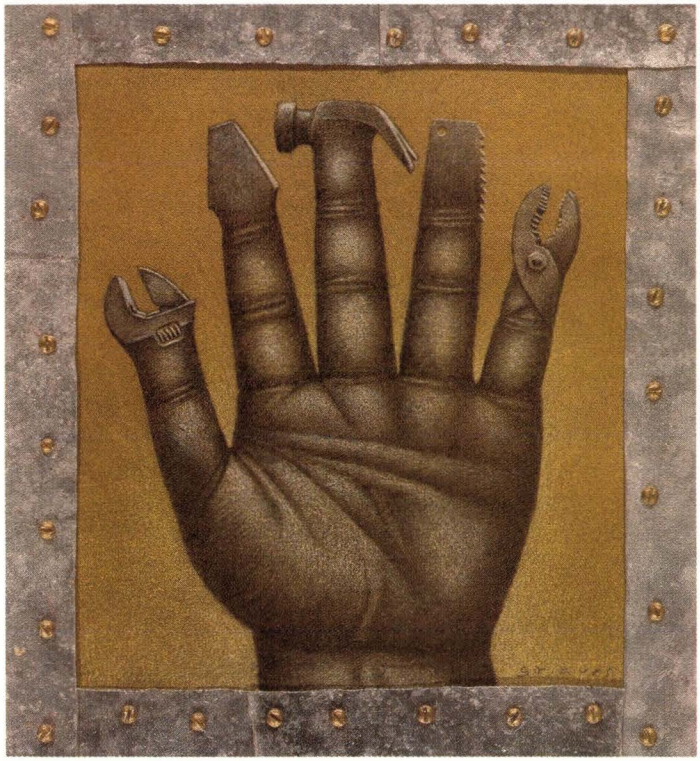
The obvious answer is that the key to your front door is the crypto-key to your home's network. All the bits are legal packets, but the data sections don't make sense. Mr. Protocol earnestly recommends the view that encryption should be the goal of more than the old '60s radicals who eternally trumpet the evils of Big Brother. In fact it is the expectation of privacy that makes us put curtains in our windows at home. We feel exposed without them, though we (probably!) have nothing to hide.

Mr. Protocol suggests that when one of those 160-bit addresses is the electronic equivalent of your street address, what goes on behind it should be encrypted as a matter of course, for the same reasons that you keep your curtains drawn, and he suggests that you examine carefully the arguments and motives of those who would have it otherwise as a matter of law. ⊸

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`.



KEITH GRAVES

Some Tools

by PETER COLLINSON,
Hillside Systems

About two weeks ago, I attended a presentation at a trade show where I heard the usual story that "users don't want to use command-line input; they want to point and click." The speaker did say that he preferred the "old-fashioned" command line input because he had been brainwashed by it before the various point-and-click interfaces were invented. I do sometimes wonder whether users *really* do want to just point and click or whether it's a bit like high fashion. You know: The color that everyone is wearing this year is black, because that's the only color that is available in the stores. Perhaps we all like point-and-click interfaces because we are told that we must. Of course, they do make for great demonstrations at shows.

On a machine running Microsoft Windows, I certainly find myself sneaking into a DOS window to do file manipulation because I find it's less restrictive. Perhaps it's also a matter of ergonomics; the click interfaces require you to type at some point. I find the business of moving my hands from the keyboard to the mouse and back again is a lot slower than typing the one-line command generally needed to make the same thing happen.

The *real* problem with point-and-click interfaces is that they only solve some known problem. The problem must be well defined, like copying a file or listing a directory. Someone else has had to sit down and work out the entire set of problems that are to be solved by the software. Then a button, a menu, an icon or whatever is provided as the user hook to access the known solution. I think that this fails to learn from the "UNIX experience."

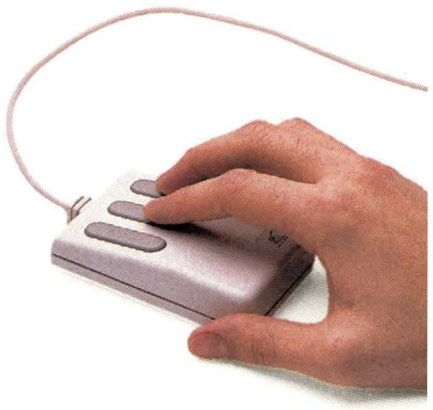
I expect UNIX commands to work together. I have grown used to thinking that commands can be used in groups to answer some new question that no one has thought of before. I am used to the idea that I can take existing commands, put them together in some way or other to create a new tool, something that has not existed before, something that solves the problem I have now.

If this problem is likely to recur, then I can put the solution into a file and add it to the set of known solutions. However, if the solution is simple, I find that I am more likely to recreate the combination of tools in a transitory way. For example, if I need to know how many files there are in the current directory, then I will type:

```
% ls | wc
   14    14    105
```

to get the answer: 14. If I want, I can make a private shell

Zippity-Do-DOS



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command, with more "user-friendly" output:

```
#!/bin/sh
echo `ls|wc -l` "files"
```

I rarely do this kind of thing. It's quicker to type the pair of commands than remember the dumb name I have given to the new command stored in my private `bin` directory. I guess I am happy with the general notion that when I want to ask the question "how many?" I take a command that will generate a list, pipe it into `wc` and am given the answer. This is kludgy sometimes. For example, you have to remember to subtract one from the answer to "how many processes are running?"

```
% ps | wc
```

Remember the `ps` command outputs a title line describing the contents of each column in its output. However, the UNIX tools approach allows me to remember a recipe for counting things and then apply the set of rules in many different situations.

There are some problems with all this. I talked about this aspect of UNIX, the tools approach, around two years ago in an article called "Pipes" (*SunExpert*, August 1990, Page 31). In that article, I said, "Authors of UNIX utilities don't have to do anything particularly special to make their programs fit in with the tools approach. In general, programs will output terse information, avoiding chatty infills." I got some hate mail from someone saying that this terseness *was* the worst thing about UNIX. I suppose "hate mail" is an exaggeration; let's say dissenting mail. In some ways, I find that I agree with the poster, probably to his surprise.

I am forced to conclude that the default of terseness might not have been the correct way to go. If you wanted things to interoperate using terse data streams, then it might have been reasonable to be forced to specify an option saying that a tool should operate in terse mode. This was not the way that the designers of UNIX chose to go. Terseness was probably a byproduct of the slow I/O devices they were using to communicate with the machine. Terse output made it easier to work and not wait for the characters to appear on the final paper roll.

These slow devices have left us a legacy. The tools approach, where the output from one program is glued to the input of another, allows us to construct transitory command lines to achieve some task of the moment. To use the approach, the cost is that you need to know of the existence of a number of commands that form the building blocks. Here are a few worth looking at.

The Tr Command

The `tr` command is a true filter. It doesn't take file name arguments like many commands do; instead it passes its standard input to its standard output. As the characters fly by, each is inspected to see if it should be replaced by another, or perhaps it should be deleted depending on the options to the command. To change all occurrences of "A" in a file to "a," use:

```
% tr A a < in > out
```

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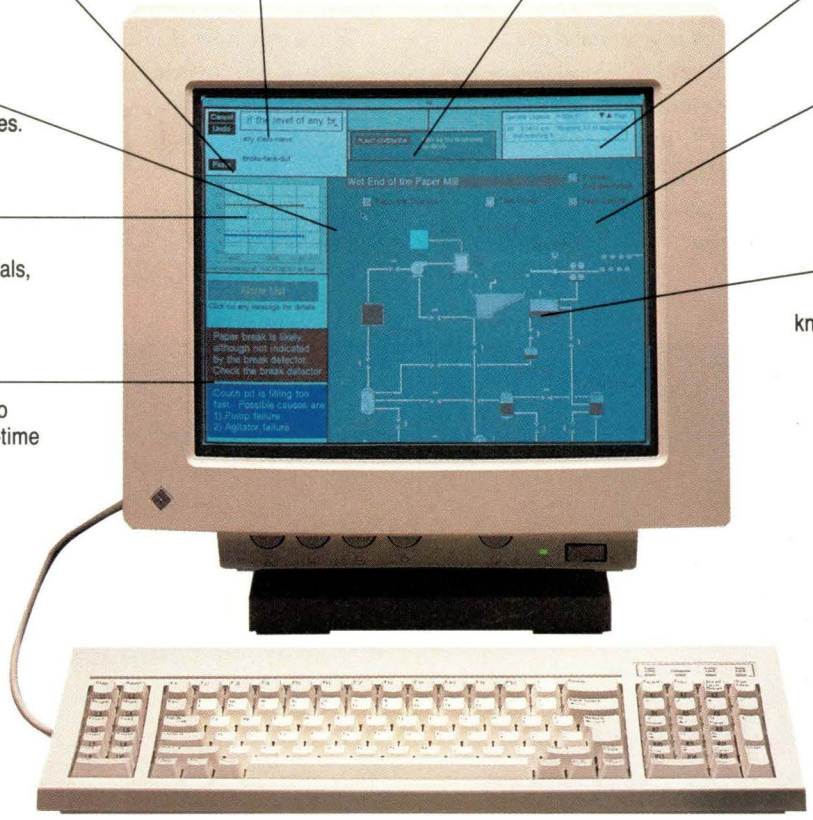

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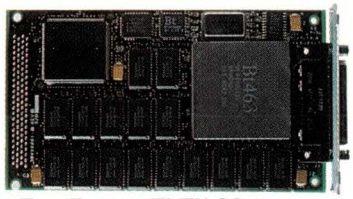

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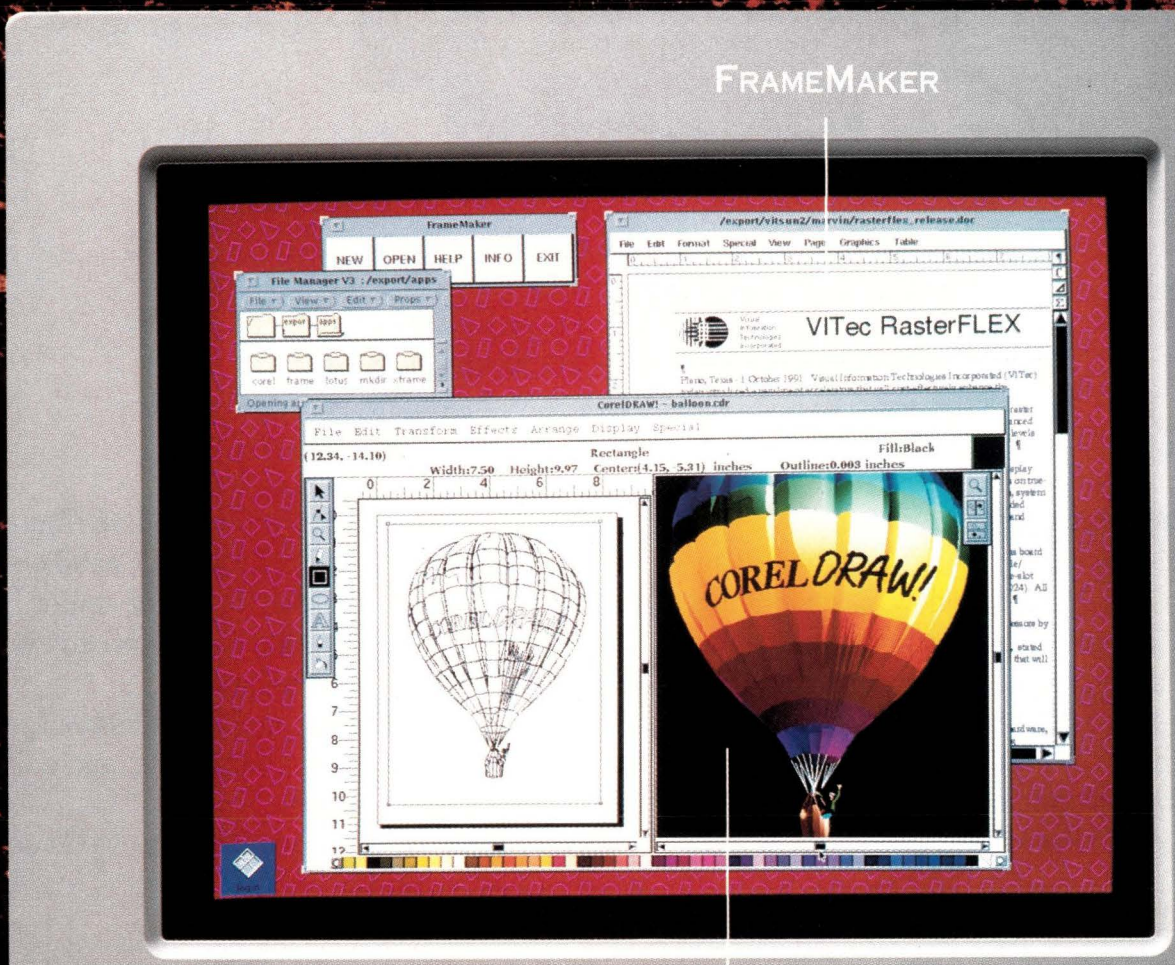

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This passes all characters through except for "A," which is changed to lowercase. To change more than one character, you simply supply two lists:

```
% tr ABCDE abcde < in > out
```

Here "A" is mapped to "a," "B" mapped to "b" and so on. It's more useful to be able to change ranges:

```
% tr A-Z a-z < in > out
```

The hyphenated ranges here expand to the uppercase letters from "A" to "Z," mapping onto the lowercase letters "a" to "z." The file `out` will simply contain lowercase letters.

You can specify single characters as octal constants in the usual unfriendly UNIX manner. Consult the file `/usr/pub/ascii` to get ASCII character codes and meanings. For example, to change tabs to a single space:

```
% tr '\011' ' ' < in > out
```

The `tr` command has a couple of useful switches that extend its usefulness. The `-d` option makes it delete characters in a single range. A very usable DOS-to-UNIX file conversion script is

```
% tr -d '\015\032' < dos > unix
```

This deletes extraneous carriage-return characters, leaving newline to mean end of line. It also deletes control-Z, which is sometimes appended at the end of DOS files for some unknown reason.

You should be aware that there is a UNIX cultural problem with the range arguments to `tr`. System V systems (and future POSIX ones) insist that the arguments look like ranges in regular expression syntax and so should be surrounded by square brackets:

```
% tr '[A-Z]' '[a-z]' < in > out
```

I need to quote these to get them past the shell. I was sent a solution to this by Peter Vernam of Draper Laboratory Inc. He uses `tr` when writing interactive scripts to ensure that the response from the user is in a known case for testing. Simply, he wants to do something like:

```
# get response
read ans
ans=`echo "$ans"|tr A-Z a-z`
if ["$ans" = yes ]
then
#       we have yes
fi
```

The clever line is the one that passes the response from the user through `tr`. This changes uppercase characters in the user's reponse into lowercase. We can now test only for lower case in the script, allowing the user the ability to input data

in any case. Remember the backquote operator runs a command and sends its output back into the shell; here we store it back in the ans variable. Peter wants to write this portably so that his scripts can be moved easily between System V- and BSD-derived systems. To do this, he adds:

```
# guess BSD
tolwr="tr A-Z a-z"
# does it work?
if [" `echo XYZZY | $tolwr`" != xyzzy ]
then
# no must be System V
   tolwr="tr '[A-Z]' '[a-z]'"
fi
```

at the start of his scripts. Luckily, when the System V program is given the bare strings as parameters, it doesn't stop and complain. It still works, passing the input to the output unchanged. So, the if statement will fail if the System V program is being used because XYZZY will be passed through unchanged. The final act is to make use of this and change the character conversion line in the main script to:

```
ans=`echo "$ans" | $tolwr`
```

Like many UNIX tools, sort 'understands' a number of things about the source file.

Sorting

The UNIX sorting tool is another early program. The early C library contained a version of the quick-sort code, and we see that many programs use sorting almost without thinking. The shells present sorted lists of filenames to commands when expanding the * operator. I am so used to the sorting provided by the ls command that I find it inconceivable that DOS doesn't do it.

The program sort is useful for organizing unordered data:

```
% sort /etc/passwd
```

will sort the lines of your password file into ASCII collation order. The command

```
% sort -r /etc/passwd
```

sorts in reverse order.

Like many UNIX tools, sort "understands" a number of things about the source file. The source file is composed of text separated into records of lines. In the default case, sort treats the lines as vectors of characters and sorts the lines into order on a character-by-character basis from left to right within each line. This is what is happening in the default cases in the two examples above.

Alternatively, the lines can be split into a number of logical columns separated by white space. To sort on any column other than the first, a field specification is given:

```
ls -l | sort +2 -3
```

sorts the long output from the ls command into "owner" order. To see what is happening here, look at the output from ls -l

```
drwxr-sr-x 9 bin 512 Feb 3 1991 var
```

I have compressed spaces for printing reasons. Column numbering starts at zero, so column 2 is the field of interest containing the owner bin. The sort command, then, says +2, start sorting *at* column two and -3, stop at column three–so only the owner field is used as a sort key. If the -3 option is omitted, the sort key will continue to the end of the line and will also wrap back to the beginning.

You can specify field delimeters by using the -t option, so

```
% sort -t: +2 -3 /etc/passwd
```

will sort on the uid field of the colon-separated password file. If you try this, you may get some unexpected results. This is because the output is sorted in the ASCII collating sequence and not in ascending numeric order. The need for numeric sorting is so common that sort provides a way of saying "look at the data, interpret the characters you find there as a number, and sort into numeric order." To put the password file into numeric uid order:

```
% sort -n -t: +2 -3 /etc/passwd
```

Several tools take advantage of the -n option to sort; they can be coerced into inserting a number at the start of each line of their output. This numeric field can then be used as a sort key by specifying the -n switch to sort.

The uniq command is a good example here. Normally, it takes its input and outputs only one copy of any repeated lines. To find out how many people are logged on, we might try:

```
% who | wc
```

This doesn't work correctly on a server machine because one person can be logged on several times. To find out how many *individuals* are logged on we might try

```
% who | cut -d' ' -f1 | sort | uniq | wc -l
```

The output of the who command is passed into cut to strip all data except the first column. See below for more on cut. The first column contains the user names of all the people who are logged on. We sort this so that repeated names will appear on contiguous lines. The data stream is passed into uniq to strip repeated lines before being passed into wc to

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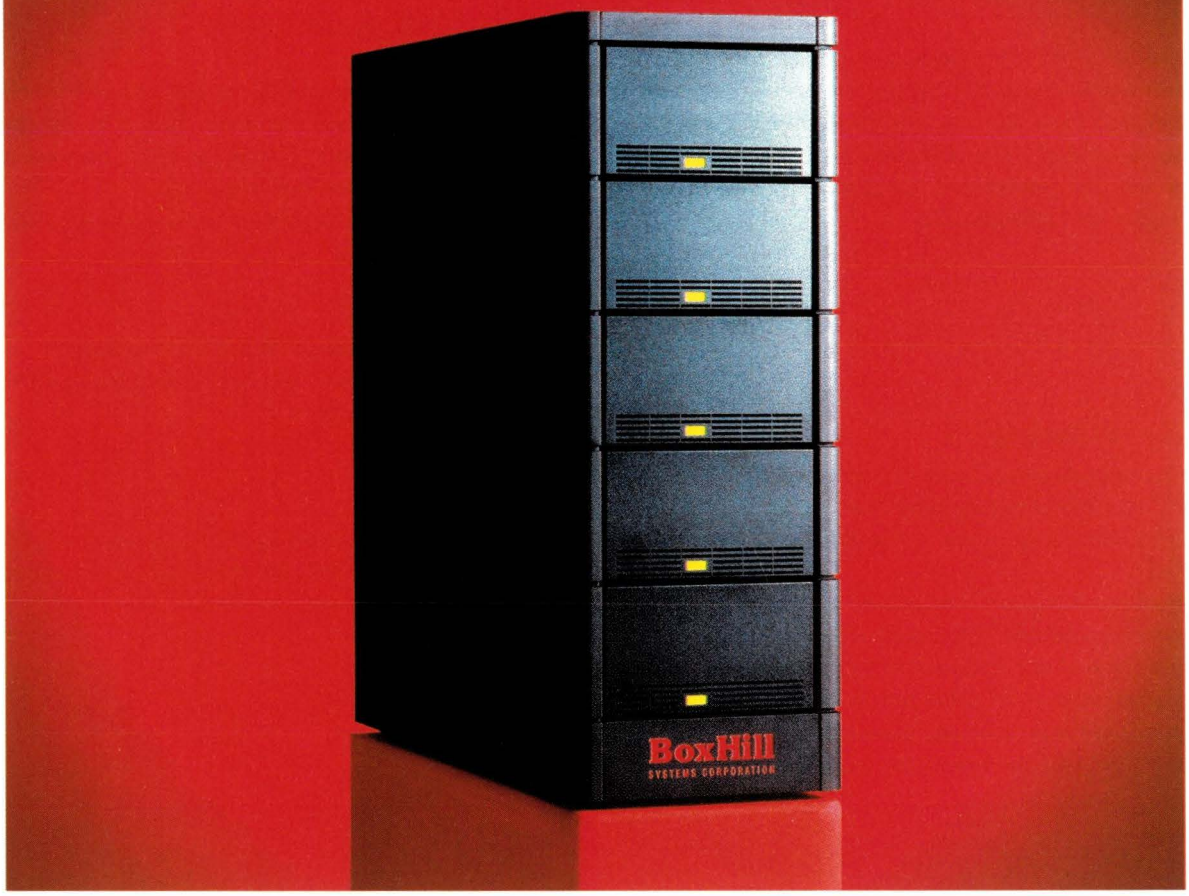

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count the number of lines. The number of lines represents the number of individuals who are logged on.

If we were interested in exactly who *was* logged on more than once, then a slight change to the script will permit this:

```
% who | cut -d' ' -f1 | sort | uniq -c | sort -rn
```

The call to `uniq` now contains a `-c` option that says "precede each output line by the number of times it is repeated on the input." The final `sort` command sorts this into descending numeric order. The result is a list of login names, one per line, each preceded by the number of times that person is logged in. Something like:

```
5  pc
4  mam
2  lisa
1  root
```

Cutting and Pasting

The example above used the `cut` command to pick off the first field from the `who` command. The `-d` flag sets the column delimeter to a space, the `-f1` option says "print column one."

It's worth a small groan here–it would be nice if all these options were standardized across all commands, wouldn't it? It's also a shame that `cut` doesn't follow the same default "white space" rules as the other commands for picking a single column. In the default case, many of the other commands collapse tabs and spaces into a single delimeter. The `cut` command doesn't; the default delimeter is a tab. Well, the `who` command uses spaces after the user name to provide padding for pretty output columns, so we have to say "use space as a delimeter" to `cut`.

The `cut` command can print multiple fields:

```
% cut -d: -f1,5 /etc/passwd
```

will print columns one and five of the password file, the login name and the "real user name" field. The command doesn't provide formatted output, so `-f5,1` does not have the expected effect. Another groan.

The `cut` command can also be used to pick off a certain number of characters:

```
% cut -c1-80 file
```

truncates the source data to 80-character columns.

The companion of `cut` is `paste`. This joins its input files together, line by line. So:

```
% paste f1 f2
```

will append the contents of line 1 in `f2` to the end of line 1 in `f1`, separating each data set by the default delimeter, a tab. So if `f1` contains:

```
1
2
3
4
```

and f2 contains

```
one
two
three
four
```

the combined output from the paste command above will be:

```
1 one
2 two
3 three
4 four
```

Like many commands, paste uses a single hyphen on the command line to mean "read from standard input." This allows it to be used in some interesting ways:

```
% ls /bin | paste - - - -
```

prints the input in four columns, each separated by a tab. Take a look at the manual pages for cut and paste; it's true that awk and sed can perform many similar functions, but these two commands have some "unique selling points" and are a little quicker and possibly easier to use.

Finally

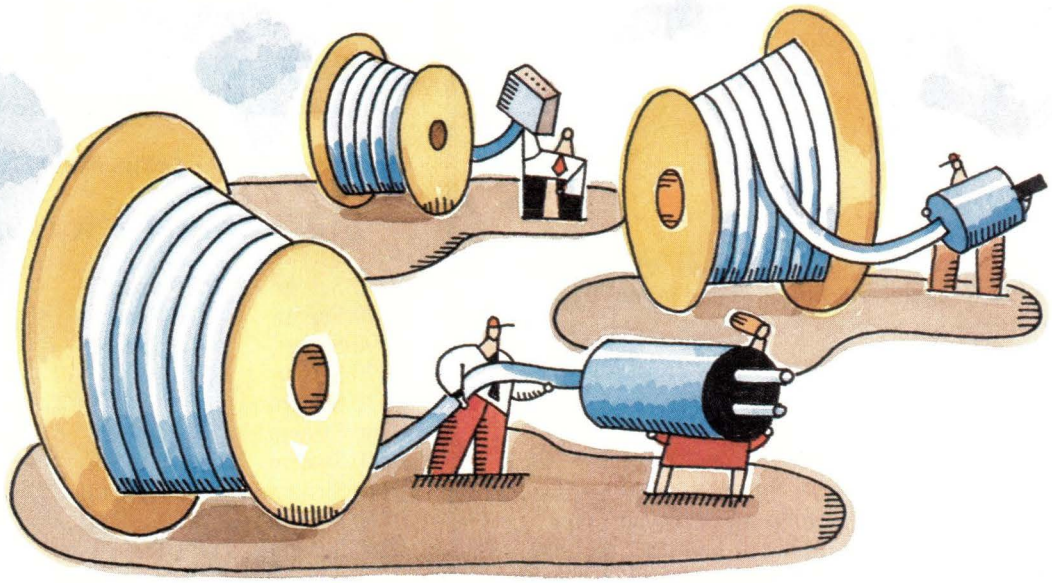
Again, I have managed to only scratch the surface in this article. There are several other commands I would like to discuss. I'll return to them later.

By the way, email from readers is certainly welcome, even the "nice article–BUT" letters. It means that people read the stuff I write. Also, as I said to Peter Vernam, "it's hard as a freelance person to get to look over someone's shoulder to pick off the nice idea that should be passed around."

Sometimes email from people is printed in the "Letters" section (unless it's blatant advertising); sometimes questions prompt new ideas for articles; sometimes I can incorporate your ideas into articles that I am writing.

Sorry, though... I cannot debug your programs, stop your machine from crashing, work out why the network connection to your machine fails regularly on Tuesday morning at 11:30 a.m., explain the differences between System V and BSD UNIX, stop your next-door neighbor from playing Bob Marley at 9 a.m., etc., etc. Email to me is always acknowledged and usually replied to quickly. Delays in replying normally mean that I'm not here. I'm there.

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



ROBIN JAREAUX

A Guide to Workstation Hardware (Part 1)

by RICHARD MORIN,
Technical Editor

In this column, I will say a few words about the hardware interfaces one finds on and around computer workstations. If you're a complete hardware or software jock, you should probably turn the page. The explanations will be too facile for real hardware experts, and true software elitists leave hardware issues for others to solve.

If you occasionally need to know about cables, plugs, terminators and the like, however, I may be able to help out a bit. I'm not a hardware guru, by any means, but I keep Canta Forda Computer Laboratory's machines running and occasionally pinch-hit at other sites. I won't mislead you too badly, in any case, if only because I have a crew of hardware types looking over my shoulder as I write this.

Much of the difficulty in hooking things up lies in knowing what to call the pieces. Unfortunately, most of the language in common use is ambiguous, misleading or just plain wrong. Let's start, in each case, with some putatively precise definitions, then move on to common, if imprecise, jargon.

All electrical interfaces use conductors to carry the electrons around. These are almost universally made out of metal, with copper used for all the longer runs. Aluminum is starting to see use in places where weight and/or cost are important. Other metals, such as gold and silver, are used to coat the pins on connectors, make connections inside integrated circuits, etc. Copper is flexible, reasonably economical and a pretty good conductor, however, so it gets used for most wiring jobs. It is universally used, for instance, for flexible cables.

Insulation is used to keep the conductors apart and to protect them from the outside world. There are many kinds of insulation, with various amounts of flexibility, abrasion resistance, temperature characteristics, etc. If you are putting wiring into a wall or ceiling, you should make sure that it is properly rated for this kind of service. Look for "plenum wiring," which, among other things, doesn't give off toxic fumes when subjected to high temperature.

Wires and Cables

A wire consists of one or more conductive strands. Solid (single-strand) wire is used for applications where economy, current-carrying capability and/or size are more important than flexibility. Stranded wire is very flexible and resists breakage due to repeated bending. Power and telephone wires in the walls of buildings tend to use solid wire. The same signals are carried by stranded wires once they enter the rooms.

Two or more wires may be joined together, separated by insulation, to form a cable. Most of the "electrical cords" you will encounter are actually

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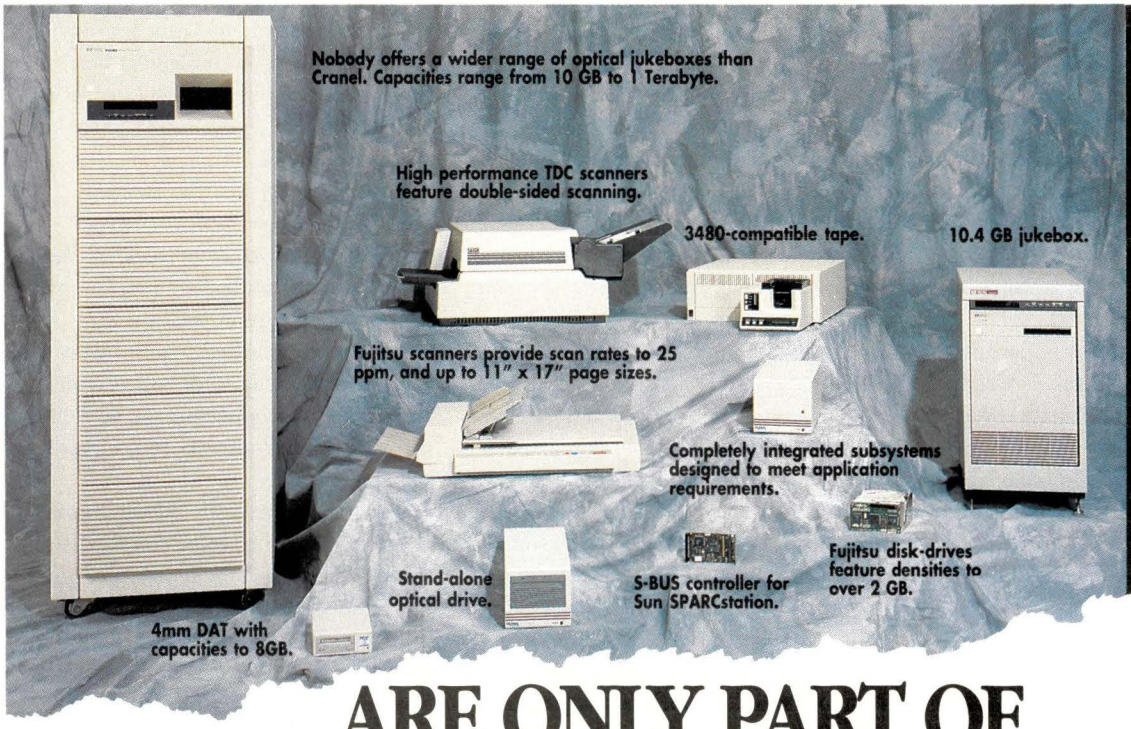

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multiconductor cables. If a cable carries only power or insensitive signals, no special precautions are needed to ensure accurate transmission. The wires, insulated from each other, simply travel together down the cable.

Most cables are circular in cross-section. In "ribbon" cable, however, the wires are joined edge to edge. Ribbon cable is commonly used inside pieces of equipment, where its flexibility and convenience (ribbons accept connectors very easily) are more important than its relative lack of durability and strength. "Zip cord," commonly used for ungrounded power cords, is a simple form of ribbon cable.

If impedance control is important (see next month's column), "coaxial" cable may be used. The name comes from the fact that the conductors share a common central axis. In "coax" (commonly used for Ethernet, radio signals, etc.), the outer conductor (shield) is kept at a constant distance from the inner one, and assorted details (wire size, dielectric constant, etc.) are very closely controlled.

Even in less critical applications, low-level and high-frequency signals may need a bit of help. Wires may be surrounded by a conductive "shield" to keep them from radiating and/or receiving radio signals. Pairs of wires may be twisted together, providing electromagnetic shielding for each other. These "twisted pairs" are used for some local-area network applications. In extreme cases, twisted pairs may be shielded, as well.

Cables can get very complicated. I have seen cables that contained individual wires, shielded twisted pairs and coax all at the same time. Such cables aren't cheap, but they can solve difficult signal-handling problems while keeping installation costs to a minimum.

Connectors

A pair of connectors is used to join two parts of an electrical circuit. Connectors normally have two genders: male and female. As is the case with other small beasties, it isn't always easy to tell which is which. In America, the electrical contacts (i.e., pins) from the male connector go into the corresponding holes of the female connector. Europeans, I am informed, decide gender according to the topology of the connector's case.

In any case, there are numerous exceptions. Some connectors (e.g., Molex) can have both male and female elements. In these cases, the "official" designations must be determined by fiat or consensus and learned by rote. Other connectors are truly androgynous; I have some connectors that consist of one pin and one hole each. In these cases, gender is unknowable (and irrelevant).

Complicating the issue further, connectors can be cable- or chassis-mounted, shielded or unshielded. Pairs of connectors can be held together by bolts, sliding clips or plastic snaps. Wires can be attached to pins by insulation displacement, soldering or crimping. Ordering connectors can be a dicey business; it is all too easy to get *almost* what you want.

But why be pedantic, I hear you say. Isn't the male connector commonly called a plug, and the female a socket? Yes, but cable-mounted connectors are also called plugs, and chassis-mounted connectors may be called sockets, jacks or even receptacles. And no, it isn't

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always the case that all chassis-mounted connectors are female (note the power connectors found on computer equipment).

Plugging It In

Even when you have the right kind of connector, there can be problems. The first one occurs when a vendor chooses the same type of connector for two different uses. A particularly thoughtless workstation design might, for instance, use the same plug for the keyboard and the audio connection. You may not think this sort of thing can happen to you. After all, getting the right connectors hooked up isn't rocket science. Well, a friend informs me that he knows of at least one rocket that was ignited prematurely because of swapped firing and data connectors. The consequences of a mistake in workstation wiring will no doubt be less spectacular, but they can still be pretty costly. Stay awake!

Another problem has to do with connector orientation. It is quite possible to get some connectors plugged in upside down, with unpredictable (and generally unpleasant) results. In workstations, the internal SCSI connector is the biggest troublemaker. This is a flat connector with two parallel rows of square holes. (DEC calls it a BERG connector, but nobody else recognizes the name; the SCSI-1 spec just calls it an unshielded connector.)

A particularly thoughtless workstation design might use the same plug for the keyboard and the audio connection.

Some vendors put a plastic bump, or key, on the female connector, and a matching slot on the housing around the male pins. More frequently, there is a triangle embossed into the body of the female connector, and perhaps onto the shell surrounding the male. If there is no shell, look for a "1" near one end of the male set of pins.

Some ribbon cables are made up of rainbow-colored wires. The color of the wire should indicate the last digit of its number. The color code (also found on resistors, etc.) uses black, brown, red, orange, yellow, green, blue, violet, gray and white to stand, respectively, for the digits 0-9. My favorite mnemonic for the color code is: Better Be Right Or Your Great Big Venture Goes West.

It is also common for ribbon cables to have a specially colored (e.g., red) wire at one edge. This should indicate the wire for pin 1, and normally will, but I give no guarantees on the subject. Once you have found pin 1 on both connectors, line them up and plug them in.

Note that these insertion problems are *all* the fault of the vendors.

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Properly designed connectors can't be put together wrong, even in the dark. (A nonelectrical alignment device [tab, slot, etc.] should line the connectors up before the pins engage.) A properly designed system doesn't allow users to mate the wrong pair of connectors, particularly if the result will be damage to the system. C'mon, designers, get it together!

Power, Heat, etc.

The aforementioned power connectors are a real boon for hardware vendors. The connector on the chassis can be the same, regardless of where the device will be used. Only the power cord has to be specialized, and cords are cheap. Of course, the power supply has to accept the local voltage and frequency, or things won't work at all well. This puts a burden on the user, lest the device get the wrong kind of power.

Power line frequency isn't much of a problem. Using beefed-up transformers and filter capacitors, even conventional modern power supplies can handle either 50- or 60-Hz power. Switching power supplies pretty much disregard the input frequency, so the whole issue goes away for them.

Voltage levels can be more of a problem. Plug a device into 220 when it expects 110, and bad things will happen. Consequently, users are expected to find and adjust a little switch that sets the expected input voltage. Fortunately, even that requirement is now going away. Many switching power supplies now accept any conventional line voltage. They take as much power as they need and let the rest go by. Cute.

Most computer power cords have a third (ground) pin. This is primarily intended as a safety feature. If the case is grounded, it cannot become "hot" due to a short-circuit. Even if your building's wiring is not grounded, however, you should use grounded (three-wire) cables to tie your computer gear together. This eliminates static build-up among the devices, and may keep sparks from destroying sensitive internal components.

Even when everything is working properly, however, power wiring can get you into trouble. The first issue is power usage: Do your circuits have enough capacity to handle the total load? The second issue is heat production: Will the equipment (or your office) get too warm?

Most fuses and circuit breakers are specified in amperes (amps, for short). Most devices list power requirements in watts. To calculate the total current (amps) needed by a set of equipment, add the watts for all the units, then divide by the local voltage. This is conventionally 110 volts in the United States, but line voltage may vary by 10% or even 15% from this value. In most cases, however, 110 is a safe value to use. Thus, if the equipment totals 2,200 watts, it will need about 20 amps. If your circuit is only capable of providing 15 amps, you have a problem. Find a stronger circuit, or feed your equipment from two separate circuits. Intermittent high-current devices, such as laser printers, will cause less line voltage fluctuations if fed from a separate circuit breaker. While you're at it, keep your cabling short and make sure it is rated for continuous duty at the needed current.

Unfortunately, things are never quite as simple as they appear. Switching power supplies do not draw current continuously, and they can draw more peak power than their wattage ratings indicate. After you have installed your systems, feel the power cords for heat. If they are noticeably warm, you should consider upgrading their capacity.

Switching power supplies can also cause problems for the power companies. The current drain is erratic, but nonrandom, and doesn't match the criteria for which most power wiring systems were designed. Consequently, Europe is about to require special circuitry in switching supplies.

Be careful about covering up or enclosing power cords, as well. Their current ratings are based on free-air usage. If they are enclosed, they may heat up and cause a safety hazard. Enclosures can also be a problem for equipment. Be careful about putting peripherals into cupboards, closets, etc. The fans are designed to exchange heat with the surrounding room. If the ambient temperature gets too high (over about 80 degrees Fahrenheit), some devices will be unable to cool themselves properly.

Whole rooms and buildings can have cooling problems. A human being at rest produces about 100 watts of heat. Add normal lighting and a typewriter, and you might get to 250 watts. My main workstation consumes around 500 watts in normal operation, and almost all of that ends up heating my office. This is not atypical; masses of peripherals and large color displays can bring the total even higher.

Many older offices are not set up to handle the heat produced by thousands of watts worth of equipment. The result will be discomfort at best, and ruined equipment at worst. If you are planning to put a lot of computer equipment into an office, get somebody to analyze the total cooling requirements.

Next month, we will look at some of the more esoteric aspects of cabling: impedance matching, termination, etc. We will also take a shot at some of the active devices found on networks: routers, gateways, etc. Please let me know if there are any specific hardware topics you would like to see covered–a follow-on article is always a possibility. ➸

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

It's In the Mail

Excited, confused, inspired or irritated by something you read in *SUNEXPERT Magazine*? We would be happy to hear from you. Our email is always available to answer questions directed at our columnists: Michael O'Brien, Peter Collinson, Richard Morin, Peter Salus and S. Lee Henry.

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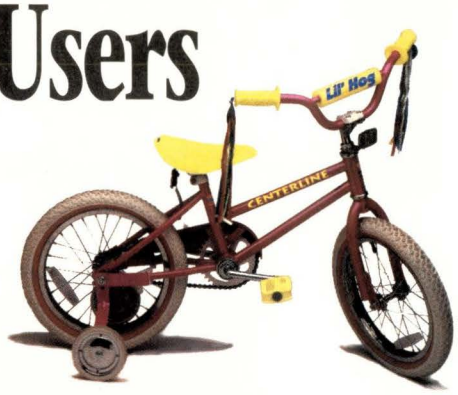

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JOHN W. KELLEY JR.

Quality

by PETER H. SALUS

At the end of my June column I wrote: "After this year, any company that wants to do business with the European Community will have to comply with ISO 9000-9004, which is a quality standard. It is no triviality to comply with this standard. Each country has (at least nominally) set up organizations to register compliance. The U.S. version is ANSI/ASQC Q90-94..."

Well, in four weeks I averaged about two pieces of mail per day on ISO 9000, U.S. mail and electronic mail. I also received several phone calls. Most of the queries were for more information and for information sources. This month, I've decided to elaborate on these topics.

The ISO 9000-series is for "quality-system assurance standards." The European Community adopted 9000-9004 in 1987, with a five-year period for companies to transition to the requirements. Critics have charged that adoption of the standards was a way for the EEC to create trade barriers.

This year, with required compliance just around the corner, some people are waking up to the true challenge of the quality standards: complexity. This is obvious from articles as diverse as those by Peter Burrows in *Electronic Business* (January 27, 1992) and Lee Sands in the *Denver Business Journal* (January 10, 1992). But Donal W. Marquardt (in the January 1992 *Management Review*) points out that because ISO 9000 defines quality concretely, it has real value "so it can be readily implemented."

Earlier articles appeared in *Industrial Engineering* (October 1991) and *Industry Week* (August 18, 1991). But it is most important for everyone to realize that these standards are not merely for hardware and software. The result is that there has been extensive discussion of the implications of ISO 9000 for American business in a number of other industries. The article in *Industry Week* focused on plastics.

In May 1990, *Air Conditioning, Heating and Refrigeration News* reported from the gas-appliance manufacturers' meeting, asking whether the quality standard would "shut U.S. furnace manufacturers...out of the 1992 European market." In November 1990, the *Chemical Marketing Reporter* carried a piece, and in December the *Journal of Commerce* had a special report, "New standards ahead for sizes of containers" on "containerization and intermodalism."

There have been two interesting arti-

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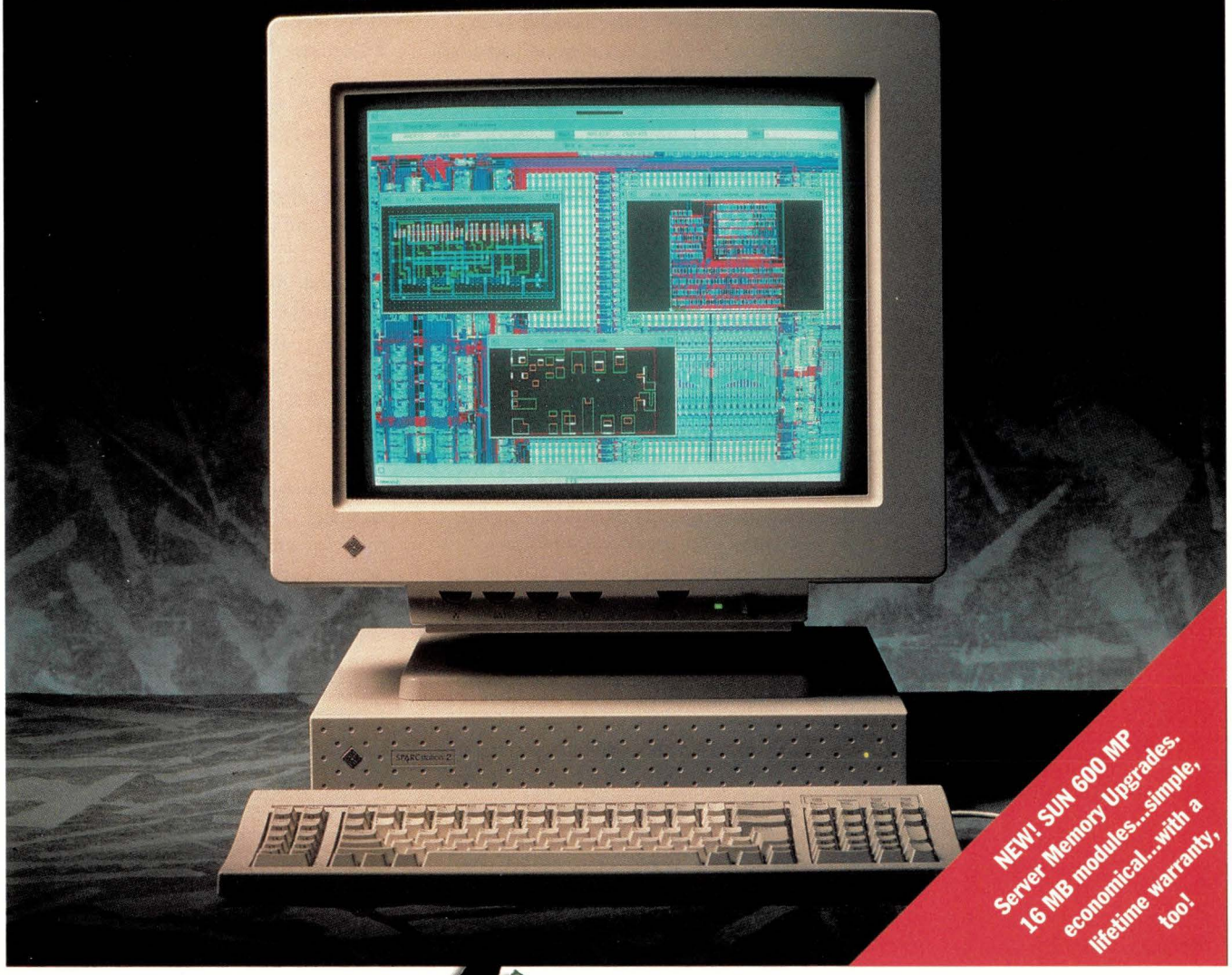

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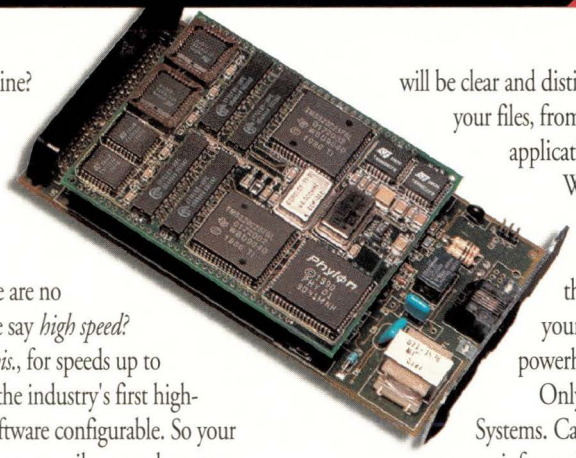

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cles in *Pulp & Paper*. In March 1991, Kelly Ferguson published an illuminating interview with John J. Kirchenstein on how the quality standards might affect the paper industry's efforts in Europe; in July, Lora Ingman had a column on "ISO 9000 and 'nonquality.'" And in June 1991, *The Oil Daily* carried a report by Chris Carey on the U.S. firms that were seeking ISO certification in order to compete in the European market.

I've gone through all this just so you can see that the computer industry isn't alone: This issue is far broader and far more important. One of my correspondents answered my query as to what U.S. companies were doing about quality: "mostly having their marketing organizations announce that they're committed to win the Malcolm Baldridge Quality Award next year (I certainly am, aren't you?) and then assigning surplus people to committees to study and perhaps implement a Quality Program. The advantage of this over sending them to standards meetings is lower travel costs."

There was more in this vein, including important inscriptions on the back of business cards. I fear that too many U.S. companies in information technology are taking the issue too lightly. I think we should be serious about the quality standards–it certainly appears that other U.S. industries are.

Where to Get 'Em

As another result of the many questions that come to me, here are some sources for various kinds of standards. Note that ISO and ANSI standards and U.S. Government FIPS are not available by anonymous ftp.

In general, ISO standards are available from the accredited national standards bodies (in the United States, ANSI; in the United Kingdom, BSI; in Germany, DIN; etc.). The documents pertaining to the many X3 (Information Technology) standards are also available from:

ANSI
11 W. 42 St.
New York, NY 10036
voice: (212) 642-4900
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POSIX documents may be obtained from:

IEEE Service Center
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Z39 standards (library services, publishing, etc.) are available from NISO:

National Information Standards Organization
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IT8 standards (specifications for the exchange of digital data between electronic prepress systems and their components) are looked after by the National Printing Equipment and Supplies Association:

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U.S. Government "Federal Information Processing Standards" are available from:

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Springfield, VA 22161
voice: (703) 487-4650
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Finally, I have refrained from attempting a full list of the more than 100 countries that participate in ISO and the addresses of the standards bodies. However, if there is interest shown in a "subset directory," I'll provide information in a future column.

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

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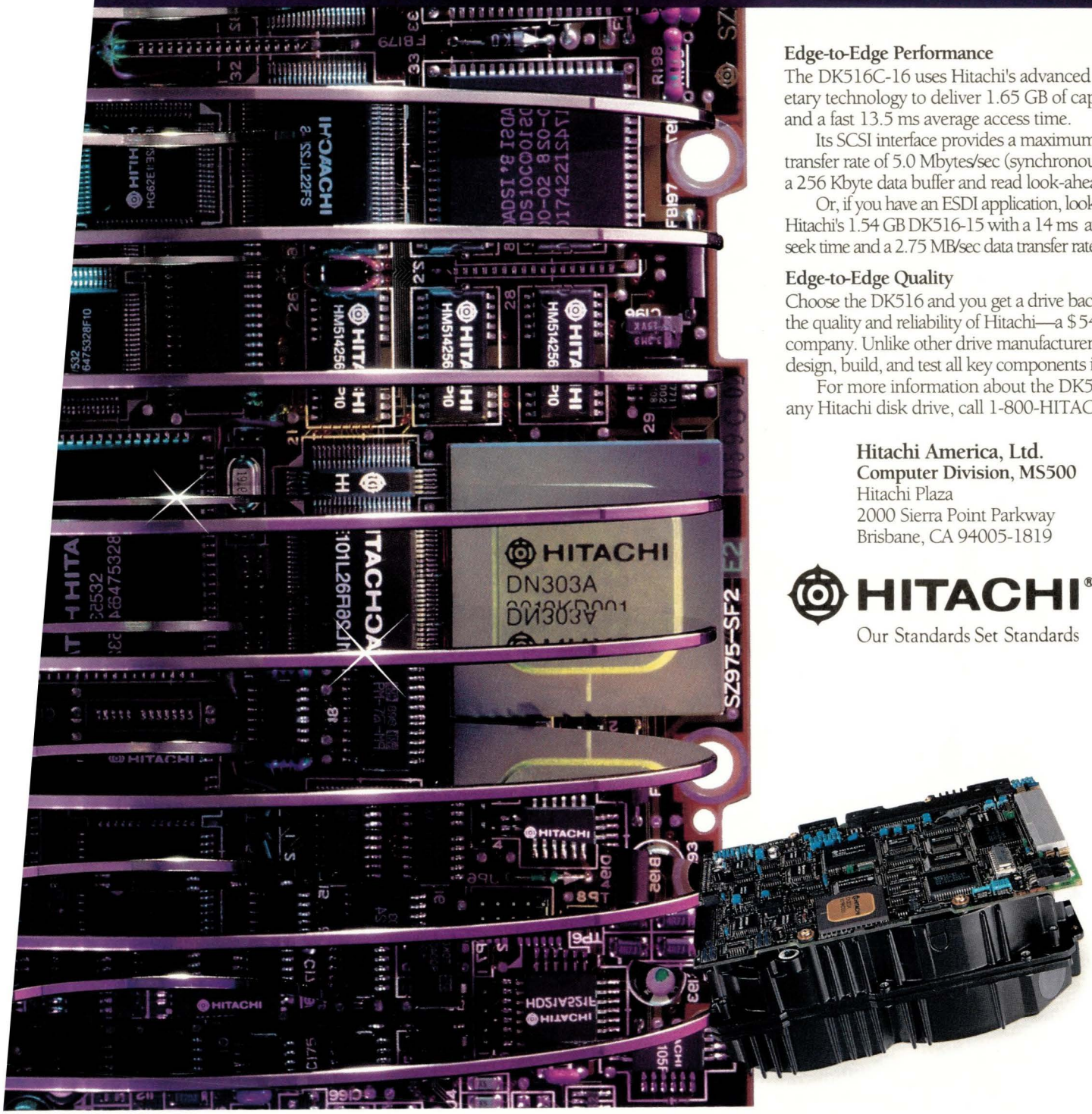

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Circle No. 22 on Inquiry Card

Managing Resources with Calendar Manager

by S. LEE HENRY

Calendar Manager in OpenWindows Version 3 is a delightfully useful tool. We can now browse multiple calendars at once and even mail appointments to each other from Mailtool. (Take a look at the calendar template in Mailtool's "Compose Message" window. It's under the templates list on the Include menu.)

Calendar Manager can easily be used to manage other resources as well: conference rooms, the company van and audio-visual equipment. Or you can use it to post office activities, invited speakers or production schedules.

What's New?

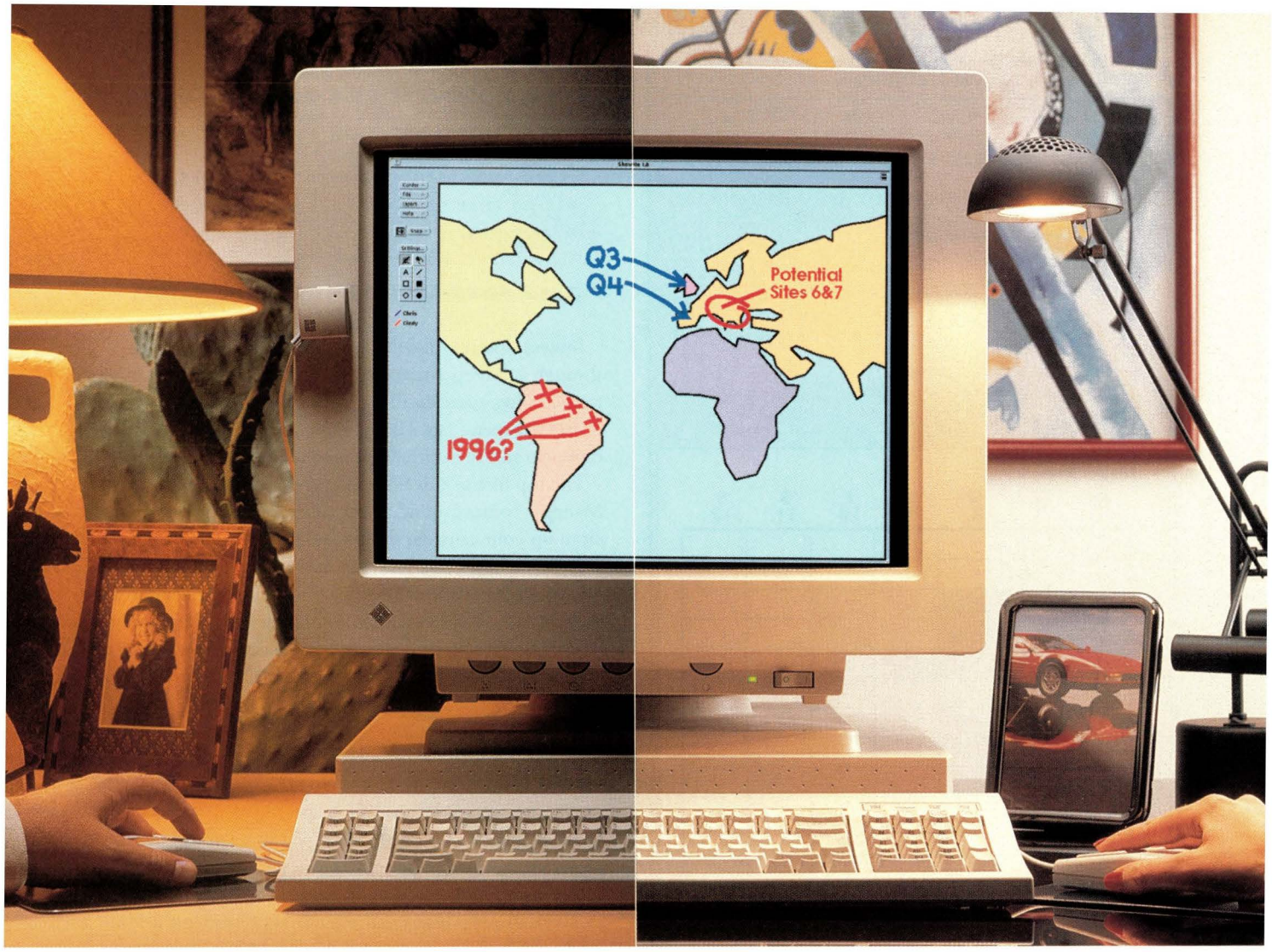
Calendar Manager in OpenWindows Version 3 has added a multibrowse option. The more you can convince folks in your browse group to use Calendar Manager, the more you will come to enjoy this new feature. It greatly simplifies the coordination of peoples' schedules that makes setting up meetings such a headache. Multibrowsing (see Figure 1) makes use of superimposed grids corresponding to the calendars of everyone in your selected browse list so that you can easily visualize times when everyone (or almost everyone) is free and determine what the unavailable people are doing when you want to schedule your meeting.

Multibrowsing also allows you to insert these meetings into multiple calendars with one insert operation (provided you have insert privilege) and greatly simplifies adding and deleting calendars from your browse list.

Another new feature of Calendar Manager is the To Do List, which allows you to keep track of activities that defy scheduling but require some mechanism to help remind you of their importance.

"My Eyes Only" appointments are new. Nothing about these appointments will appear for anyone but you, regardless of the accesses that you have given to others.

If someone's in another time zone, you can adjust your



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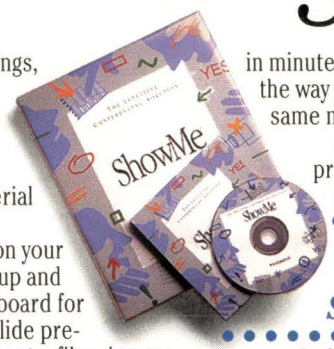

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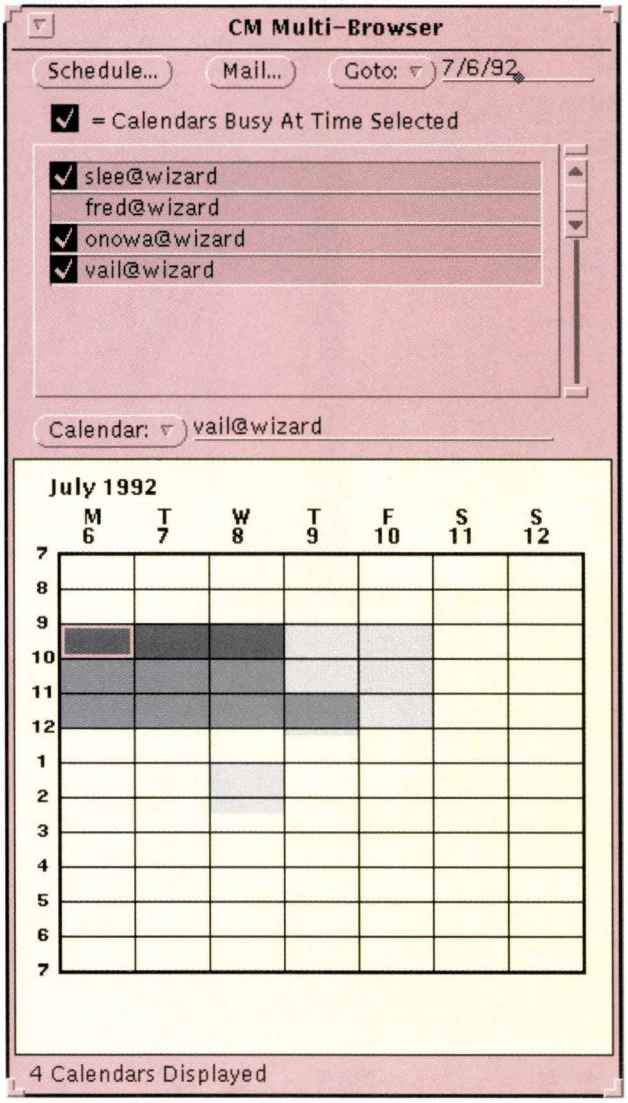


Figure 1. The Multi-Browser Grid

view of their schedule by using the Time Zone option under the Edit menu. This is much easier than converting these times in your head.

The Files

Calendar Manager does all this magic with a handful of files. The directory `/var/spool/calendar` is where calendar files are kept. This directory should be owned by the user daemon and the group daemon.

```
drwxrwsrwt 2 daemon  daemon  512 Jul 13 04:02\
    /var/spool/calendar
```

Calendar Manager is fussy about ownership and permissions because it is the daemon rpc.cmsd that manages your calendar database. Each calendar file is called callog.<userid>, is owned by the user <userid> and the group daemon and has its permissions set to 460 (read by owner, read/write by group, no privilege to the world):

```
-r--rw---- 1 slee daemon  5766 Jul 13 14:21\
   /var/spool/calendar/callog.slee
```

```
** start of log on Mon Jul 13 04:00:10 1992 **

(access read "world" )
(access write "slee@wizard" "onowa@magician" )
(access delete "slee@wizard" "onowa@magician" )
(access exec )
```

Figure 2. Access List from the callog.<userid> File

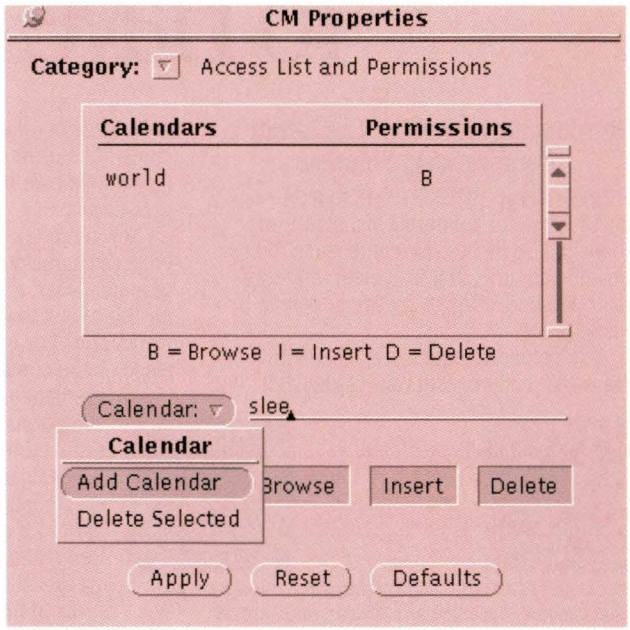
Browse, insert and delete privileges are extended not through UNIX permissions but through the settings internal to the callog.<userid> file, which the owner sets through the Properties menu (see Figure 3) in the Edit menu. The list of browsers and their privileges are included in this file.

The top line of this file will change each day as Calendar Manager comes around in the wee hours of the morning to clean up your calendar. Items that you delete during the day are actually only "marked" for deletion up to this point. This marking keeps them from appearing on your calendar, but they are not actually removed until garbage collection (about 4 a.m.). A backup of your calendar, .calbak.<userid>, is also created at this time.

Calendar Servers

If your site uses automounter to allow your users to play musical desks, you probably want your calendars available across your network too. To set up Calendar Manager to follow you from desk to desk, what you want to do is set up your particular calendar so that you have browse, insert and delete privileges wherever you log in. Though you automatically can browse, insert and remove appointments on the workstation where you start Calendar Manager, you must add yourself as <userid@station> to use your calendar from a particular workstation or simply <userid> to use it from anywhere. You can give others in your group this privilege as

Figure 3. Setting Up Your Access List for Networkwide Use



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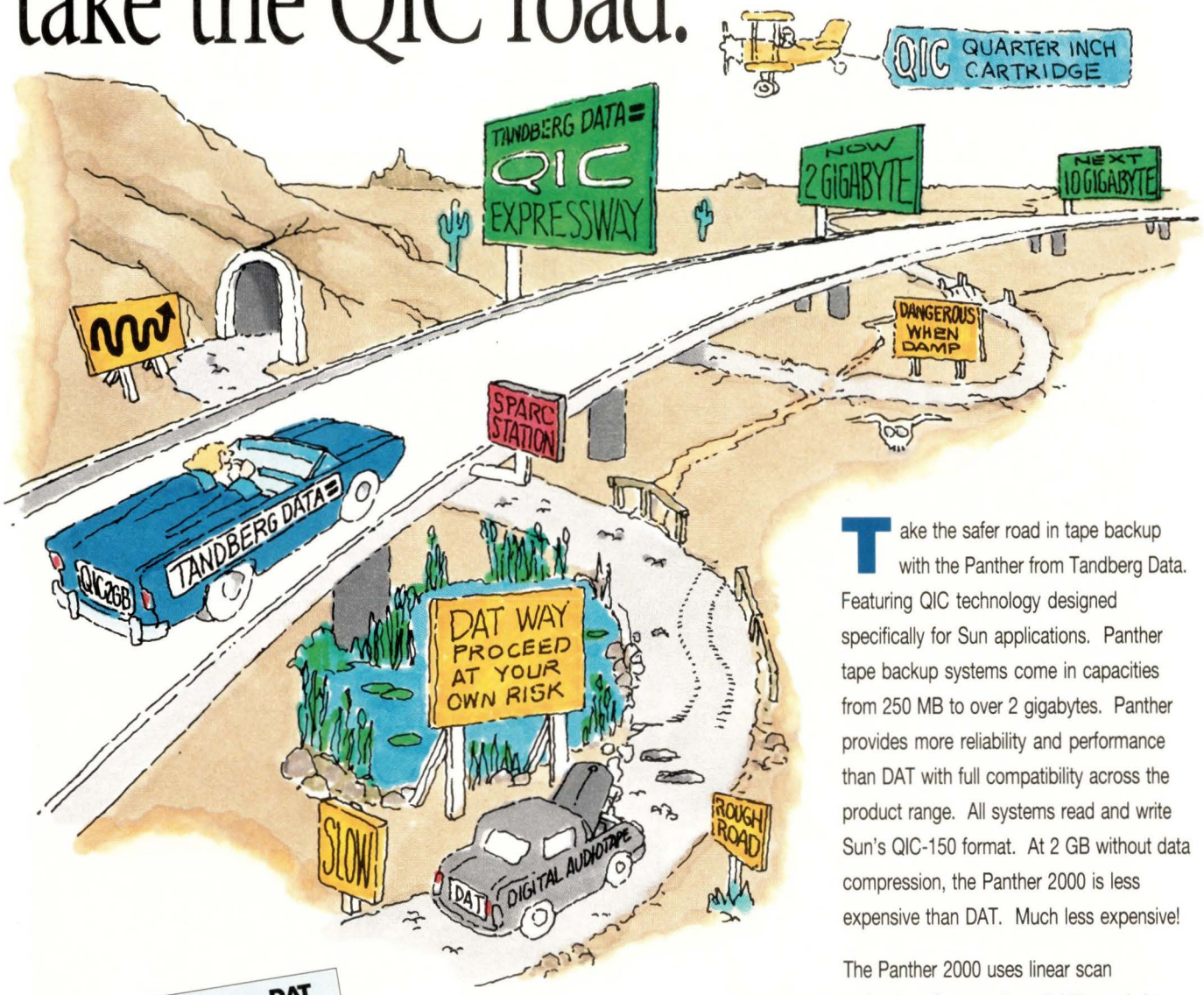

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well. Use <somebodyelse@theirhome> if you want to restrict their access to their home workstation or simply <somebodyelse> if you want them to have roving access. Then, you or they can access "yourname@home" from anywhere on the network.

Calendars for Resources

Setting up calendars for limited resources like conference rooms or the company van is similarly easy. You first have to set up a pseudo-user for the resource by adding it to your `/etc/passwd` file (and updating your NIS maps if you're running NIS). If you log on to the system where you want the calendar to reside and start up calendar manager, you're done. Just make sure you add the users to your browse list that you want to control and manage the resource.

If you're like me and don't allow anyone to log in under a pseudonym, make sure you lock out logins by entering an asterisk into your passwd file. If you can't or don't want to have to log in and start OpenWindows on the system where you want your calendars running, you can create the calendar file as I've done in the scripts in Figure 4.

What the first script creates is a file that looks like Figure 2 and has permissions and ownership like this:

```
-r--rw---- 1 slee  5145 Sep 11 04:02 callog.slee
-r--rw---- 1 slee  5145 Sep 10 04:02 .calbak.slee
```

It also moves the files to the host you designate as your calendar server, sets up the file with the correct permissions and ownership, and shuts down the old daemon so that when Calendar Manager starts up again, it looks at the new calendar.

The .cm.rc file in your home directory is a configuration

Figure 4. Scripts for Creating and Managing a Calendar File

```
#
# setup_calendar - set up calendar remotely
#
if test $# != 2
then
    echo "Usage: setup_calendar <userid> <server>"
    exit
fi
CALUSER=$1
CALSERVER=$2
USERID=$1
Q=\"
echo "Version: 1" > callog.$CALUSER
date | awk '{print "**** start of log on " substr($0,1,19), $6 " ****"}' >> callog.$CALUSER
echo "" >> callog.$CALUSER
for access in read write delete
do
    LINE="(access $access"
    while [ "$USERID" != "" ]
    do
        echo -n "userid for $access> "
        read USERID
        if test "$USERID" = ""
        then
    LINE="$LINE )"
        else
            LINE="$LINE $Q$USERID$Q"
        fi
    done
    echo $LINE >> callog.$CALUSER
    USERID=$CALUSER
done
echo "(access exec )" >> callog.$CALUSER
rcp callog.$CALUSER $CALSERVER":"/var/spool/calendar/callog.$CALUSER
rsh $CALSERVER "chown $CALUSER /var/spool/calendar/callog.$CALUSER"
rsh $CALSERVER "chgrp daemon /var/spool/calendar/callog.$CALUSER"
rsh $CALSERVER "chmod 460 /var/spool/calendar/callog*"
rsh $CALSERVER "rm /var/spool/calendar/.lock"
rsh $CALSERVER "/usr/local/bin/killbyname rpc.cmsd"
```

```
#
# @(#)killbyname
#
kill `ps ax | grep $1 | sed 's/^ *//' | sed 's/ .*//'` > /dev/null 2>&1
```

file for calendar manager. The last line in this file shows the calendars you will have in your browse list. This file is created by Calendar Manager as you set up your browse list through the Browse menu (select Browse, Multi-Browse...; enter the calendar you want to browse or remove on the Calendar: line; and select your function from the list). If you want to set up your users' browse lists for them, you can create this list and add it to their .cm.rc file. For example, you might give each of them a browse list containing everyone in their group. If you have a calendar server, you can create this list easily from the `/etc/group` file or NIS map. Otherwise, you need to know where each person's calendar resides (their workstation name). This information won't reside anywhere in your system unless you've built it in yourself.

If you move calendars from one workstation to another, you must be careful to re-create them with the correct ownership and permissions.

Proceed with Care

Most of the time, Calendar Manager takes care of itself just fine, thank you. If you move calendars from one workstation to another, you must be careful to re-create them with the correct ownership and permissions. Also, I don't suggest that you hand edit these files any more than is necessary as their format is sensitive.

Calendar Manager provides a lot of functionality that you ought to take advantage of. Even I'm getting organized ➸

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

Field of Dreams...

ARTIFACTS COURTESY OF NATIONAL BASEBALL HALL OF FAME AND MUSEUM/PHOTOGRAPHY BY SUSAN BLISS

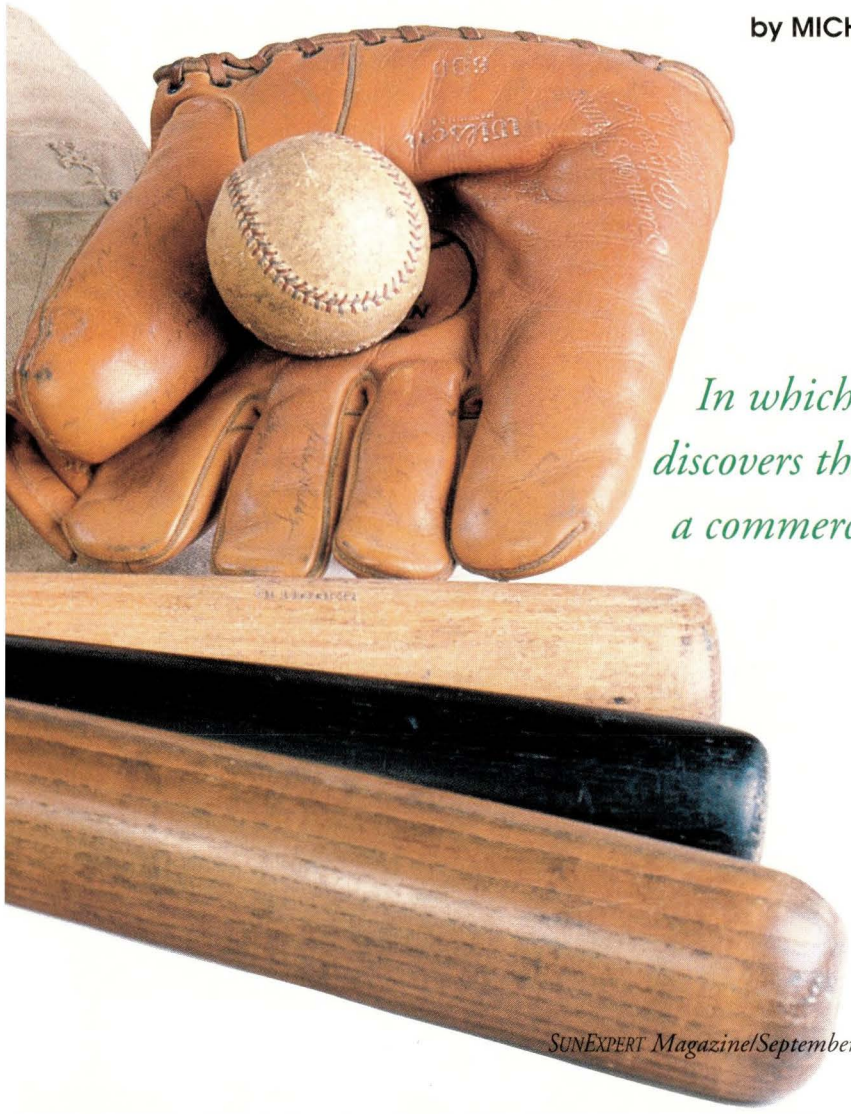
and Realities

Somewhere, at some other place and time, the sun shines and bands are playing; somewhere children play and birds sing, and Mighty Casey put the ball a country mile on the other side of the Mudville town line.

Here, however, at a small trade press magazine just outside of Boston, there is no joy for, once again, the Fearless Reporter has to do an article on Sun Microsystems Inc. in the commercial market.

He stares at his monitor screen and blinks myopically. He has, he estimates, done this story at least once a year...in some form...every year since 1982. Well, back then, it wasn't Sun in commercial markets. It was minicomputers. And then it was micros. And then it was UNIX. And, most recently, SPARC.

by MICHAEL JAY TUCKER, Executive Editor



In which our Fearless Reporter discovers that, yes, Virginia, there is a commercial market for SPARC.

He hits a key or two, sighs and tries to think of a headline. The problem is, you see, that these stories are usually a year or two ahead of the market. When you write them, you *know*...know in the way you know the graceful arch of a pop fly over a Kansas sandlot on a late summer day...that you're right, and damnit! There is a place in MIS for micros or minis or UNIX or whatever, but oy! Is it hard to prove it.

For one thing, the stuff is new–users are few and hard to come by–and even if you do find 'em, they're early adopters, pioneers whose experiences are romantic and exotic as a Lewis and Clark expedition on the Lost River of MIS...but which may or may not be particularly relevant to the day-to-day experiences of the rest of us.

And, well, this year it is going to be worse. This year...this year, he'll have those problems, and something worse. *Something* on the horizon. Something looming and ominous. Something lurking out there...with red glowing eyes and the theme song from *Jaws* playing in the background...Intel!

You see, as this story opens, the Reporter knows that Intel Corp. is gearing up to ship the 80586, or P5, or whatever Intel finally decides to call it. The Reporter doesn't know much about the P5, but he does know it is rumored to offer performance well within the RISC range, but, in addition, to be compatible with that mountain of DOS software out there.

Worse, as the Reporter turns to his monitor and begins to type, Microsoft Corp. is talking about Windows NT, an upgraded version of Windows that will include many of the features that make UNIX so cuddly and lovable. And NT too will be compatible with the DOS candy mountain.

And there's what terrifies him. What if P5/NT is the future? What if the great drive to the Glass House that Sun began those many years ago is about to falter, fall and fail? Like a game that begins well for the home team but then, in the middle, the runner slides into home and, as the dust clears, he's there with a broken arm...

The Reporter shudders, slightly, as though in the Kansas distance there is a rumble of thunder, a hint of storm and rain.

Grand Slam

It is hard to believe, reflects the Fearless Hack–er, make that Reporter–that not long ago you could find people who didn't believe that

Spreadsheets Batting Cleanup

Among the heaviest hitters of all "commercial" software is the spreadsheet. Indeed, when Lotus Development Corp. introduced 1-2-3 for the Sun Microsystems Inc. workstation, this magazine actually devoted a special issue to the event (*SunExpert*, March 1990, Page 44).

The reason for the excitement was that while there have been spreadsheets on UNIX for almost as long as there have been personal computers (Access Technology Inc.'s 20/20, for example), it was the PC spreadsheets that gained fame and fortune. It has been said that the PC's real success was due as much to Lotus as IBM.

But now, two years later, how have the PC-oriented spreadsheets fared on the Sun workstation? The answer is largely mixed: generally good, but not sterling. "Workstation sales...didn't take off the way we thought they would, but we're doing all right," says Stephan Zauchenberger, product manager at Informix Software Inc., which runs Wingz on the Sun. He notes, though, that Wingz has proved popular among people who want to do rapid application development but who may not wish to use traditional programming tools. "People are using Wingz's language, Hyperscript, to write some very sophisticated templates to do some very sophisticated things... like trend analysis, for example."

Meanwhile, Lotus says it is not disappointed with 1-2-3 on Sun. "It has done well," says Antonio Parham, product marketing manager for UNIX products at Lotus. "We've had significant revenue." However, he says he is not at liberty to provide any numbers. When Lotus introduced its spreadsheet for Sun, most analysts suggested the target customers would be technical users who wished to consolidate their PC and workstation software on a single platform. That may not have been the way it has worked out. "I really don't have the breakdown," says Parham. "I would only be speculating...[but] I would say that scientific and technical purchasers have not been the majority."

Lotus users on Sun, meanwhile, describe themselves as being not displeased, but not ecstatic either. "It fits our needs," says Steve Rasmussen, systems administrator at Robert Trent Jones Companies, which uses Lotus on Sun for some of its accounting operations. "But I think they've got a ways to go before they make it as good as their DOS product."

Meanwhile, among the spreadsheets that have been expressly developed for UNIX and/or SPARC, the trend seems to be to integrated software and groupware. Both Applix Inc. and Dux, for example, offer their spreadsheets within larger packages of office-automation software.–*mjt*

UNIX, much less SPARC, had a place in MIS at all. You can still find a few folks who believe that–mostly at companies where even the wallpaper is Big and Blue–but economics has converted a lot of even the hardest core Big Iron Bigots. "The recession," says Gray Lemmke, product marketing manager for the general systems division of Hewlett-Packard Co. "It really boils down to the fact that I can offer a compute server as a mainframe replacement at one-fifth the cost of a mainframe. Given the fact that the economy is soft, that's a very compelling reason." And HP ought to know; it's been selling UNIX-based systems in commercial accounts since before there *was* a Sun Microsystems.

And, while Sun hasn't got the installed base in MIS that, say, HP has, it isn't doing badly there either. In fact, according to John Logan, an analyst at Boston-based high-tech consultant The Aberdeen Group, Sun machines are actually starting to show rather impressive on-line transaction processing numbers. "It caused the industry to stand up and take notice," he says. "It made people say, 'You know, maybe Sun is really serious about the commercial market.'" He says he was particularly impressed by the fact that Sun did its OLTP tests with Sybase, which is not often used for benchmarking.

But now there's the P5...which, to the Hack, sounds like a WW III planet-buster that Buck Rogers Must Defuse in the Final Reel. "To me," says Ken Gilbert, director of marketing for the systems division at Wyse Technology, "the P5 is the first processor that brings the Intel Corp. architecture close to the world of RISC." And Wyse already offers an Intel multiprocessor box that's a very effective UNIX-based server.

He thinks that Sun has had problems getting into the commercial market in the first place: "Sun has had a very difficult time bringing their machines to the commercial market, just as I would have a difficult time bringing my machines to the technical market. That's because of the nature of the market." And he adds that P5 is going to make that situation a lot worse. "I don't see P5 going after Sun in the technical world. I do see it raising a barrier for Sun in the commercial market."

With those grim words ringing in his ears, the Hack...er, Journalist...turns to his story in earnest. He will interview users, he thinks. It will be they who will determine the height of the P5 barrier, and whether there's razor wire and broken glass across the top.

The most famous Sun users in the commercial market are on Wall Street, where Sun workstations have found a place as traders' platforms. Yet, the Trade Press Hack is not sure the Street is an appropriate place for his story to begin, or even visit. Securities traders are a lot like the traditional technologists who have run Suns all along. They need number crunching, big screens, networking... In effect, the Wall Street Wizards are not "real" commercial computerists. They are a niche, high-performance market with a need for niche, high-performance machines.

Economics has converted a lot of even the hardest core Big Iron Bigots.

Besides, it is difficult to find Wall Street people who'll talk–even off the record. You see, the securities industry is...well, the Hack wouldn't say it was red in tooth and claw, but the term "highly competitive" has a nice ring to it. The Streeters figure their information systems are a competitive advantage, and they're not exactly eager to advertise what they've got and how they use it.

Yet, in the end, he does interview one name from the Street–J. P. Morgan, which agrees to speak to him, for background, mostly. The company is using a variety of Sun hardware, including a number of Sun 690 servers. The Hack is cheered to learn that J. P. Morgan has been generally satisfied with the machines, though they are not yet "in a full production role."

But, interesting as this all is, it is not peculiarly relevant to his story. It is not "commercial" computing...not in the sense of databases and the Glass House. However, what causes the Hack's pointy little ears to suddenly pick up, and the small boar-bristles on the back of his neck to rise, is that Morgan is working, along with software vendor Fusion Systems Group Inc., to give its systems extremely high availability.

Explains John Bullivant, a company vice president in the global technology and operations organization, "If the workstation goes down, you just move the individual over to another workstation. But, if the server goes down...we simply can't afford that." Because, of course, if that happens, the business comes to a complete halt.

John Ritter, also a vice president in the global technology and operations organization, amplifies the same idea. "We really can't afford to have the machines go down so that it would interfere with the settlement process" i.e., the buying, selling and confirmation of sales of securities, he says. "We currently have no high volumes or very large database problems...but we need to be able to have the machines available." And thus, their own work on high availability and their relationship with Fusion.

*Well, well, well...*thinks the Hack, as he hangs up the phone. You see, "high availability" is not a traditional workstation consideration. Performance, yes. But not availability...that's a "mission-critical" consideration that you find in MIS shops.

The next user that the Hack manages to find is more significant still. From Sun itself he learns of the Robert Trent Jones Companies of Ft. Lauderdale, FL. It says much about the Hack's petit bourgeois origins that he has never before heard of Robert Trent Jones–possibly the most famous

designer and builder of golf courses and golf-oriented country clubs in the world. When he happens to mention, casually, the name of his upcoming interview to his boss, that individual almost drops his coffee, begins to breathe rapidly and clutches at the air as if to discover an invisible golf club.

"[Trent's] a golf-course architect," explains Steven Rasmussen, systems administrator for Robert Trent Jones. "He's designed them all over the world...over 500." The Robert Trent Jones Companies consists of four different businesses. "We have four companies here: a design business, a golf course construction business, a private golf club and a public golf facility."

Rasmussen works to provide computer services to these four. "The system is set up in a building...which is kind of in the middle of one of the golf courses he owns," says Rasmussen. "In this office, we have a number of Suns, some PCs and a lot of terminals," says Rasmussen.

This collection supports MIS-type tasks at three different locations: the centralized office, the public golf facility and, shortly, "the other facility, about 2,000 feet from here, the private country club, which we're wiring up right now." At the central office, the Suns run mostly as servers, which then support terminals, printers and point-of-sale (POS) systems at the golf course and its pro shop.

"We've got three SPARC 2s," says Rasmussen. "One is a network server, the other is an accounting server, which runs all our accounting software and the POS systems, and the other is used mostly for CAD." In addition, there are also several individual Sun workstations, "more or less to do administrative work."

At the central facility, the servers connect to several Wyse terminals. "We run Lotus [Development Corp. 1-2-3], WordPerfect and the accounting software," he says. "We're real happy with the accounting software and the POS stuff. It's the Real World [Corp.] accounting package, with the point-of-sale software built on it by a third party."

But how, given the nature of the business, did the Jones companies come to use Suns? The answer to that, the Hack learns, is complex. Workstations first entered the equation as a design platform–designing a golf course is, after all, a CAD problem like any other–but from there they spread. "We were in a situation where we didn't have any networking at all," says Rasmussen. "We basically had some old XTs laying around...so we could pretty much start from scratch."

The first thing they found was that most of the software they wanted, like Lotus 1-2-3, was available on the Sun. Also, "we kind of like the idea of one source for the networking...as opposed to going to, say, Novell [Inc.] for a network operating system." That went in Sun's favor, as did connectivity in general. "It has some real advantages in terms of...linking to remote locations. We had one office in New Jersey, and we needed to connect to Mr. Jones' house."

In the end, the companies went with Sun as much as possible. "Over all," he says, "I think it has been a success. There have been some snags, but nothing like a major drawback."

The Trade Press Hack gathers up his courage. OK, but, suppose Rasmussen had to do it all over again. What about P5, and NT? Would those change his platform of choice? "I don't think so," answers Rasmussen. "Those are still pretty new." Quite frankly, he doesn't trust them yet.

Line Drive

The Fearless Trade Press Reporter is startled by that. He hadn't thought of it. People who do commercial, MIS-style computing tend to be careful souls. They have to be. If their systems go down, the company does too. It's not like being a happy-go-lucky young software engineer at an R&D lab, where if the system goes down and bounces everybody says, "Hot dog! A rumble!" and goes to fix it.

But it had never occurred to the Hack that the famed caution of commercial computing might actually work against an Intel/Microsoft combination. After all, PCs are just so...so...so pin-stripe, you know? And wasn't it just the other day he heard someone say, "I've never met a CIO who'd run his business on a Sun"?

Which is why his next user, Kliger-Weiss Infosystems Inc. (KWI), sorta knocks his socks off–plain socks, by the way, not designer, and hardly the sort of thing you'd buy at, say, a Benetton store–and that's a hint.

You see, just as our Fearless Reporter has never played golf–well, except for the kind that has little windmills and the cutsey-poo water traps in the shapes of hearts and snowflakes–neither has he ever shopped in a Benetton. But, at last count, it seemed that everyone else in the Known World had. We're talking big-league retail here.

You wanna guess who runs their business on Suns? Wanna? Huh? Wanna?

"My company is in the outsourcing business," explains Sam Kliger, CEO of Kliger. "We manage information systems for high-fashion retailers." Companies including but not limited to Benetton come to KWI and make *it* their MIS department.

Outsourcing of MIS is a nationwide trend. In a recession it makes sense to focus your attention on your actual business–in Benetton's case, that's selling clothes–and let someone else worry about information systems. Not only does it free up your personnel to actually be something like a profit center, but it can be cheaper in the bargain. "When you outsource," says Kliger, "not only do you get rid of MIS hardware, but you also get rid of the executives associated with it... like the CIO."

The difference in cost can be startling. Kliger says that another national retail chain, the Gap, does its own MIS. "The Gap's MIS budget last year was $10 million," says Kliger. In contrast, the whole of KWI was "a $3.5 million company last year...and we had 500 stores on our system." That was last year. This year, it is 600 stores, representing some 45 distinct companies.

And how many Suns does he use to do this, to manage MIS tasks that would put a mainframe to shame? Three.

Workstations, that is. Not servers. "We have three SPARCstations, two doing the work and one for development," he says. Kliger doesn't like

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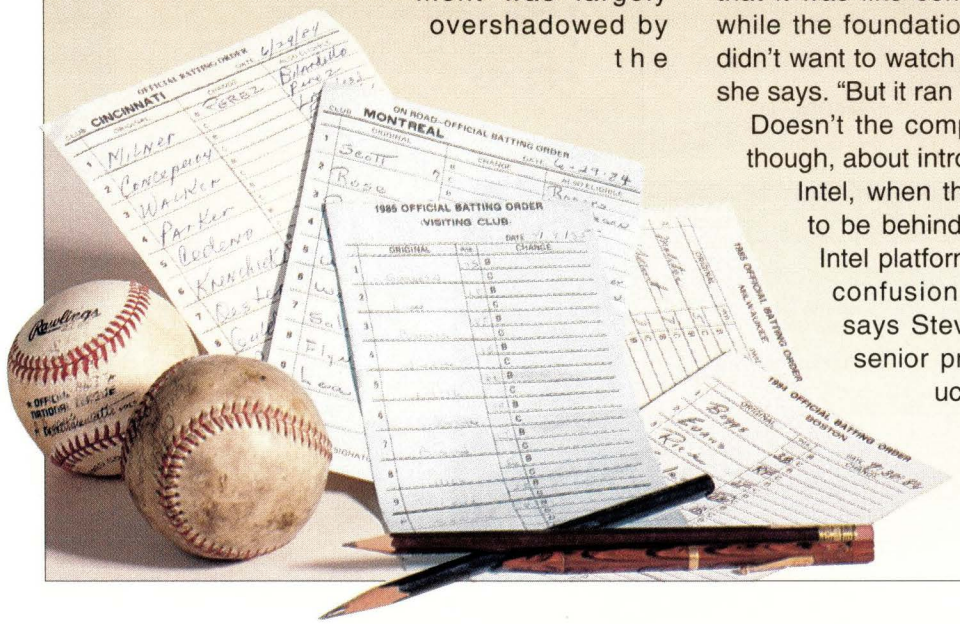
PCs: Played or Trade?

One of the stated goals of Sun Microsystems Inc.'s strategy has been to displace PCs on at least some executive desktops and replace them with workstations. While that has happened here and there, it's more common for Suns to enter commercial environments as servers, with the PCs remaining in place as clients.

There is, though, another option–to run Sun software on the Intel Corp. machines themselves. Sun's Solaris operating system debuted, in fact, at this year's Sun Expo. The announcement was largely overshadowed by the introduction of UNIX Software Labs' UNIX System V.4 for Intel, and the subsequent announcement that Novell had partnered with AT&T to form Univel Inc., which was to market a SVR4 with NetWare extensions.

But those who have seen Solaris on Intel say that it is a very stable, full-featured operating system. Island Graphics Corp., for example, was porting its products to Solaris even before the OS was complete. Kelly O'Connell, Island Graphics' product manager, office products division, says that it was like completing the roof of a house while the foundation was still being poured. "I didn't want to watch it the first time it was tested," she says. "But it ran ... It was really amazing."

Doesn't the company feel a little concerned, though, about introducing product for Solaris on Intel, when the market momentum seems to be behind other forms of UNIX for the Intel platform? "Right now there's a lot of confusion about the UNIX desktop," says Steven Mankoff, the company's senior product manager, office products division. "It's not clear who the leading players are going to be."–*mjt*



servers. "I think the future of computing is in workstations. For most situations, servers ought to be thrown in the garbage."

Every evening, KWI's two systems phone up the point-of-sale machines at each of the client systems. They poll those POS machines and enter the resulting data in a Unify Corp. database. "We're using Unify, except of course for the reporting. All of our reports are sophisticated C programs." Then clients get their reports via Federal Express, or they can dial in and access the system directly.

What makes this kind of performance possible, says Kliger, is the workstation model of computing itself. "People don't realize it," he says, "but the architecture of the workstation is about as good [for database manipulation] as a parallel processor." If you have multiple workstations, they can each search different parts of the database, in exactly the same way that much larger, and much more expensive, multiprocessor database engines can.

In fact, Kliger argues that multiple networked workstations are actually better for his business than a single system would be. "I don't need one big system. I don't want one big system. Because if your system goes down, then so do all your clients."

To that end, he plans on sticking with workstations. By next year, he plans to have 10 Suns in his office. "They're great for business," he says. "They don't take up much space. They don't use a lot of power. They look great...we have them on granite pedestals. Customers love them. They love the Star Trek Syndrome. We made them look powerful by standing them up. When they're on a desk, they look like PCs."

Summer Rains and Home Plate

*Far out...*thinks the Hack as he hangs up the phone.

Oh yes...that P5, that NT, they bug him still. He has grim flashbacks of 1982, when he entered the business doing a book about financial applications of the Texas Instruments Co. TI/994A personal computer–*requiem en pace*–and at the time, the machine had seemed such a winner. He sent in the completed manuscript the same day TI withdrew the machine from the market. His book sold 30 copies, not counting the ones he bought for his mother. When you get your start that way, you tend to be jumpy about Intel-based machines. They tend, well, to be a bit like wild onions and feral grasses in the no-man's zone between home plate and the pitcher's mound: They crowd things out.

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Backup so easy, you can do it with your eyes closed.

TTi
TRANSITIONAL
TECHNOLOGY, INC.

Circle No. 43 on Inquiry Card

Alternative Pitchers...

Sun Microsystems Inc. is not alone in its attempt to bring SPARC to commercial computing. Several other companies are attempting the same feat, and some are doing it rather well.

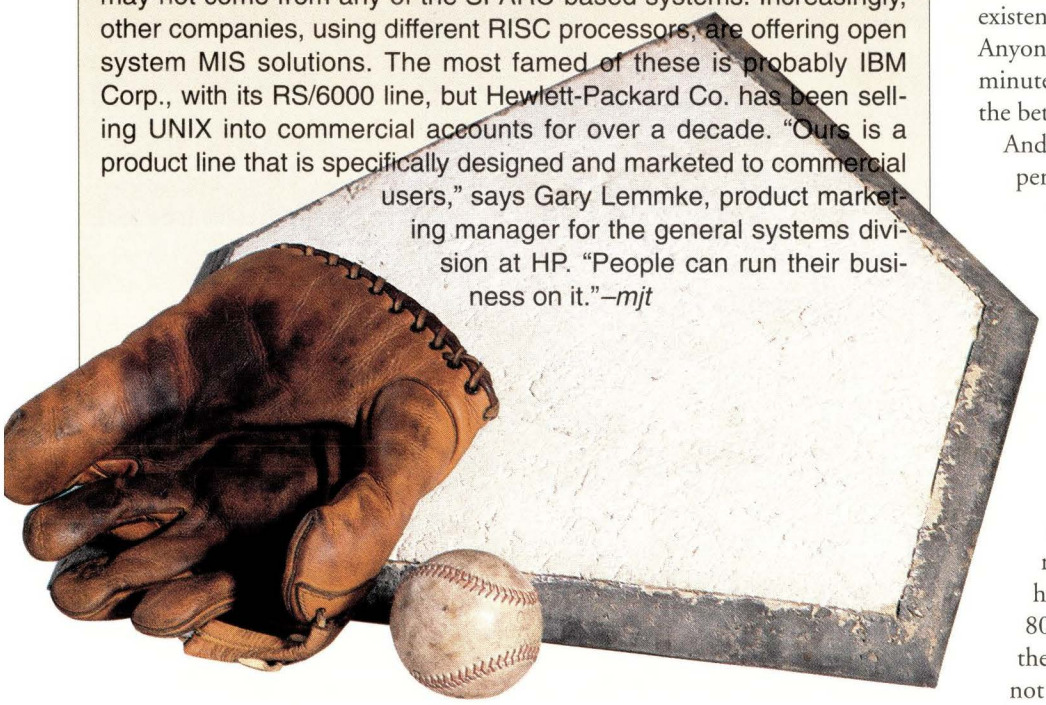
Consider, for example, ICL plc, the European computer vendor that does business in the United States as ICL Inc., Irvine, CA. ICL offers a line of systems, ranging from desktops to servers, that are based on the SPARC processor and sold almost entirely into commercial accounts.

One such is Jardine Insurance Brokers San Francisco Inc., a San Francisco-based division of the giant Jardine trading firm of Hong Kong. It uses a large ICL DRS 6000 to provide office automation functions to some 70 different users. "We've got a DRS 6000," says Dean Ching, the company's information systems administrator. "It supports those 70 users...all on ASCII terminals...running insurance industry-specific applications." They also make use of ICL's own Office Power OA package.

Why did Jardine go with a SPARC-based ICL rather than a more traditional choice–say an IBM Application System/400? "That the computer used SPARC was pretty important to me," says Ching. "Because there are a lot of SPARC applications out there...I may never run any of them, but just having the chance to do so is a plus." He also likes the performance he gets out of a RISC processor. "This puppy really putts along," he says.

Another vendor targeting the MIS market is Solbourne Computer Systems Inc., which has recently begun to target the database market in particular. "In terms of our market focus," says Travis White, the company's vice president of marketing, "we tend to look at customers who want to bring in a relational database to their operation. Then, in that group, we tend to focus on Oracle users. And, then, within that group, on Oracle financial [applications]."

But the biggest rival to Sun in UNIX-oriented commercial markets may not come from any of the SPARC-based systems. Increasingly, other companies, using different RISC processors, are offering open system MIS solutions. The most famed of these is probably IBM Corp., with its RS/6000 line, but Hewlett-Packard Co. has been selling UNIX into commercial accounts for over a decade. "Ours is a product line that is specifically designed and marketed to commercial users," says Gary Lemmke, product marketing manager for the general systems division at HP. "People can run their business on it."–*mjt*



But, the rub of it is ... "Those things are still pretty new," Rasmussen had said.

You see...you see...the P5 isn't that sure a bet anymore. There are complexities and confusions and rumors of war. It is no longer clear that Intel necessarily sets the pace of X86 development. There have always been X86 clones available, and in recent years the cloners have begun to challenge Intel, just as PC cloners challenged IBM years and years ago.

In fact, according to Will Zachmann, president of market research firm Canopus Research and publisher of a forthcoming newsletter, *Canopus Reports*, P5 may be little more than an attempt to address that fact. "They're attempting to create some features in the architecture that are potentially unique to Intel," he says. But, he says, it is not certain that those features are the ones PC makers want or will pay for. "I don't think Intel is going to be able to to lead the industry down a path that isn't fully compatible."

Then, too, there is the issue of NT, from all reports a fabulous operating system–but you can't buy it yet. Microsoft isn't shipping it. It is still very much in development. But even if it were already out in Egghead in shrink-wrapped boxes, there's another kicker here–OS/2.

No kidding. The operating system that was being given up for dead and buried is...well, still alive. IBM continues to push it. And, OS/2's mere existence creates a whiff of uncertainty. Anyone thinking NT has to stop a minute, and wonder...could OS/2 be the better bet?

And the Hack, who is not a nice person at heart, with a short temper and a long memory, takes pleasure. For nearly a decade he has listened to PC-bigots tell him that he was a fool to specialize in UNIX because there was no hardware or software standard. Now, the shoe is on the other hoof. Where the UNIX wars are dying down, and single standards emerging, now the PC world seems hopelessly divided. It's not Intel 80X86 anymore...it's variants of the X86 standard in conflict. It's not DOS...it's Windows NT vs.

Companies Mentioned in this Article

Applix Inc.
112 Turnpike Road
Westboro, MA 01581-2833
Circle 114

Dux
4906 El Camino Real
Los Altos, CA 94022
Circle 115

Fusion Systems Group Inc.
2225 Broadway, 24th Floor
New York, NY 1007
Circle 116

Hewlett-Packard Co.
3000 Hanover St.
Palo Alto, CA 94304
Circle 117

ICL Inc
North American Sales
9801 Muirlands Blvd.
Irvine, CA 92718
Circle 118

Intel Corp.
2625 Walsh Ave.
Santa Clara, CA 95051
Circle 119

Informix Software Inc.
4100 Bohannon Drive
Menlo Park, CA 94025
Circle 120

Island Graphics Corp.
4000 Civic Center Drive
San Rafael, CA 94903
Circle 121

Lotus Development Corp.
55 Cambridge Parkway
Cambridge, MA 02142
Circle 122

Microsoft Corp.
16011 NE 36th Way
P.O. Box 97013
Redwood, WA 98006
Circle 123

Novell Inc.
122 East 1700 South
Provo, UT 84606-6194
Circle 124

Oracle Corp.
500 Oracle Parkway
Redwood Shores, CA 94065
Circle 125

Solbourne Computer Systems Inc.
1900 Pike Road
Longmont, CO 80501
Circle 126

Sun Microsystems Inc.
2550 Garcia Ave.
Mountain View, CA 94043-1100
Circle 127

Sybase Inc.
6475 Christie Ave.
Emeryville, CA 94608
Circle 128

Unify Corp.
3870 Rosin Court
Sacramento, CA 95834
Circle 129

UNIX System Laboratories Inc.
190 River Road
Summit, NJ 07901-1400
Circle 130

Wyse Technology
3471 N. First St.
San Jose, CA 95134-1803
Circle 131

Windows vs. OS/2 vs. DOS (still the most popular operating system) vs. SCO vs. Destiny vs.... whatever.

The Hack does not gloat. It is too soon to declare victory. But, even so...he leans forward now, gazing at the blankness of his screen. It is different, now. He has a different feeling about the story. Before, he was tired and confused...now, there is a certain eagerness, not wholly hopeful, but fascinated. How to describe it?

It is like, oh, say, being in ancient wooden stands, late in the day, when the winds are coming up and, already, you can smell the rain off somewhere, coming...and you stand in the bleachers...silent with all the others around you...straining to hear the call of the ump, and see the runner appear broken or triumphant...on a field of amber and late summer shadows. ➸

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SUNEXPERT Magazine
PRODUCT REVIEWS

Three Tools for Boosting Productivity

by **BARRY SHEIN,** Technical Editor

This month we look at a user-interface builder, a high-performance SCSI board for VME-based systems and Sun's NeWSprint software. All of these products are potential productivity enhancers.

The Builder Xcessory

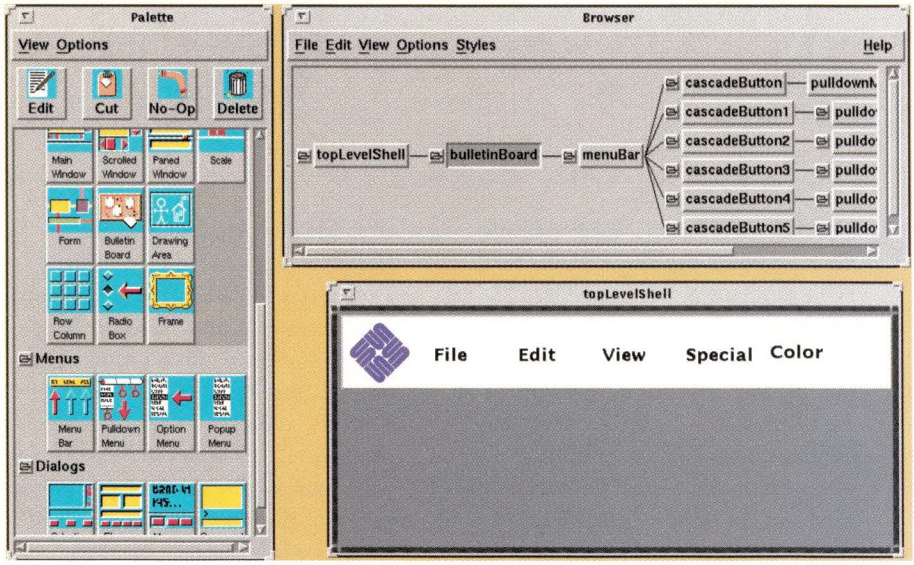
As anyone who has built GUI interfaces in C knows, it's a tedious business. Every little detail of every little widget–colors, fonts, size, hierarchy, etc.–must be specified in line after line of C code. And none of this gets the actual application done, it just makes it pretty and easy to use.

Well, tede no more buckaroos! The Builder Xcessory from Integrated Computer Solutions Inc. (ICS) lets you build GUIs quickly with an interactive, WYSIWYG toolbox interface reminiscent of one of the better drawing programs. Just drag and drop the pieces together on the screen, and it will generate the needed C code with the release of a button on a pull-down menu.

There's just one catch: It's designed to work with Motif, not OpenWindows. The program runs fine under OpenWindows, but the code and Makefiles it generates are Motif-specific. Also, you will need a fairly recent version of Motif.

Installation of the software is easy. You just read it off the tape and follow the simple instructions. Builder Xcessory uses a license manager (something I always find painful); I was missing a piece of information to get it enabled. However, a quick call and a few threats about being under deadline pressure and ICS supplied me with everything I needed.

Firing up this program for the first time is an experience in and of itself; it's enough to make you forget the dumb license manager. Three windows pop up, one of which is the toolbox palette. Two other windows pop up at startup also, a Browser and a Resource Editor.



As you build an application with Builder Xcessory, a tree appears in the browser window indicating the hierarchy of widgets you are creating.

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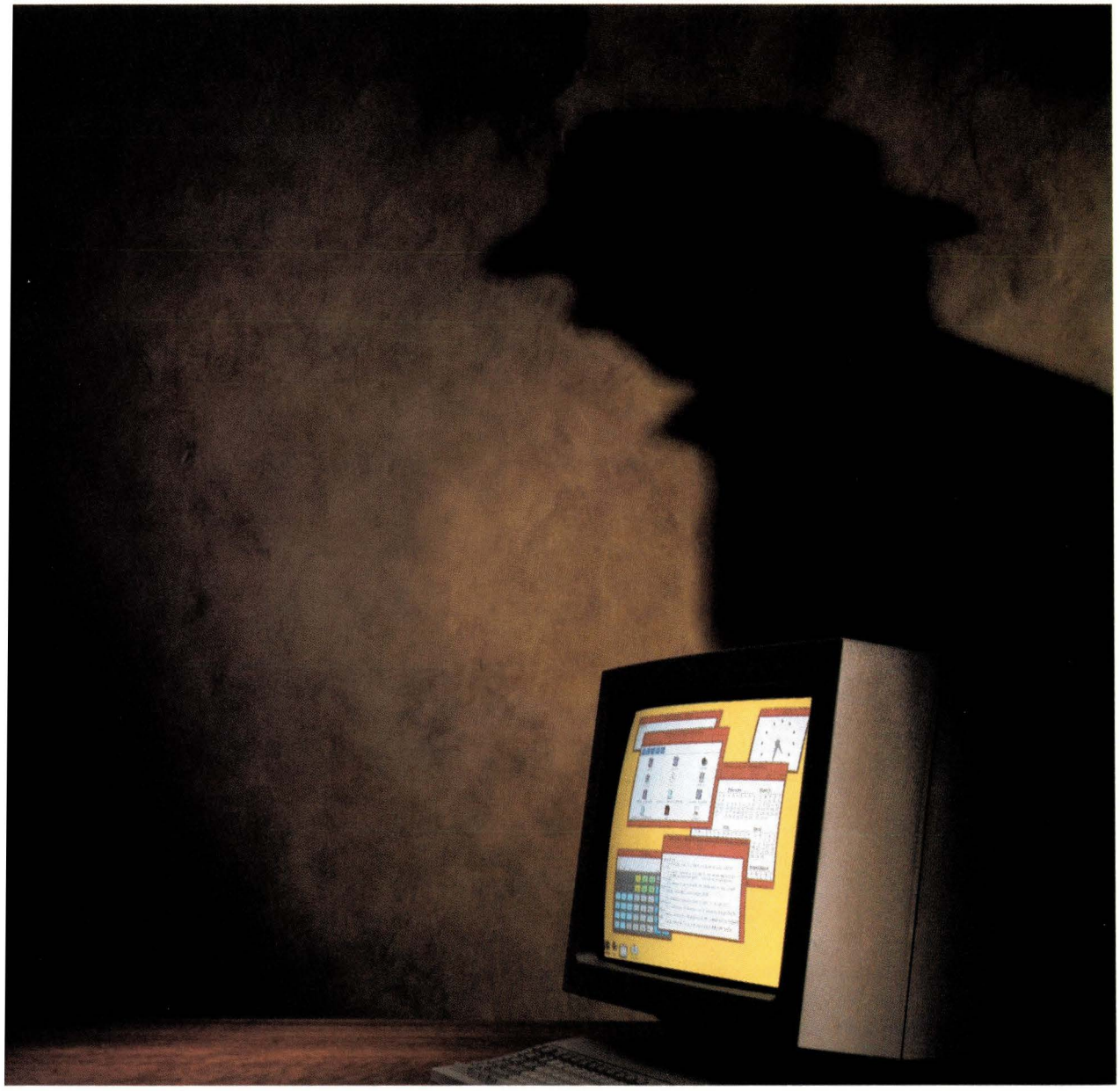

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HEWLETT PACKARD

I opened up the User Reference Guide to the tutorials and took the software out for a test ride. The first example has you build a two-button application with callbacks. One button fires off an `xterm`; another exits the program. After creating a "bulletin board" (a standalone window that holds other objects), you push the Push-Button button and drag and drop a couple of buttons.

As you build this application, a tree appears in the browser window indicating the hierarchy of widgets you are creating. To select a widget for further modification, you can either directly select it on the screen or push the corresponding box in the tree. Selecting Automatic-Update in the Resource Editor's pull-down menu causes the Resource Editor to show you all the possible resources you can change on the currently selected object. I scroll down to labelString, push the button next to it for an editor window (the company has specialized edit windows for each type of object) and change the text from their generic "pushbutton" to "XTERM," click on Apply, enter a line explaining how to call the callback when the button is pushed, do similarly for the EXIT button and I'm on my way. All that is left to do is select Generate-UIL from the menu bar to save my work into a re-readable file and finally select Generate-C to generate the C code.

Once out of Builder Xcessory I edit the callbacks to actually perform the desired function on each button press (coding the application is still your job), type `make`, and I'm done (the application worked as expected). I reopen the workspace, change the fonts on the buttons with a few motions, save, rebuild, and I realize that this is easy.

One very nice feature that Builder Xcessory takes advantage of in the X Intrinsics library is that most changes won't undo the code you've added by hand to your application.

Builder's tool palette is broken into subpalettes: Primitives such as buttons and scroll bars, Containers (standalone windows), Menus and Dialogs. Although you can't build every possible interface, you can certainly build all of the most common interactive panels.

Another useful feature in Builder Xcessory is the idea of separate Styles. This lets someone design all the color and font and other stylistic layouts into a separate area that can later be read into Builder Xcessory and applied to the current application design as needed.

All in all, I find this an exciting program. You need the right software environment (Motif), enough memory, disk and screen to run the program (nothing excessive), but it's well worth it. ICS Builder Xcessory can turn hours of drudgery into a few minutes of activity that almost resembles play. I'll make a bold analogy: ICS Builder Xcessory is to GUI development what the spreadsheet was to accounting–truly revolutionary.

The Builder Xcessory

Company
Integrated Computer Solutions Inc.

Address
201 Broadway
Cambridge, MA 02139

Phone
(617) 621-0060

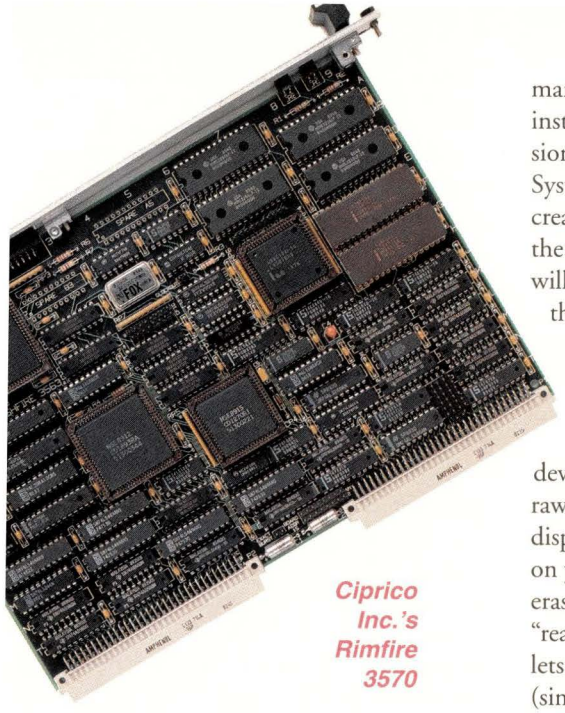
Fax
(617) 621-9555

Price
$3,200

Best Feature
A truly remarkable product overall, turns hours of tedious GUI programming into a few minutes of work.

Worst Feature
The ubiquitous license manager, but you only have to deal with it once.

Circle 100



Ciprico Inc.'s Rimfire 3570

Ciprico Rimfire 3570

Here's a depressing thought: While your CPU speed has increased by a factor of almost 100 in the last decade, your disk throughput has probably only tripled. And you're trying to push 20 times as much disk through the system.

Given that sobering news, any product that can help increase disk throughput is of interest. So when Ciprico offered to let us take their latest SCSI board out for a test drive, we took them up on the opportunity.

First, installation: The 3570 is a 6U board. What that means is it's smaller than the 9U VME slots many Sun servers use, so in those cases it has to be mounted into an extender, which is not difficult, just a few screws and an internal cable.

The 3570 also has its own device driver and some other utilities supplied by Ciprico. Again, easy enough to install. Ciprico provides scripts to help you install the driver, and its extensive manual covers simple step-by-step instructions for various SunOS versions as well as Solbourne Computer Systems Inc. systems. You will have to create the major and minor devices for the disk, and Sun's `iostat` command will not recognize these devices, but the `cs35ut` utility helps overcome that.

The `cs35ut` utility is a nice addition to the product. The program allows you to probe the devices attached to the board, issue raw SCSI commands if you are so predisposed, format and set up partitions on your disks, deal with bad blocks, erase tapes and so on. There's also a "read board statistics" command that lets you monitor the total commands (since the last reset) and any error counts that the board collects. Full source to the program is in the driver build area, something Ciprico should be especially commended for providing.

To measure performance of the board we used two methods, both very casual. First, we ran the board in production in our heavily loaded server (mostly SCSI disks) for a couple of weeks just to get a feel for any apparent difference from the Sun SCSI-3 board we normally use. Our impression was that it was a bit perkier (e.g., I timed `fsck` and found it ran almost twice as fast), although our system remained somewhat disk-bound.

The second method I used to measure the board was my nfsstones benchmark. Although this benchmark was originally designed to perform stress testing on NFS configurations by executing mixtures of typical I/O operations on the disk system, running nfsstones locally on a disk also yields interesting results when comparing different hardware configurations. All tests were performed in

Figure. Best performance results for the Ciprico Inc.'s Rimfire and Sun Microsystem Inc.'s SCSI-3 board.

Test Results

Board	Total time (lower is better)	Nfsstones/second (higher is better)
Ciprico 3570	63.49s	717
Sun SCSI-3	75.08s	606

single-user mode with nothing else running. Across several runs, the best results for each board were as shown in the Figure.

This indicates an 18% performance improvement using the Ciprico 3570 on a single disk. I would consider that worthwhile although not spectacular. I suspect that there is a point where you are squeezing out whatever the disk (a Wren-VII) can deliver. But our Sun SCSI board apparently is not quite keeping up with the disk, and that is worrisome when you consider that we normally run multiple disks off that board.

In the two weeks we ran the board under full production load (which in our case is very heavy), we never had a problem with the board. Overall, SCSI disk performance is an important factor (and potential bottleneck) in systems today. The Ciprico 3570 can help, particularly with the new, faster disks now available. Another potential advantage is spreading out your disks across more than one SCSI board to help ease loading across the SCSI bus, and to be able to plug in more disks. All in all, the Ciprico 3570 seems like a good, solid product with good performance.

Rimfire 3570

Company
Ciprico Inc.

Address
2800 Campus Drive
Plymouth, MN 55441

Phone
(612) 551-4000
(800) SCSI-NOW

Price
$2,395

Best Feature
18% measurable performance improvement on SCSI disk I/O; full C source to the disk management and performance utility is provided.

Worst Feature
None I could find–a good, solid product.

Circle 101

NeWSprint 2.0

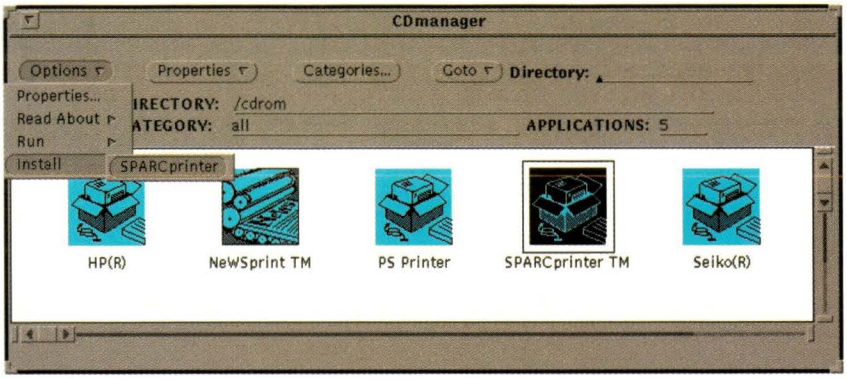
PostScript has become a standard for laser and other forms of high-resolution printing. Sun, over the years, has been struggling with a window system (NeWS) that is based on PostScript but has never achieved much market acceptance outside of Sun. Application developers, however, continue to produce products that send their output formatted in PostScript.

PostScript printers are wonderful and ubiquitous beasts. The problems have always been twofold: PostScript printers tend to be slow, much slower than the actual print engines inside them, and putting PostScript into the printer makes the printer more expensive than it otherwise might be. This is due to running PostScript inside the printer on limited CPU and memory resources. Font scaling is a major culprit in slow printing.

Sun's NeWSprint subverts that by performing the PostScript interpretation in a workstation attached to the printer rather than within the printer itself. All NeWSprint requires of the printer is that it is able to print raster (bitmap) images.

But there is no such thing as a free lunch. Obviously Sun has not bypassed all these requirements for interpreting PostScript; it has only moved them to a workstation (or server) which is then attached to the printer, typically via an SBus card, although the card is not required. Bear in mind, however, that page-sized bitmaps can be large and require faster channels to the printer.

So, what does this do to the workstation? First, unlike the case with PostScript printers, all of the NeWSprint software must run on your workstation, which must be a late-model SPARC. Also, that workstation needs sufficient resources to run all this software and produce the required images. Reading over many comments posted to the Usenet Sun Manager's Group by people who use NeWSprint, the consensus seems to be that a SPARC-station IPC or 1+ with at least 16 MB of memory and sufficient disk space to hold the various temporary files NeWSprint produces are the minimum requirements. Larger SPARC



NeWSprint includes point-and-click installs for many printer drives.

servers easily fill these requirements in typical configurations.

Most people who commented agreed that there is no major problem with using a workstation that is also someone's desktop system as long as they agree that during heavy printing they will experience some significant slowdowns. Most said that this was rare, but noticeable when it hit (the window system suddenly coming to a crawl, etc.). In our experience here, this was rarely a problem. The cable that attaches the printer is long enough (about 25 feet) that the printer does not have to be right next to the workstation, but the printer cannot be down the hall either.

Everyone agrees that the result is fast PostScript printing for a typical range of page complexity. NeWSprint seems to have little trouble keeping a 12-ppm printer going at full bore.

Included with the NeWSprint software are three very slick manuals covering installation, use and driver development. Also included are two CD-ROMs, one with the NeWSprint software, the other containing products you can license from various vendors for use with NeWSprint, similar to Sun's Catalyst CD-ROM series. The NeWSprint software itself includes drivers for many printers. There are filters for `troff` (both `dit` and C/A/T), Tektronix 4014, UNIX plot, plain text and other file types. Finally, there are several general-purpose utilities for reversing page output, instructions for changing banner pages and other common needs.

Another package that comes with the software is a development library (Sun-4 and Sun-3) for writing your own filters. Most of it seems fairly straightforward, but it does seem like it would save a lot of time over having to study and implement new filters directly from a protocol and conventions manual.

The worst complaints I could find from current users of NeWSprint revolved around Sun's licensing rules for the software–you need a right-to-use license for each printer–and regarding some number of bugs in the NeWSprint software. The base package includes one RTU. The bugs cited involved graphics output, particularly lines not matching up, wayward pixels and other minor but apparently annoying problems. If you plan on purchasing NeWSprint, you would probably do well to consider Sun's software maintenance agreements for the time being so you can receive all the bug fixes and releases as they become available. ➸

NeWSprint

Company
Sun Microsystems Inc.

Address
2550 Garcia Ave.
Mountain View, CA 94043

Phone
(415) 960-1300

Price
$695

Best Feature
Fast PostScript printing.

Worst Feature
Numerous minor software bugs; licensing should be studied carefully to avoid surprises.

Circle 102

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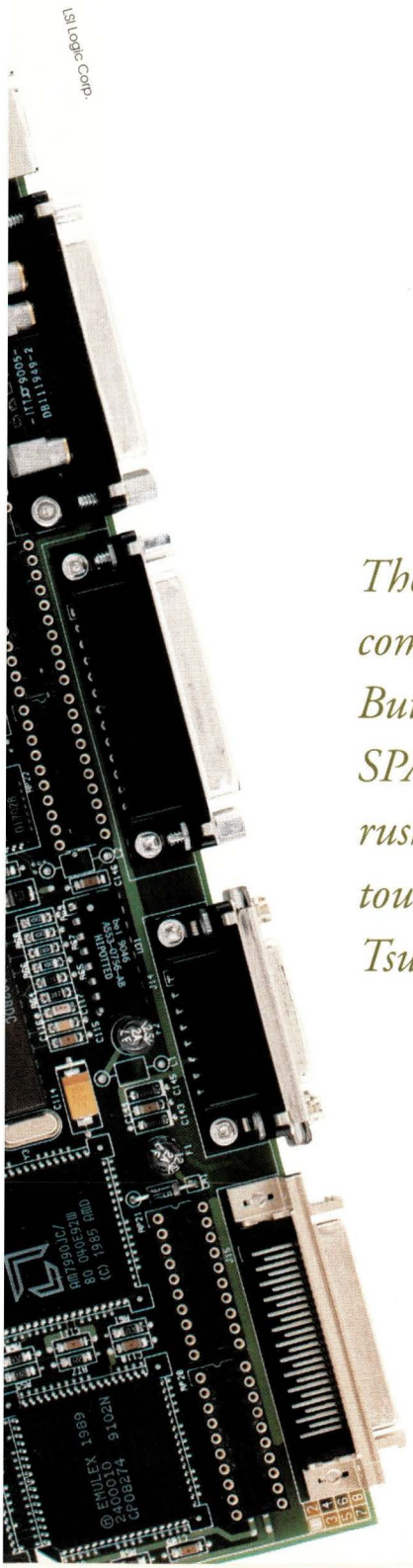

LSI Logic Corp.

by **MARY JO FOLEY,** Senior Editor

SPARCstation 10 compatibles and clones are more than just a gleam in the eyes of the SPARCalike vendors. Before Sun Microsystems Inc. took the wraps off the SS10 in May the SPARCalike vendors had moved from the planning to the design and development stage with their clone and compatible versions of these products. By the time Sun unveils its anticipated low-end, under-$5,000 desktop this fall, this scene will have played itself out again.

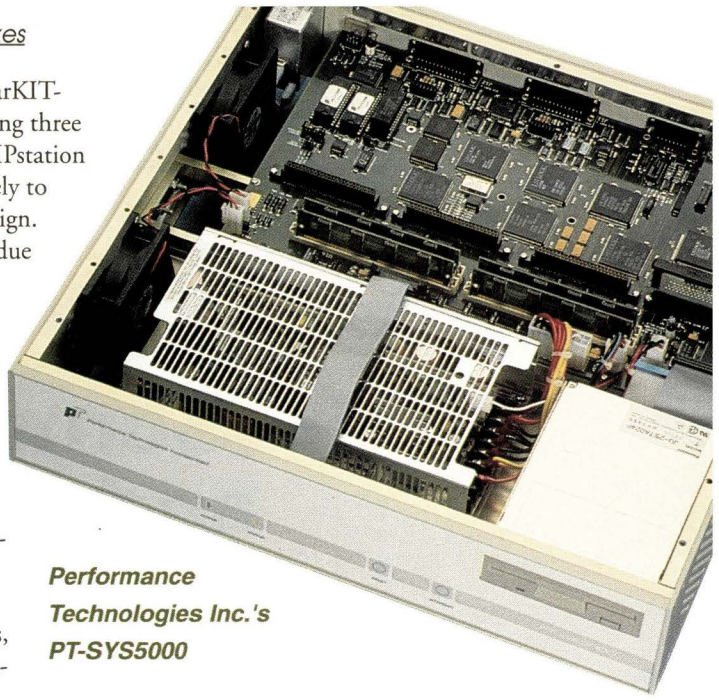
They just got their SS2 compatibles out the door. But, already, the SPARCalike vendors are rushing to put finishing touches on their SS10- and Tsunami-based systems.

Virtually the only holdup for the SPARCalike firms (and Sun, as well) has been the lack of production quantities of the Texas Instruments Inc. SuperSPARC processor for the SS10s and Tsunami SPARC chips for the low-end machines. Granted, a couple of other processor vendors have moved in to fill the gap. At the high end, the Ross Technology Inc. subsidiary of Cypress Semiconductor Inc. has unveiled its superscalar hyper-SPARC chip, as well as a complete chip set on a motherboard called SPARCset (see "New Products" section). And at the low end, LSI Logic Corp. has begun shipping its SparKIT-40/MBus, a chip set and manufacturing kit enabling OEMs to build 40-MHz, SPARCstation 2 compatibles and clones that are MBus-based–for under $5,000. LSI also continues to offer OEMs the Sun SPARCstation 2 chip set it licenses from Sun. And it will be making available the SS10 chip set, another product it is licensing from Sun, later in the year.

SPARCalike companies are flocking to TI's and Ross' chip sets. CompuAdd Computer Corp. has "looked at" Ross' SPARCset, says Charles Leadford, general manager of the advanced systems group. Ross' product, which is both "less expensive and less expandable than Viking [SuperSPARC]," in Leadford's words, might just fill the bill. CompuAdd has done some thermal modeling of an SS10 compatible based on the Ross design, Leadford confirms. But whether or not CompuAdd opts to employ the Ross design "depends if Sun will be supporting their [Ross'] MBus design and will be porting Solaris to it," he says. "If SunSoft doesn't do the port, it would be tough to do it ourselves." As reported in *SunExpert* in August (Page 20), CompuAdd is likely to build both a full-blown SS10 compatible and a board-level upgrade, allowing existing SPARCstation 1s and 2s to be turned into SS10s without exchanging the chassis.

CompuAdd is also looking into the possibility of moving into the Tsunami-level low end. Leadford questions the level of profit margin that would be possible with an under-$5,000 machine. Nonetheless, CompuAdd "would like to have at least two of three products [that it is considering] out by the first quarter of 1993," he says.

Tatung Science & Technology Inc. has licensed the LSI SparKIT-40/MBus. It is developing three new MBus-based COMPstation products, which are likely to be based on the LSI design. Two of the systems are due to ship this fall. The COMPstation 99 Superscalar series will feature up to two 36- or 40-MHz processors and ratings of 64.7 SPECmarks. The SuperCOMPserver will offer up to four 36-, 40- or 45-MHz processors, eight SBus slots and as many as nine drive slots, according to the company. And the Super COMPstation series, slated to ship during the first quarter of 1993, will feature up to four CPUs, each clocking at 45 MHz with performance ratings of up to 218 SPECmarks. Marketing director Majid Eskandari also says that the company is readying a low-end SPARCalike, which will sport 8 MB of RAM and a 14-inch color monitor and will sell for $3,990.



Performance Technologies Inc.'s PT-SYS5000

SPARCalike Newcomer

Another LSI SparKIT-40/MBus licensee is SPARCalike newcomer System Computing Corp. Unlike most SPARCalike vendors, which seem to be concentrating their efforts on the high end or low end of the market, SCC is focusing on the SS2-compatible midrange. The company–which is a member of the Advanced Technology Development Center, a 30-company high-tech consortium staffed by Georgia Institute of Technology employees and funded by the government of Georgia–announced and began shipping its SCCstation-40 in August. The SCCstation-40 comes with a 520-MB hard drive, 32 MB of memory, a 16-inch Trinitron color monitor, GX graphics accelerator and 1.44-MB floppy drive. The system lists for $9,995 and will be sold through the company's fledgling direct sales force only, says President Wei Siong Tan. SCC plans to build a SS10 compatible, too, Tan says, and expects to ship it during the second quarter of next year.

SBus/VMEbus product manufacturer Performance Technologies Inc. is yet another SparKIT-40/MBus licensee. The company unveiled its first system-level product, the PT-SYS5000, in July. The system, based on the SparKIT-40, is targeted at OEMs and systems integrators with "real-time and embedded-system requirements," according to Performance Technologies. The PT-SYS5000 offers customers four or eight available SBus slots, 2 MB of RAM (expandable to 64 MB), two asynchronous serial I/O ports, an Ethernet port and SCSI-2

Opus Land Revisited?

Not every SPARC systems company feels the need to clear new ground. Some, like KFW Corp., a Thousand Oaks, CA-based offshoot of a Brazilian hydroelectric and nuclear plant conglomerate, are choosing instead to go where others have gone before.

This month, KFW is scheduled to unveil a PC-AT-bus plug-in board that will provide PC users with access to a SPARC coprocessor. The board will be a 40-MHz MBus module with an on-board video controller and room for up to 64 MB of main memory. Sound a lot like the Opus Systems Inc. Series 500? It was designed with the Opus product in mind, says John Morgan, KFW's vice president and general manager. "But we're visibly faster, even though we'll be priced the same as Opus–at around $4,999," he claims.

Among the parties rumored to be interested in reselling the product: SPARCalike vendors CompuAdd Computer Corp., DTK Computer Inc. and Tatung Science & Technology Inc., as well as other systems vendors such as Tandy Corp. and Eastman Kodak Inc.–*mjf*

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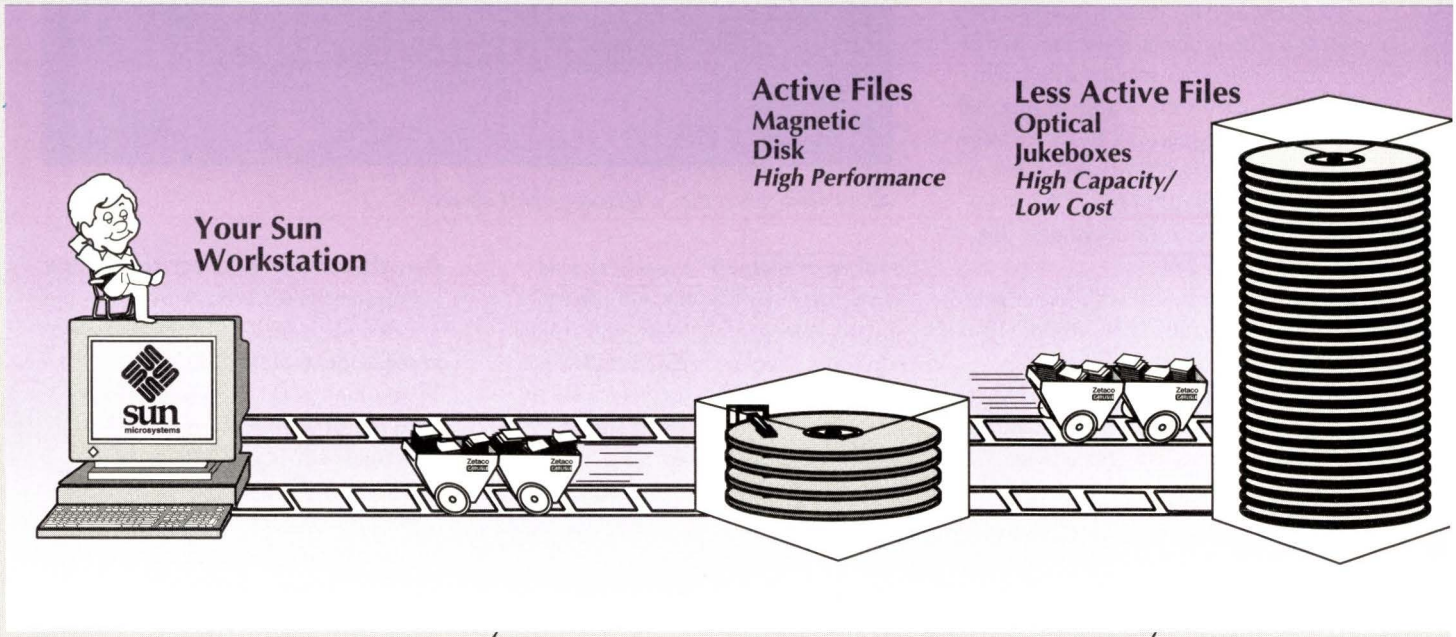

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European Office
44.442.891500
fax 0442.890439

subsystem. The system can be configured with a variety of disk and floppy options, or operated as diskless. A four-slot system sells for $5,495; an eight-slot one goes for $5,994. The disk kits start at $1,195. A port of the Lynx Real Time Systems Lynx OS is available as an option. Performance Technologies is expected to begin shipping the PT-SYS5000 this month.

Taking the high road rather than the low one is Marner International Inc. In August, Marner began shipping its DataSecurityVault, an LSI 40-MHz SPARC-based, VMEbus file server. The product features a RAID-3 "fault-tolerant" storage subsystem, an Ethernet interface and an internal UPS backup system. The server ships standard with 3 GB of storage, with upgradeability to 60 GB. The product is available in three models, the 111, 181 and 281.

But Marner is also well under way with work on its SPARCstation 10-compatible, SBus-based SPARC Cheetah system, says Martin Fenner, CEO. The Cheetah will be based on the Ross SPARCset, Fenner says, and will be available as a motherboard-level upgrade. Marner will offer a board-level product that will support up to two hyperSPARC CPUs and clock at 110 MIPS, he says. Fenner claims that Cheetah will ship in quantity in December.

Aries Research Inc.'s MBus-based Marix

Companies Mentioned in This Article

Aries Research Inc.
46791 Fremont Blvd.
Fremont, CA 94538
Circle 103

CompuAdd Computer Corp.
Advanced Systems Group
12303 Technology Blvd.
Austin, TX 78727
Circle 104

EOS Technologies Inc.
3945 Freedom Circle
Suite 770
Santa Clara, CA 95054
Circle 105

KFW Corp.
88 Long Court
Thousand Oaks, CA 91360
Circle 106

LSI Logic Corp.
MS-D102
1551 McCarthy Blvd.
Milpitas, CA 95035
Circle 107

Marner International Inc.
1611 93rd Lane N.E.
Blaine, MN 55434
Circle 108

Opus Systems
329 N. Bernardo Ave.
Mountain View, CA 94043
Circle 109

Performance Technologies Inc.
Computer Products Division
315 Science Parkway
Rochester, NY 14620
Circle 110

Ross Technology Inc.
7748 Highway 290W, #480
Austin, TX 78736
Circle 111

System Computing Corp.
430 10th St., Suite S109
Atlanta, GA 30318
Circle 112

Tatung Science & Technology Inc.
2060 Ringwood Ave.
San Jose, CA 95131
Circle 113

Another New Kid on the Block

Another SPARCalike vendor hoping to carve out a niche at the high end is new-kid-on-the-block EOS Technologies Inc. EOS is a startup formed primarily of former RDI Computer Corp. and TriGem Corp. engineers and managers, whose primary business to date has been developing gas-plasma flat-panel displays. In July, EOS began touting its MBus, flat-panel-display machine, the EOStation, as an SS10 compatible. In fact, the products that EOS began shipping in July, the EOStation 1052 and EOStation 10, are midrange systems based on dual- and single-CPU configurations, respectively, of the Ross SPARCset. Because the systems are MBus-based, they are compatible with TI's SuperSPARC. A board swap (once the TI chip is available in volume) will result in a SS10 compatible.

Both the EOStation 10 and 1052 ship standard with 16 MB of main memory (upgradable to 128 MB), a 525-MB hard drive, 1.44-MB floppy drive, an extra internal drive bay, 1,152-by-900 17-inch color monitor, two SBus slots, SCSI-2 port and Ethernet and serial ports. Besides shipping with the standard Solaris 1.X, the EOStations come with SunView and a C compiler. GX accelerator graphics are available as options. Minus GX,

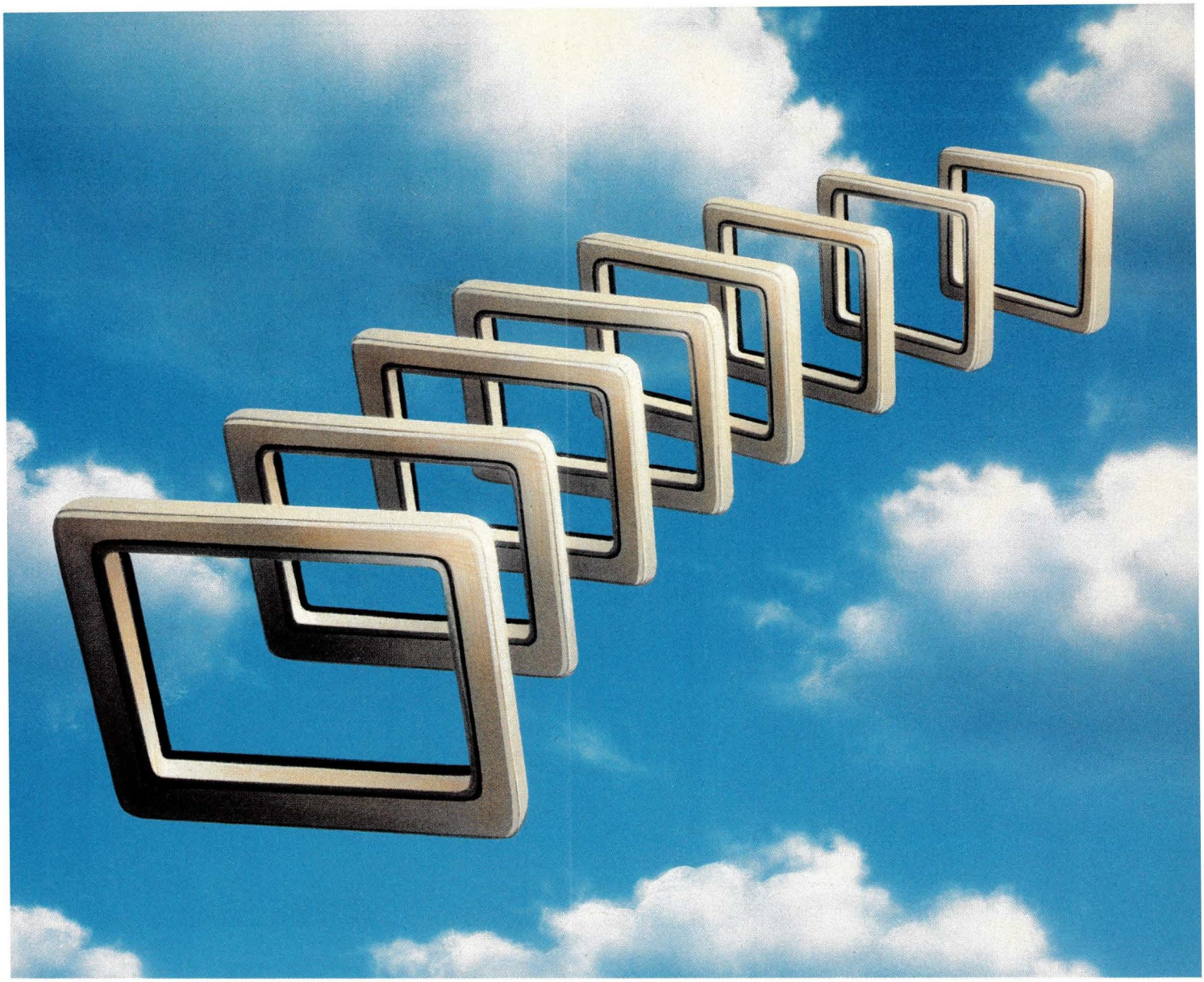
the EOStation 10 retails for approximately $10,000; the EOStation 1052 goes for roughly $15,000. EOS is currently shipping product through manufacturers' representatives.

Then there's Aries Research Inc. Aries was created when investors in the former Solarix Inc. merged Solarix people and products with those from a neighboring SPARCalike startup, Computer Systems Engineering Inc. (CSE). The company is headed by Lawrence Kou, a former research fellow at the IBM Corp. T.J. Watson Research Center.

Aries' Advanced System Divison has relaunched the former Solarix MBus workstation as the 64-bit, 40-MHz, MBus-based Marix station (due, at least in part, to pressure from Sun because of name similarities between "Solarix" and "Solaris"). The Marix is a deskside tower that comes with 32-MB standard memoy, three SBus slots, Ethernet thinnet and thicknet ports, SCSI-2 interface, two serial ports, one parallel port, a 1.44-MB floppy, a 670-MB hard drive and a 1,152-by-900 resolution color monitor. Aries is shipping the bulk of these systems, as file servers, to customers in Japan, France and Israel, according to Kou. The company starting selling product in the United States this summer.

Aries' Standard System Division is selling a SPARCstation 2 clone, called the Parrot II. The 32-bit, 40-MHz system is a desktop workstation with 32 MB of standard main memory, three SBus slots, Ethernet, SCSI-2 and serial ports, a 1.44-MB floppy drive, a 424-MB hard drive and 1,152-by-900 resolution color monitor. Kou says the Standard System Division plans to license the Sun SS10 chipset and develop a clone that will ship sometime in the first quarter of 1993.

Regardless of the SPARCalike vendors' differences, most would probably agree with CompuAdd's Leadford's assessment of the market to date: "Sun currently controls the life cycle and channels of these [SPARC-based] products. We didn't realize these facts when we got into the market." A couple of years older and wiser now, the SPARCalike companies are doing all they can to narrow the gap. ⊸



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NEW PRODUCTS

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

Interpreted Command Languages for Motif

A Rhode Island company has introduced a product that allows software developers to integrate Motif with interpreted languages such as Tcl, Lisp and BASIC. Sunrise Software's ezX 3.2 combines the company's existing GUI development system with a dialog management capability that provides the link to interpreted languages. These languages can be used to control the behavior of windows and widgets. The company says this simplifies application development for the Motif environment.

The product is available on Sun, Digital Equipment Corp. VAX, IBM Corp. RISC System/6000, 386 UNIX and Silicon Graphics Inc. systems. Pricing begins at $3,500 per developer's seat. There are no run-time fees or royalties for applications built with ezX.

Sunrise Software Inc.
170 Enterprise Center
Middletown, RI 02840
Circle 175

Data-Acquisition Product

A data-acquisition peripheral that attaches to a Sun via the SCSI port has been introduced by Gradient Technology. The DeskLab 216 for UNIX workstations is a two-channel, 16-bit A/D and D/A system based on the Motorola Inc. 56001 digital signal processor. It offers sustained aggregate sample-to-file rates of 100 kHz. The product also has an optional telephone interface.

The DeskLab 216 does not require an additional driver on the host system. It comes with its own software. Bundled with the product is a point-and-click graphical user interface that supports signal editing plus various analysis tasks, including FFTs. Pricing begins at $6,495.

Gradient Technology Inc.
95B Connecticut Drive
Burlington, NJ 08016
Circle 176

Photographic Network Printer

A color network printer that can produce photo-quality output has been introduced by Codonics. The NP-600 printer uses dye-sublimation technology with 16.7 million simultaneously printable colors. It can connect to almost any existing Ethernet or token-ring networks and supports such file formats as TIFF, GIF, Macintosh PICT, Sun Raster, X11 bitmap and so on. The company says that no special software drivers are required on host computers.

The printer has two output formats–8½ by 11 inches and 8½ by 8 inches. It can also produce transparencies for overhead projectors. The printer also has a built-in spooler that can accept images from multiple systems on a network. Pricing begins at $12,500.

Codonics Inc.
Imaging Division
17991 Englewood Drive
Middleburg Heights, OH 44130
Circle 174

Software for Software Companies

Business-operations software for software companies has been announced by Scopus Technology. Called ProTeam, the product is a groupware application that integrates the various business aspects of software development into a single package. The product is modular, and, as of press time, there were modules available for bug tracking, call tracking, customer support and business data visualization. The company says that other modules are forthcoming.

The product is built on top of the

Sybase relational database and is divided into client front-end and server back-end. Currently, its clients will run on any X Window System display, while its servers will run on any machine that supports Sybase, including Sun, the Hewlett-Packard Co. 9000, the IBM RISC System/6000 and MIPS Computer Systems Inc. systems. The company says that a typical configuration, consisting of four technical support people and 20 engineers, would cost about $45,000.

Scopus Technology Inc.
1900 Powell St., Suite 900
Emeryville, CA 94608
Circle 177

Xmath Gets Signal CAE

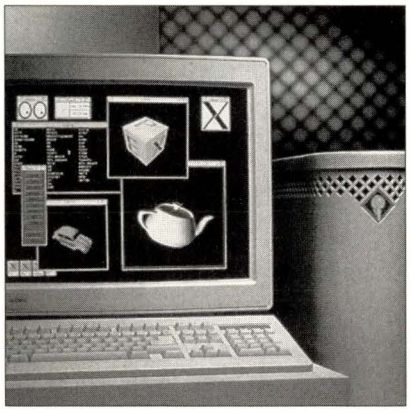
Integrated Systems has introduced a module that works with its Xmath numerical analysis tool for the X Window System. Called the Xmath Signal Analysis Module (SAM), the product allows Xmath users to perform various DSP analysis tasks. To this end, it contains a library of routines that allow users to generate signal and noise waveforms, model various linear and nonlinear channel characteristics, and modulate and demodulate narrow-band and spectrum signals. In addition, Xmath SAM contains plotting routines for signal visualization and interactive analysis.

Xmath SAM was co-developed by Elanix Inc., which specializes in signal-processing products and scientific software. Xmath, meanwhile, is a numerical-analysis environment that combines interactive color graphics, a scripting language and a Motif-derived GUI. Xmath SAM is currently available on Sun SPARCstations and compatibles and DECstations from Digital Equipment Corp. Pricing for Xmath SAM begins at $6,000.

Integrated Systems Inc.
3260 Jay St.
Santa Clara, CA 95054-3309
Circle 178

PEX Terminal Shows from Sho

A line of PEX terminals has been introduced by Shographics. Called the PEXstation 1 series, the machines support the PEX standard for 3D graphics under X and are intended for such markets as MCAD and ECAD. Traditionally, these markets have been dominated by workstations, but Shographics is betting that, with the introduction of large servers like the Sun 600 MP, engineering networks



now have excess computing power that users are eager to exploit. The hope is that, just as X terminals appeared on networks where 2D displays were required, PEX terminals will appear wherever designs are being done in 3D. Shographics thinks this market will be respectable and cites numbers from market-research firm X Business Group that by 1995 some 38,500 PEX terminals will be shipped by all vendors.

Shographics has three models currently in the line. The first of these is the PEXstation 1, with a display speed of 40,000 Gouraud-shaded triangles per second and a 16-inch, 1,280-by-1,024 monitor for $11,900. The PEXstation 1/ST has a speed of approximately 12,000 Gouraud-shaded triangles per second at $17,900 on the same size monitor. The PEXstation 1/SX, with 270,000 Gouraud-shaded triangles per second, is priced at $24,900 with a 19-inch, 1,280-by-1,024 monitor. All three are based on the company's proprietary graphics silicon assisted by Intel Corp. i860s.

Shographics
1890 N. Shoreline Blvd.
Mountain View, CA 94043
Circle 179

ASIC Design Tool

Knowledge Based Silicon has introduced an ASIC design-entry tool that automatically generates both VHDL and Verilog from graphical descriptions of circuit behavior. Called the flowHDL Training and Evaluation Kit, it gives the designer a graphical method of design entry that is linked to a simulator, so that designs can be tested prior to the generation of actual HDL output. Then, once the developer is satisfied with the design, the product generates VHDL and Verilog that can be sent to such HDL synthesis and simulation tools as those from Synopsys, Cadence Design Systems and GenRad.

The flowHDL product runs on a Sun SPARC systems with SunOS 4.0.2 or higher. Pricing begins at $995 for a single-seat license.

Knowledge Based Silicon Corp.
1201 Main St., Suite 2000
Columbia, SC 29201
Circle 180

See Da Bug? C-DeBug!

An Illinois company has introduced a debugger for C users called–what else?–C-Debug. Just in case you don't (see the bug, that is), the product, which is from Softran, searches code for errors, catches them prior to an application's actual crash and then provides a detailed description of the location and nature of the problem.

Moreover, the company says that among C-DeBug's advantages is that it can be used on multiple platforms, making cross-platform development less difficult. It currently runs on UNIX, DOS, OS/2 and VAX VMS. Pricing ranges from $239 to $995.

Softran Corp.
One Naperville Plaza
Naperville, IL 60563
Circle 181

SPARCset Sets Sail

A set of peripheral chips plus a licensable motherboard design has been introduced for would-be SPARCalike vendors. The SPARCset from Cypress Semiconductor and its Ross Technologies subsidiary is said to significantly reduce basic engineering costs for SPARC-based systems vendors. The SPARCset contains much of what is necessary to build a functional SPARCalike, including a choice of several different CPUs, ranging from the

single-processor 33-MHz Cypress CYM6001 SPARC module to the dual-processor, 66.7-MHz CyM6226 hyperSPARC module.

The set also boasts a graphics controller (the Cypress CY7C617), an MBus-to-SBus interface (the CY7C616 and CY7C618 chips), a two-chip memory controller (the CY7C613) and I/O chips (the CY7C614 and CY7C615) that allow SPARCalike builders to use low-cost controllers made for the 386SX bus. In addition, the SPARCset comes with the technical data necessary to build 8-layer motherboards that fit the standard SPARC workstation enclosure. In quantities of 100, a complete seven-chip SPARCset chip is $250.

Cypress Semiconductor Corp.
3901 North First St.
San Jose, CA 95134-1599
Circle 182

RAID for Fault Tolerance

A line of network storage subsystems featuring redundant arrays of inexpensive disks (RAID) technology has been introduced by ECCS. The company says that the products are meant to provide fault-tolerant storage solutions for networks. The line, which the company says is to be called the RAID Modules, will range in capacity from 200 MB to 8 GB. Models will be available for UNIX platforms and Novell Inc. networks.

The modules will be available in a RAID Level 1 (FT-1) configuration and a RAID Level 5 (FT-5) configuration. They will also be available in various capacities and degrees of fault tolerance. Pricing for the FL-1 products begins at $4,800 and at $13,750 for FT-5 products.

ECCS Products Groups
ECCS Inc.
One Sheila Drive, Building 6A
Tinton Falls, NJ 07724
Circle 183

SBus Expansion Box from Sun

Sun Microsystems Computer has entered the SBus space race with an expansion chassis. The SBus Expansion Subsystem is a standalone enclosure that provides three SBus slots to the SBus-based SPARCstation IPX, SPARCstation 2, SPARCstation 10 and the SPARCserver 630. It connects to the host via a cable from a connector in one of the host's own SBus slots.

The SBus Expansion Subsystem can support SBus cards of varying widths. It also provides the room for up to two 424-MB disk drives. The product is sold by both SMCC and the SunExpress subsidiary of Sun. Pricing begins at $2,495.

Sun Microsystems Computer Corp.
2550 Garcia Ave.
Mountain View, CA 94043
Circle 184

Parallel Interface to Transputers

A host system interface that provides a link between the SBus and parallel subsystems based on the transputer has been introduced by Alta Technology. Called the HSI-SBus, the product is a one-slot SBus containing a proprietary 32-bit interface and a 25-MHz T805 transputer from SGS-Thomson. Developers can use the HSI-SBus to link Suns to scalable compute engines and/or peripheral subsystems, such as RAID disk farms.

The HSI-SBus' transputer has four 20-Mb/s communications links to connect to other devices. External connections from the four are achieved via standard twisted pair, and an unshielded cable can connect devices up to 50 feet away. The product's interface provides a sustained 10-MB/s transfer between the SBus and the transputer, and more than 8 MB/s to the four transputer links. Pricing begins at $1,595.

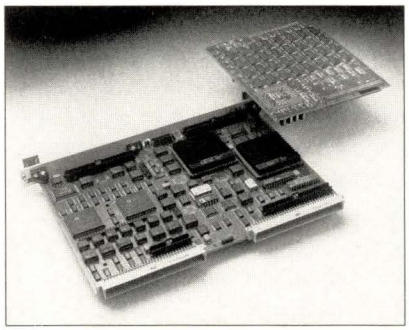
Alta Technology Corp.
9500 South West, Suite 212
Sandy, UT 84070-6655
Circle 185

200-MFLOPS Vector Processor

CSP has introduced a 6U VME64 board that provides up to 200 MFLOPS. The SuperCard SC-3Xl/VME is a vector processor with one or two Intel Corp. 50-MHz i860 XP chips, up to 64 MB of memory

and up to 200 MB/s I/O. Software support of Sun systems is available.

The SuperCARD SC-3XL/VME



comes with a gallium-arsenide memory controller, which allows the DRAM memory to operate at 200 MB/s, and also supports cache coherency with bus snooping and parity. For I/O and control, the board has three I/O channels with DMA, including a VME64 interface (at 72 MB/s), a VSB interface (at 40 MB/s) and the company's CSPIO interface (200 MB/s). Pricing begins at $12,000.

CSP Inc.
40 Linnel Circle
Billerica, MA 01821
Circle 186

Shamrock Blooms in the Sky

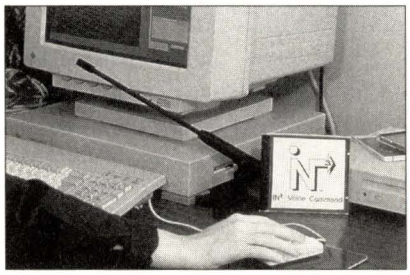
A number-crunching Shamrock has bloomed at Sky Computer. The Skybolt Shamrock, in mono- and multiprocessor versions, is an i860-based application accelerator for VMEbus Suns that will offer computation speeds of up to 1.28 GFLOPS. The Shamrock is a daughterboard supporting up to four i860s on a single 6U VME. Up to four Shamrock daughterboards can then fit onto a single 9U VME board such as the Skybolt-mp. The company says that the latter configuration, with some 16 i860s, provides an aggregate performance in excess of 10 GFLOPS.

The product is being sold as a single product, or as an upgrade to the company's existing Skybolt line of VME boards. With the products, Sky is offering systems software to make the i860s more accessible by end users. This includes the SKYvect Toolkit–a suite of compilers, libraries and software tools, and the Compute Cluster Library. The Cluster software allows the four processors of each Shamrock daughterboard to act as a single CPU. Thus the Skybolt-mp's 16 i860s can act as if they were four individual CPUs. Pricing for the 6U Shamrock begins at $12,450 and for the 9U Skybolt-mp Shamrock at $32,350.

Sky Computers Inc.
27 Industrial Ave.
Chelmsford, MA 01824
Circle 187

Voice Recognition for Sun

A voice-recognition product for Sun SPARCstations has been introduced by Command. Called IN3 Voice Command, the product provides voice control of Sun's OpenWindows user



interface as well as voice-command input to selected applications. The company says that product is meant to be a third input device, along with keyboard and mouse, that the user can employ to speed up command-intensive applications, such as CAD/CAM. Users type in a command or keystroke pattern, then invoke IN3 and speak whatever word or phrase they wish to represent that command; then the machine will be able to subsequently recognize that phrase and react accordingly.

The company's original voice recognition and speech processing products ran on add-in DSP boards. However, this year, CCI ported its software directly to the SPARC, mostly in anticipation of the SPARCstation 10. However, IN3 also runs on the SPARCstation 1, where it is capable of recognizing 150 spoken commands. The company says it has not yet reached an upper limit for the number of commands it can recognize on a SPARCstation 10.

The product requires no additional hardware beyond the microphone, which is already built into many SPARCstations. Pricing begins at $495.

Command Corp. Inc.
3675 Crestwood Parkway
P.O. Box 956099
Duluth, GA 30136-9502
Circle 188

Gem of a Document Imaging Solution

Diamond Micro Solutions has designed Document Imaging Solution, a turnkey document-imaging application that helps businesses more effectively process and manage large amounts of paperwork. Targeted users for the product are financial institutions, insurance companies, HMOs and government agencies.

The Sun SPARCstation 2 with 400 MB of storage is the file server and runs the Oracle database application, fax/modem functions, optical storage drives and Innovatech imaging software. The integration of these components provides the power for businesses to handle large amounts of paper to efficiently store, update, archive, retrieve and transmit data, text and images.

The systems scanner is a high-speed device capable of handling paper and graphic images, as well as microfilm, microfiche and aperture cards. The scanner and HP LaserJet III reside at different locations on an Ethernet network and are served by a 386 PC-compatible system with 60-MB hard drive, VGA monitor, graphics card and Ethernet network board. Diamond Micro uses commercial off-the-shelf components to offer an imaging solution that is adaptable and expandable.

Pricing of a single image station with a single-platter 1-GB jukebox is approximately $70,000. The cost with a 10-platter, 5-GB jukebox is approximately $85,000.

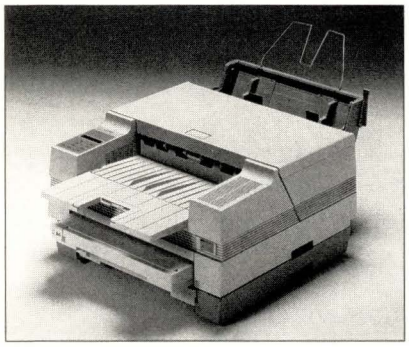
Diamond Micro Solutions
Alvarado St.
San Leandro, CA 94577
Circle 189

Laser Plotter from Mutoh

A new desktop, plain-paper laser plotter from Mutoh America has hit the market. The Model CP-503, as it's

called, is designed to provide high-quality A- and B-size check plots for AEC, mechanical CAD and printed-circuit-board-design applications.

The plotter boasts optimal resolution



of 400-by-400 dpi and a plotting speed of 8 ppm for 11-by-8½-inch, A-size media. Another function permits users to quickly and easily reduce original D- and E-size drawings to A- and B-size without having to reconfigure their driver. The plotter employs a TI34010 embedded controller with a clock speed of 60 MHz, and a 6-MB RAM internal memory buffer permits greater capacity for large and/or complex drawings.

The new model is HP-GL compatible and standard interfaces include RS-232C and Centronics. Suggested list price is $8,495.

Mutoh America Inc.
500 West Algonquin Road
Mt. Prospect, IL 60056
Circle 190

This Engine's Got Power

Software Engines announced the release of a complete development environment for automatic generation of sophisticated applications. The product, Software Engine, promotes creation of full-scale applications including GUI, automatic real-time screen updates, forms, data browsers and user-defined menus for database objects without programming.

Software Engine features automatic learning of existing applications for easy migration and multimedia authoring facilities. It is an open system and is provided with more than 200 utility and support programs and more than 100 API library functions.

The product is commercially available for the Sun SPARC family architecture running SunOS and uses Sybase as the underlying database engine with an OSF/Motif GUI, which is compatible with OpenWindows. Software Engines offers development tools and environments as well as consulting services. Pricing begins at $30,000.

Software Engines Inc.
151 Second St., Suite 5A
Hoboken, NJ 07030
Circle 191

Introl's Serious Storage

Introl now supports 56-platter erasable (magneto) optical subsystems for Sun and Silicon Graphics Inc. workstations. With formatted capacities of up to 932 MB per removable disk, these subsystems provide solutions for a wide range of applications including graphics libraries, database archives and CAD/CAM. The product includes a standalone jukebox with dual drives, cabling, full documentation and Introl's SCSI-Flex software driver.

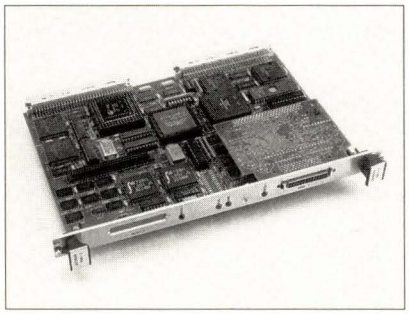
Dual optical drives avail the subsystems of fast access times, and SCSI-

Flex software and device drivers make installation and configuration easy. Suggested list pricing starts at $34,495.

Introl Corp.
2817 Anthony Lane South
Minneapolis, MN 55418-3254
Circle 192

Visualization ADE

An Application Development Environment (ADE) that enables fast development and prototyping of interactive graphics visualization applica-



tions has been announced by Uniras. Based on the X Window System and OSF Motif standards, the visualization environment combines Uniras' agX/Toolmaster, a toolkit that enables development of visualization applications, with various GUI builders.

The combined products enable programmers to build and test comprehensive visualization applications, including the user interface, all from within the GUI builder.

Pricing: agX/Toolmaster goes for $5,900, and the GUI is cost-dependent on the manufacturer.

Uniras Inc.
5429 LBJ Freeway
Suite 650, LB 144
Dallas, TX 75240
Circle 193

Love Your X?

Pagine has entered the X market with two RISC-based X terminals. The C2000 and M2000 are powered by 33-MHz, MIPS R3000-based processors, with cache and MMU. The C2000, a high-resolution color product, features a 1,280-by-1,024, 17-inch, 74-Hz, noninterlaced screen. Pagine developed a high-density ASIC, including a 64-bit color graphics engine, to complement the main RISC processor. Combined with Pagine's software, the C2000 claims a benchmark rating of 125,000 X stones.

The M2000 is a monochrome terminal with a resolution of 1,280 by 1,024 and an X stone rating of 100,000. Both models offer Ethernet connectors and serial ports. The M2000 is priced at $1,799; the C2000 is $3,499.

Pagine Corp.
1961-A Concourse Drive
San Jose, CA 95131
Circle 194

Primetime Freeware

Prime Time Freeware has announced the second in its upcoming series of UNIX freeware titles on CD-ROM. Volume 1, Number 2 (July 1992) of the company's product contains 3 GB of software and documentation on two ISO-9660 CD-ROMs. Packages are stored as compressed `tar` archives, reducing their size and avoiding ISO-9660 file-name limitations. The disks are accompanied by a more than 50-page booklet.

The current issue includes 386BSD, Andrew, Athena, BSD NET/2, CAML, CLU, COOL, comp.sources.(`amiga`, `games`, `reviewed`, `sun`, `unix`, `windows`, `x`), Epoch, GINA, GNU, GO, Icon, Ingres, InterViews, ISODE, Kermit, LispView, Mach, Magic, (WRL) Modula-2, (SRC) Modula-3, PCLU, Postie Pat, Scheme, Scorpion, Serpent, T, UnixTeX, WINTERP, X11R5, XView and hundreds of other packages.

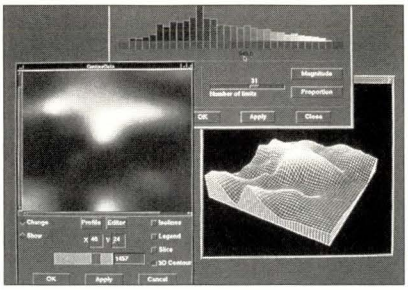
The list price of the issue is $60, with discounts of up to 30% for customers who subscribe to the company's service.

Prime Time Freeware
415-112 N. Mary Ave.
Suite 50
Sunnyvale, CA 94086
Circle 195

Fast SCSI-2 VMEbus Adapter

The FST-2, a VMEbus host adapter that implements fast SCSI-2 technology, was released recently by Zetaco. The adapter has two SCSI ports, supporting up to 14 SCSI devices, including hard disk, tape and optical disk.

The product supports a 10-MB/s



data-transfer rate and features embedded scripts that offload processing and reduce SCSI overhead. The adapter employs a 32-bit Motorola Inc. 68EC030 microprocessor. FST-2 implements hardware mirroring, also known as RAID 1, useful in applications requiring the high availability of RAID storage.

The product is designed for configuration flexibility with modular design. The logic for both SCSI ports is on daughterboards, so that each port can be easily configured either as single-ended or differential SCSI and can be upgraded to future SCSI technologies.

Zetaco has fully qualified the FST-2 on Sun VME platforms and also provides a generic driver so that OEMs can port to various platforms. The product is available in the 6U size or in the 9U form factor. Pricing is $3,000.

Zetaco Inc.
11400 Rupp Drive
Burnsville, MN 55337
Circle 196

Tape Backup Software for Solaris

Transitional Technology has announced its Nightshift/UNIX tape backup and restore software package for Sun workstations and servers. The package is available with the company's family of 8mm tape backup subsystems, including 2.5- or 5-GB single-drive subsystems or the 50-GB Series 10 and 10i cartridge handling systems.

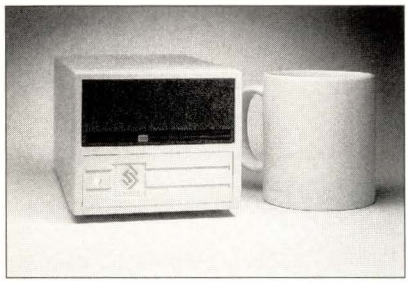
Nightshift provides an integrated, centralized backup of all workstations in a preconfigured backup domain. Rapid random access to any user's files makes restoring data simple. A unique file system permits reconstruction of a file to any point in its backup history, and a data-recovery facility permits restores from incomplete or damaged tapes.

All SPARC-based workstations and servers running Solaris 1.X or 2.0 and running under OpenWindows V.3 and native command-line mode will be compatible with the software. A SCSI port and the appropriate drivers provided with Solaris are required.

Transitional Technology Inc.
5401 E. La Palma Ave.
Anaheim, CA 92807
Circle 197

Super-Small 1.3 GB of Storage

If you have room for two cups of coffee on your desk, then you have room for 1.3 GB of storage. Unison Information Systems has introduced Pocket



Rocket, a SCSI external high-performance 3½-inch hard disk subsystem.

Housed in a 147-cubic-inch package, the subsystem delivers an average seek time of 10 ms and has a 5,400-rpm rotational speed and a data-transfer rate of 10 MB/s. Performance is improved further by a 512-KB segmented cache buffer that maximizes throughput. Pricing is $2,085.

Unison Informations Systems Ltd.
21 Walsh Way
Framingham, MA 01701
Circle 198

RAID Box with Disk Fault Protection

Box Hill has introduced an 8-GB-capacity RAID Level 5 box for high-speed fault tolerance. The Box Hill RAID Box uses hot-swappable drives intended to eliminate downtime due to disk failure.

The RAID Box implements disk striping, which reads and writes data and error-correction information across its independent disk drives, so that if a single drive fails there is enough information on the remaining disks to allow data reconstruction.

Removable drive modules allow disks to be replaced while the system is running. The RAID Box is compatible with Sun, Hewlett-Packard Co., IBM Corp. RS/6000, NeXT Computer Inc. and Pyramid Technology systems. Pricing for one unit is $35,000.

Box Hill Systems Corp.
161 Avenue of the Americas
New York, NY 10013
Circle 199

Lower Priced Imaging Plotters

Océ Graphics has expanded its plotter line with the introduction of two new machines. The G9864 and G9865 offer 406-by-406-dpi resolution with a maximum print speed of one inch per second, 32 gray shades and line patterns, HP-GL/2 support and auto switching between raster and vector input. Either machine can produce plots as long as 50 feet. Additional features include auto-cut and stacking-bar/take-up reel, auto-format recognition and a built-in 3½-inch floppy drive. This drive lets users do off-line plotting of vector files, which minimizes host processing time.

Both plotters interface with most available CAD software, host computers and turnkey CAD systems. They accept vector data files in HP-GL, HP-GL/2, CC 906/907 and VDF data formats, and raster data in the Green Sheet format. Océ's ADI driver converts AutoCAD drawings to the VDF format for better use of disk space and faster data transmission. Other available drivers include those for MicroStation and CAD Overlay. Standard hardware interfaces included with both plotters are RS-232-C serial, Centronics parallel and SCSI on Sun workstations. Optional interfaces offered are LocalTalk and Green Sheet Raster.

Océ also announced a conversion package for owners of earlier models at a list price of $4,000.

Pricing for the D-size G9864 is $19,900 and $20,990 for the E-size G9865.

Océ Graphics USA Inc.
385 Ravendale Drive
P.O. Box 7169
Mountain View, CA 94039-7169
Circle 200

Compact Laser Printer

IDEA has added two new laser printers to its 13000 printer line. The 13X09 and 13X16 laser printers feature an automatic switching capability that allows the printer to simultaneously support PC, mainframe and midrange hosts.

Both provide letter-quality output. The 13X09 prints 9 ppm and is designed to meet low-volume print requirements. The 13X16 prints 16 ppm and is suited for large-volume print requirements in shared network environments.

They are priced at $3,000 and $5,600, respectively, and carry one-year on-site warranties.

IDEAssociates Inc.
29 Dunham Road
Billerica, MA 01821
Circle 201

Back It Up

Contemporary Cybernetics has added a 1-GB QIC tape streamer to its line of tape and disk storage subsystems. The CY-4000 follows the 5¼-inch form factor and can be internally or externally mounted. Read-after-write recording and parity checking of bus transfers continuously monitor the data. If an error occurs, the entire data block is rewritten, ensuring data integrity. This tape streamer offers backward compatibility with the 150- and 525-MB tape streamers. These features make the CY-4000 appropriate for users who want unattended operation and flexible growth.

The QIC streamers are available for a wide range of computer systems including those from IBM Corp., Digital Equipment Corp., Apple Computer Inc. and Sun. They are sold as turnkey subsystems that include the drive, any required hardware or software interfaces, documentation and a complete 12-month warranty that includes technical support from Contemporary Cybernetics. The streamers are priced at less than $2,000.

Contemporary Cybernetics Group
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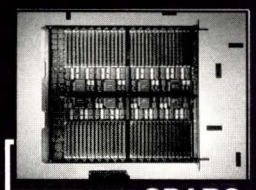

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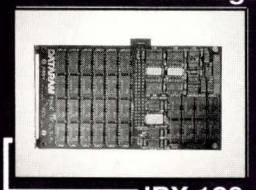

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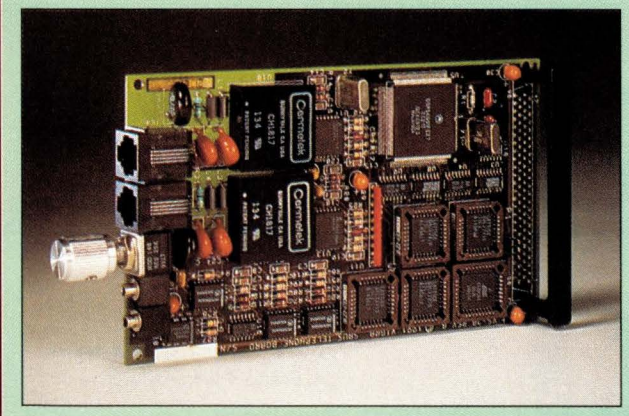

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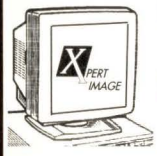

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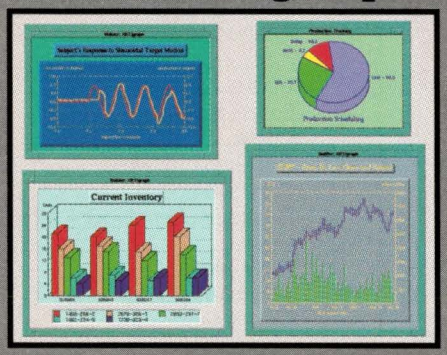

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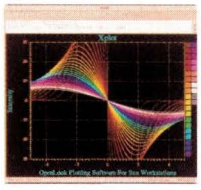

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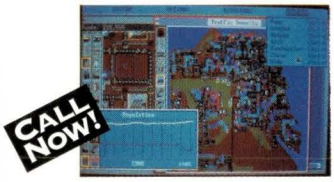

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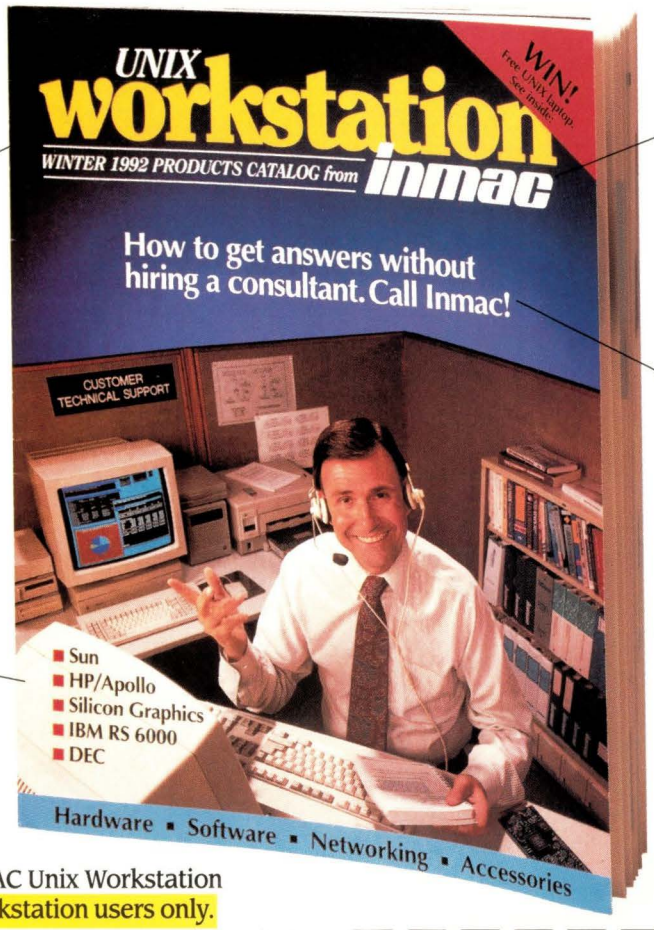

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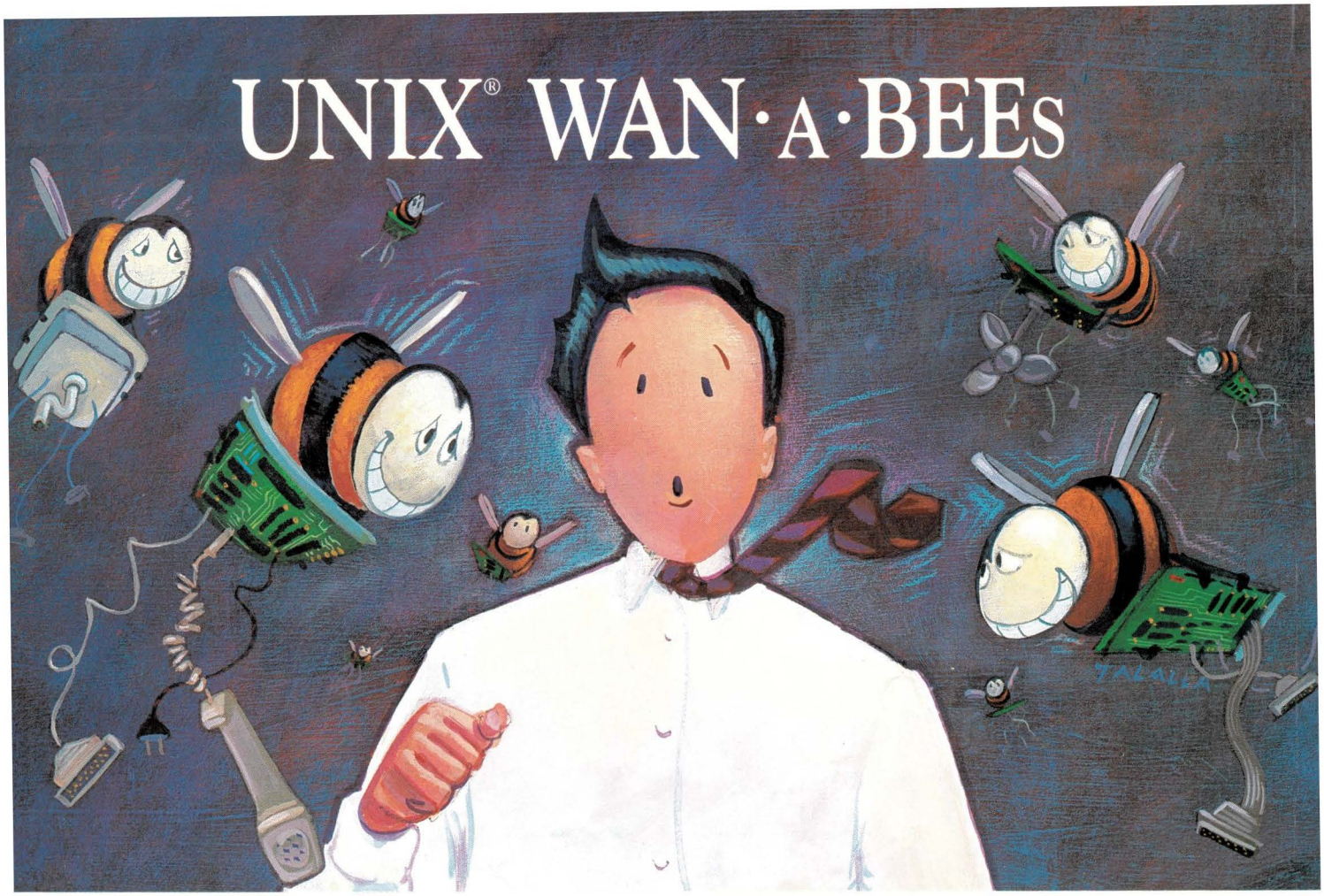

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