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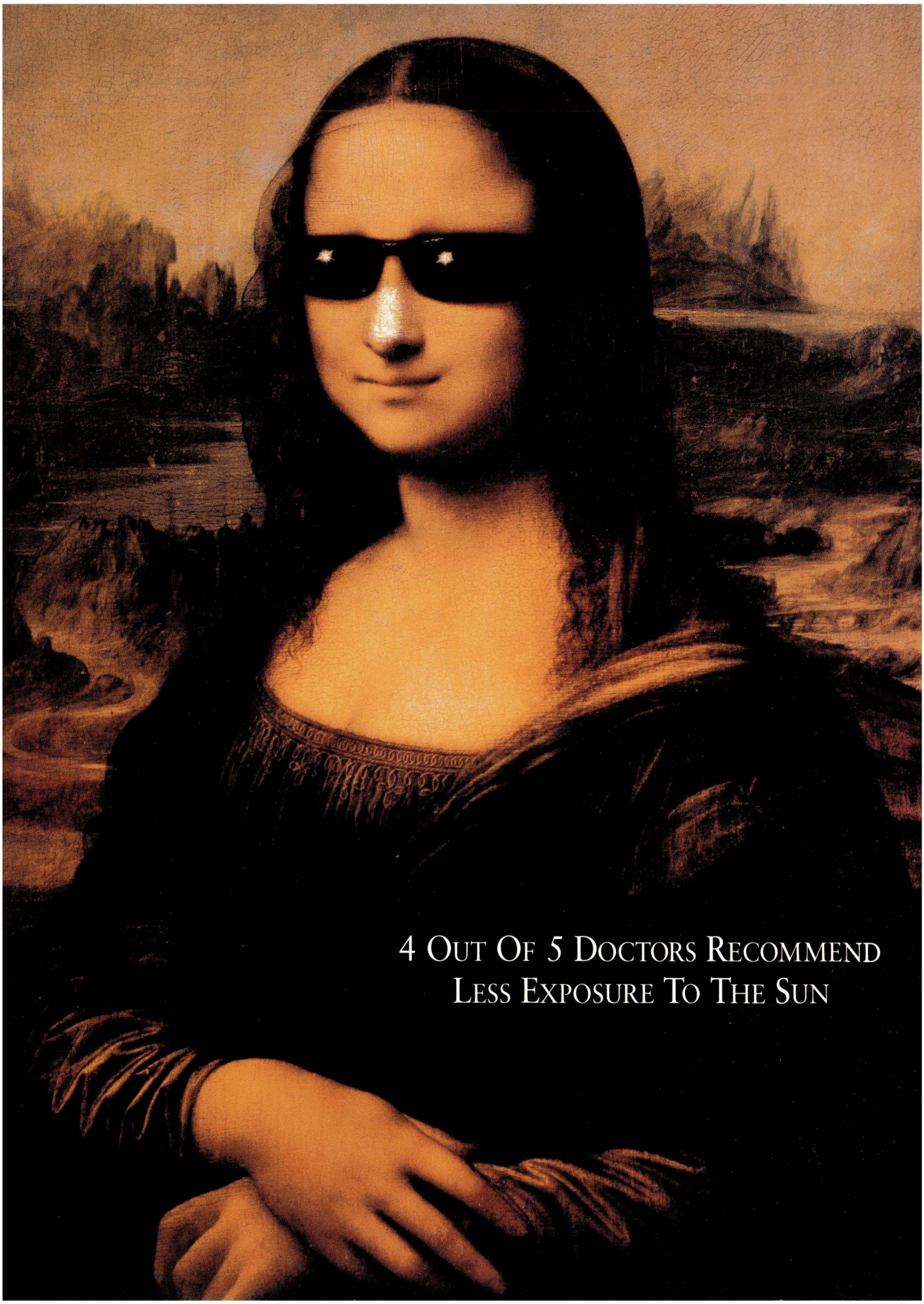
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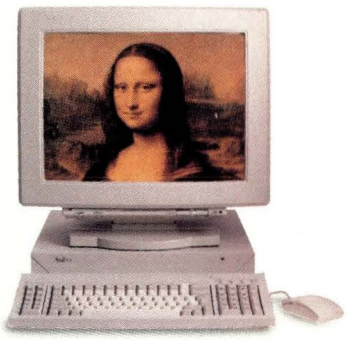

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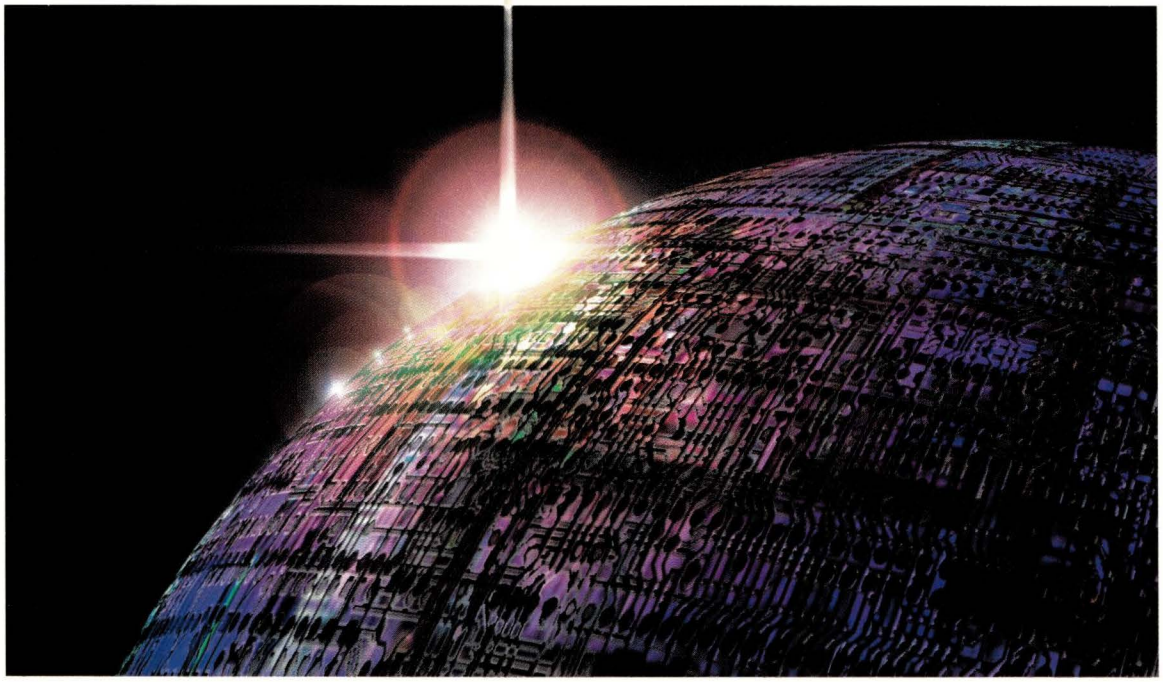

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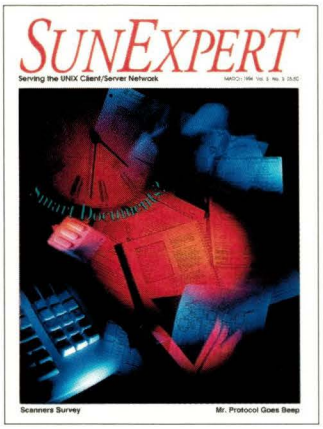

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SUNEXPERT
serves the UNIX workstation environment, emphasizing Sun, SPARC and Sun-compatible systems.

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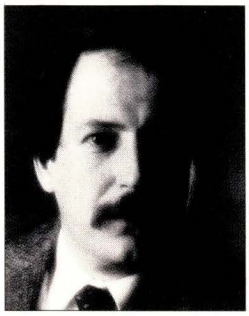
Editorial

Open Systems: Mixed Blessing

You've heard it before: Open systems mean scalable, high-performance computing that can be flexible, responsive to change and cost practically nothing. Doesn't that remind you of a recent president's "shining city on a hill?" Me too. What I'm looking for is an architect, a blueprint and a general contractor to build these cities using evolving technologies and immature standards. Any volunteers? An unfortunate and frequently overlooked consequence of an open systems strategy is what I call, for lack of a better phrase, paradigm paralysis. It means the onus of systems planning and building passes from the vendor to the users–a mixed blessing. On one hand, it frees the user to map computing requirements to business organization; on the other, it *obligates* the user to map computing requirements to business organization. Of course, Sun Microsystems and other UNIX purveyors are at the fulcrum of this teeter-totter of competing interests.



What does that mean to you? Because UNIX workstation power users, administrators and network managers are highly trained and experienced in distributed, client/server applications, you will be challenged to establish agendas and set priorities. *SunExpert* can help you. To address your needs, we have to make inferences from our experience about your concerns. We see capacity planning, network design and implementation strategies as general themes for the near feature. And we see decisions about workstation hardware, software and networking products, as well as techniques for efficient day-to-day operations and network maintenance, as ongoing bugaboos. If you have other ideas, let us know.

Doug Pryor

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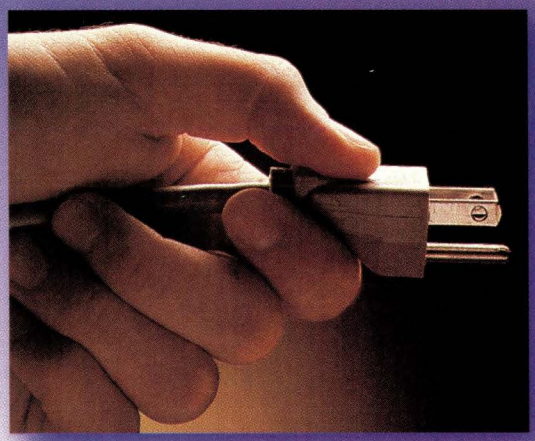

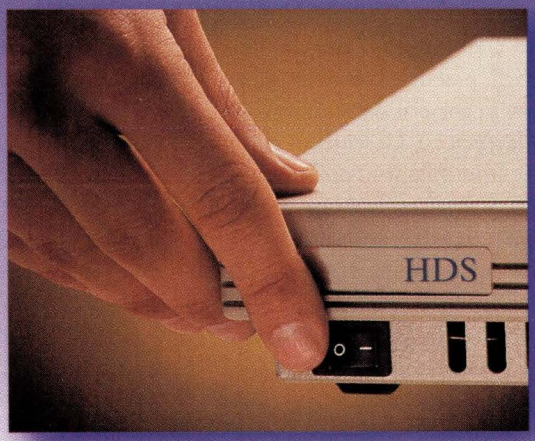

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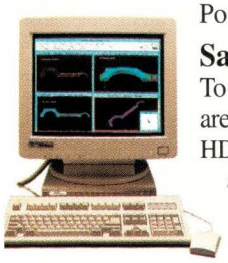

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NEWS

Sun User Group Shows Revamped

The Sun User Group is abandoning its long-term practice of promoting a trade show in association with its technical conference. SUG, which is still recovering from financial problems incurred shortly after its move to the Boston area, says that its last such trade show in December was not a success. From hence forward, SUG will instead focus on technical sessions and seminars, as well as "miniconferences."

The first such miniconference will be attached to the 1994 SunWorld Expo trade show produced by International Data Group World Expo, Framingham, MA.

SUG has traditionally had conferences with a technical component and an attached show floor for vendor displays. SUG says that the technical sessions have always been popular, but the show floor component has been dwindling since 1990. The last such show, in December 1993, has been called a disaster.

"A lot of people say it was small. I was there. It *was* small," acknowledges Alex Newman, SUG's executive director. "It was the last show the Sun User Group will do in that format."

The SUG trade shows have recently been managed by publishing and exposition company Publications and Communications Inc. (PCI), of Austin, TX. "There are two things going on at the same time," says Newman, "the trade show, which is run almost entirely by PCI, and the technical sessions, run almost entirely by SUG."

There are several explanations as to why the trade show aspects of the SUG show did so badly in 1993. "It was possibly poorly promoted," says Newman. However, he is quick to say that he is not holding PCI responsible for the problems of the show. "It is not my intention to lay heaps of blame at PCI's doorstep. I think they did what they could with a poor situation."

Other observers, meanwhile, have suggested the SUG show may have been plagued by the downturn in the computer-oriented trade show market in general. The UNIX trade show market has been particularly hard hit, and the last five years have seen several shows fold or consolidate with others.

But, whatever the cause, there will no longer be a trade show floor at SUG conferences. "To fill the gap," says Newman, "we've started a series of standalone tutorials." These will begin this month. The first is "Introduction to Solaris System Administration," which will be given by Dinah McNutt, on March 29 at the SUG headquarters, 1330 Beacon St., Boston. The second will be "Advanced Solaris System Administration," on the following day, March 30, by Peter Galvin and Dinah McNutt. The tutorials are $345 apiece, with discounts of $50 for SUG members.

"Then," says Newman, "we'll be doing two miniconferences a year." These will be, in effect, the technical seminars and conferences that had been relatively successful before, but without a show floor. "The first of them," says Newman, "will be held in the same arena, immediately following SunWorld Expo." This year's Expo will be June 13 through 16, in San Francisco, which means that the miniconference will be June 16 through 18.

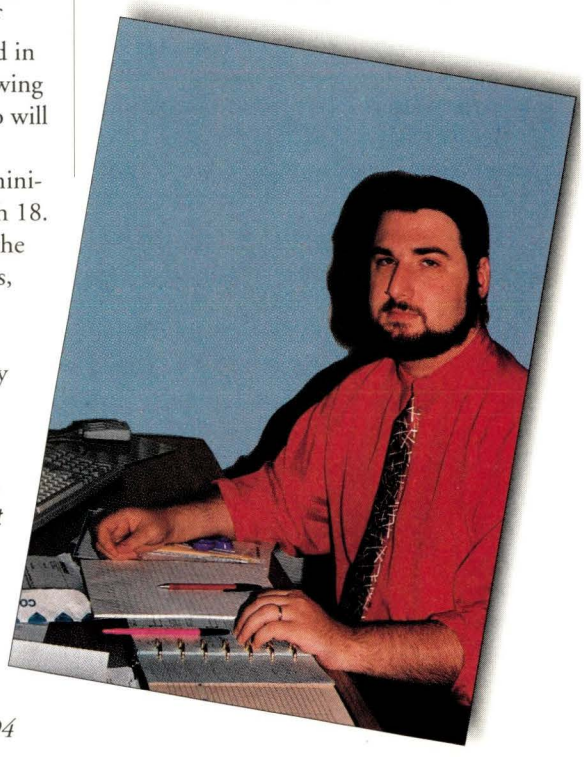
While the relationship between the two organizations is on a trial basis, IDG will be investing in the SUG show. "IDG is in full support and partnership," says Newman. "They are putting money into the project. They are sharing expenses, and they will share in the rewards."

A second miniconference is planned for later in the year, possibly in Austin. This one will not be in association with IDG.

Meanwhile, SUG is recovering from the traumas it experienced over the last three years. In 1993, it had to seek protection from its creditors. Prior to that, its relationship with Sun Microsystems Inc. had grown strained to the point of overt hostility. Newman says, however, that things are much brighter for the organization. "In '93, we got our act together," he says. "In '94, we're taking it on the road."

To this end, SUG has filed an official reorganization plan with the bankruptcy court in Massachusetts. "We expect to get it approved shortly. And, in the meanwhile, we're keeping up with our current bills," he says.

As for the relationship with Sun, that too is improving. Newman points to the December SUG show, where Sun provided many of the speakers to the technical conferences. And, moreover, "Scott McNealy spoke at the last SunWorld Expo. That was the first time in three years that the executive director of SUG and Scott McNealy had been in the same room." Of course, Newman jokes, "he was speaking, and I was in the audience, but it is a start."



The Sun User Group's executive director, Alex Newman, says that SUG will no longer promote a trade show. Instead, the group will focus on conferences, technical seminars and tutorials.

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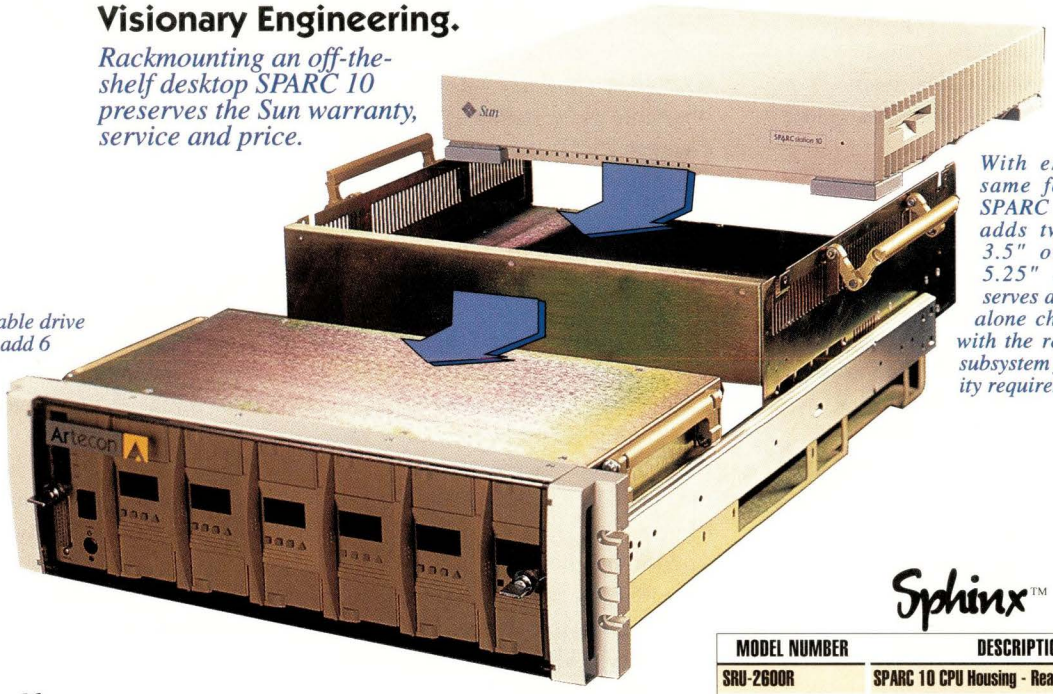

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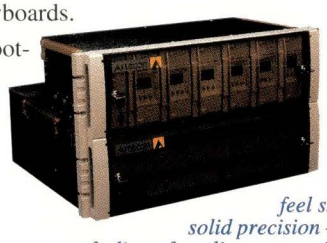

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The Day of the Comet

Sometime in late July, a comet is going to hit Jupiter. In the split seconds after impact, there will an explosion of almost unimaginable power. Its mushroom cloud may rise to the very top of the planet's atmosphere. Estimates of the amount of energy to be released range into the millions of megatons–compared to which the largest nuclear weapon constructed by mere humans looks like a firecracker.

And, already, the first few moments of the explosion's life have been modeled and displayed on a variety of systems–including Sun Microsystems Computer Corp. workstations.

One of the groups of researchers looking at the comet, and its effects, is at Sandia National Laboratories, Albuquerque, NM. "Our particular group models very large impacts and explosions," says Michael McGlaun, a technical manager at Sandia and one of the individuals involved in the effort. "Not necessarily nuclear explosions, but large ones. We modeled the St. Helens explosion, for example."

To this end, the researchers developed an explosion modeling package, CTH, which it promotes widely throughout the research community. "The code we use, CTH, is already distributed to 100 sites nationwide. It's used in everything from oil well perforations to explosive analysis. We've even got a license at a hospital. They use it to model bullet wounds." Among the many machines for which CTH is available are Sun workstations, IBM Corp. RISC System/6000s, Hewlett-Packard Co. workstations and servers, and Cray Research Inc. supercomputers.

The comet–named Comet Shoemaker-Levy 9, after its discoverers–entered the picture with its first sighting in April 1993. Actually, it was more like several pieces of comet. "What they discovered was that the comet had broken up into a large number of fragments, anywhere from one to three kilometers wide, spread over a wide area," explains Dave Crawford, a postdoctoral associate at Sandia. The comet had been captured by Jupiter's gravity, and tidal forces had torn it apart. "So," says Crawford, "the name actually refers to 17 to 21 pieces of comet." The largest of these pieces is up to three kilometers across.

The whole lot of them will plunge into Jupiter at the end of July. On earth, such collisions happen only once every 100 million years. According to a particularly famous theory, the last such event happened 65 million years ago and wiped out the dinosaurs in the process. Jupiter, however, gets hit far more often. "Every thousand to two thousand years," says Crawford. "Apparently, it happens fairly frequently to a planet like Jupiter. It is just so big."

Several groups of researchers were already looking at what the explosion was going to be like, and what effect it might have on Jupiter. The Sandia group got involved because of its interest in impacts. "We were looking at the impacts of small metal spheres on low-density foams," says Tim Trucano, a senior member of the technical staff at Sandia. Specifically, they were examining the way low-density foams react when they're hit with copper pellets fired from "gas guns."

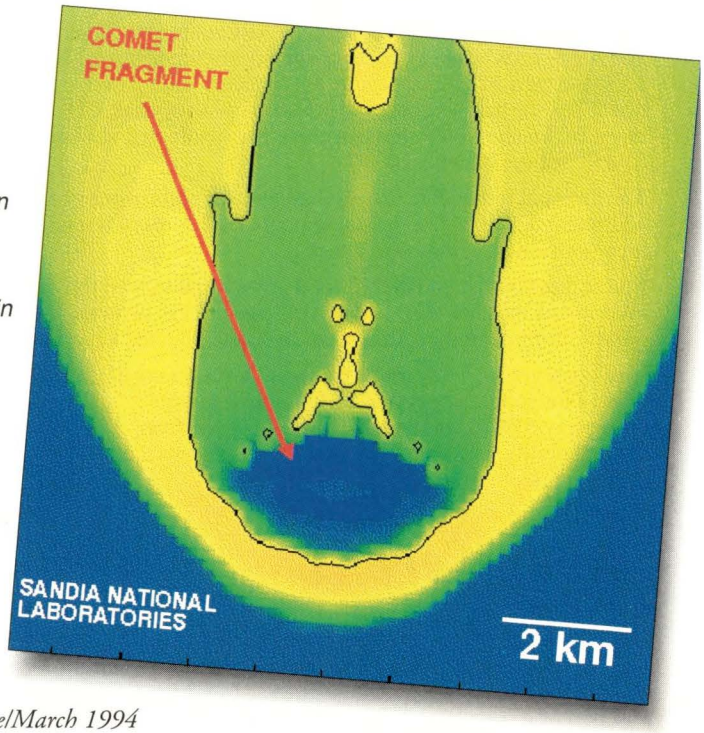
A gas gun is a device used to propel objects to very high speeds. It uses an explosively driven piston to compress an inert gas and direct it through a reducing value. A projectile–in this case a small BB-style copper sphere–is then fired out of the end of the device.

"It sounds far removed from Jupiter," says Trucano, "but it turns out that they [low-density foams] break up in much the same way that the comet does." He says that he was actually able to apply much of what he'd done with the foam studies directly to the comet. "These cometary bodies are basically ice–oh, there's some stone and such mixed in–but, chiefly, it's ice."

The other reason that the Sandia group become interested in the problem is that their software was not designed to model streamlined bodies. Much commercial modeling software came out of the aircraft industry and assumes a certain smoothness of what's being modeled. That's not true for a comet. "At six kilometers per second, these bodies don't behave aerodynamically," he says.

The Sandia group is going to be focused on the actual impact of the largest piece of the comet. The results of their models are then going to be sent upstream to several different organizations that are attempting to model what happens afterwards. Crawford notes that researchers at the University of Chicago, for example, are going to model the fireball that will follow the impact. Another group, at the Massachusetts Institute of Technology, will be looking at the larger effects on the planet's atmosphere.

And those effects will be most



A comet fragment, three kilometers in diameter, breaks up in the Jovian atmosphere. The comet, which is expected to hit Jupiter sometime in July, will deform rapidly. Three seconds after hitting the atmosphere, it will begin to resemble a dum-dum bullet spreading on impact. The lighter the color, the higher the temperature. Courtesy of Sandia National Laboratories.

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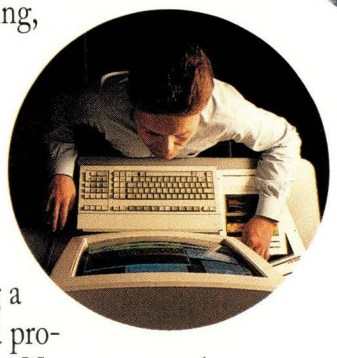

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dramatic. "As it [the comet fragment] enters the atmosphere, the friction is going to turn the gases around it into a plasma," says Crawford. "It is going to emit lots of light...for a few tenths of seconds."

That light may actually illuminate some of Jupiter's moons, and Earth-based astronomers will be able to see it. But they won't be able to see the impact directly. "Unfortunately, this impact is happening on the far side of Jupiter," he says. "There are, however, some ways around that. For one thing, researchers are telling the Voyager and Galileo spacecrafts to turn on their cameras in July." The two probes may be able to catch at least some of the fireworks.

As the comet fragment descends still further, says Crawford, "it is going to break up and deposit its energy into the atmosphere. It will be a fireball." Guesses on the amount of energy to be so released range from "a few hundred thousand megatons to a few hundred million megatons."

Either way, it will be one gigantic bang. "The fireball will expand to...reach a maximum diameter of a few thousand kilometers," says Crawford. "It may be visible above the clouds of Jupiter." In the seconds after that, "the explosion will send a shock around the planet."

It isn't clear whether the impact will have any long-term effects on the planet. Some researchers have speculated the explosion might result in permanent changes in Jupiter's appearance–perhaps even a new Great Red Spot. Others have suggested that the comet will vanish into the Jovian bulk with nary a trace.

Either way, though, astronomers are hoping to use models like Sandia's to understand more clearly what they're going to see in July. "What people need," explains Crawford, "is information about how the impact is going to behave. If they have that, then they can make predictions about what kind of disturbances you can expect."

The group did much of its numerical work for this particular project on HP machines, and then displayed the results for analysis on Sun workstations. The group's software, however, runs on a number of different platforms, including IBM RS/6000 and Silicon Graphics Inc. machines. "We've also got a massively parallel version," says McGlaun. "We're sort of keeping that in our hip pocket."

Anyone interested in CTH should contact Michael McGlaun, at Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185-5800.

ORB Interoperability Divides OMG

About a year ago, the Object Management Group put out a request for proposal for the next generation of its Common Object Request Broker Architecture. The OMG has now received 13 technology submissions from the likes of IBM Corp., SunSoft Inc. and others (see "In the Running for CORBA 2.0"). For the OMG, however, the real dirty work is just beginning.

Over the next six months, the OMG's 350 or so members, who are sharply divided over the right course to take, will have a chance to evaluate the various technologies. What they are looking for is an answer to the interoperability problem. The initial CORBA specification, CORBA 1.1, outlined a set of application programming interfaces (APIs) that allow objects to interact. It does not specify a common communications scheme, a hole the OMG always knew it would have to fill. "We asked for it in the first round, but all the companies said they weren't ready with it," says Richard Soley, vice president and director of the Framingham, MA-based standards group.

Because of that, the various object request brokers (ORBs) offered by vendors use different communications protocols and produce messages that look very different, says John Rymer, editor of the Patricia Seybold Group's *Distributed Computing Monitor*. Some, like IBM's System Object Model (SOM), use sockets. Others use the IPX communications protocol, while still more use remote procedure calls.

CORBA 2.0, which the OMG membership is now busy deciding upon, will rectify that by specifying a "small number of APIs," according to OMG's Soley. What those APIs will provide is a common communications mechanism. But opinions on the right kind of mechanism vary widely at the OMG. According to most observers, there are two camps. One, headed by SunSoft, wants to take what Seybold's Rymer calls a minimalist approach. SunSoft is proposing a gateway. Those in the other camp are all proposing some kind of communications protocol. The gateway adherents are opposed on principle to the OMG defining any protocols. The protocol camp, which includes IBM, says protocols use less overhead and are more efficient.

IBM falls on one side of the gateway camp. The company's submission for interoperability is what it calls a "universal object encapsulator," according

CORBA 1.1 Implementations

Expersoft Corp.'s XShell
NCR Corp.'s NCR Cooperative Frameworks
IBM Corp.'s SOM/DSOM
Hyperdesk Corp.'s HD-DOMS
IONA Technologies Ltd.'s Orbix
Hewlett-Packard Co.'s DOMF
SunSoft Inc.'s DOE
NEC's NEC-ORB
Digital Equipment Corp.'s ObjectBroker

Source: Object Management Group

In the Running for CORBA 2.0

AT&T/NCR Corp.
Digital Equipment Corp.
Expersoft Corp.
Hewlett-Packard Co.
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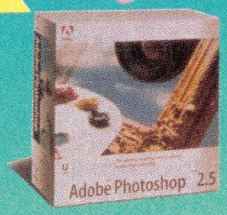

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X is Billionaire, Says X Business Group

At least according to market research firm X Business Group (XBG), Billy Gates had better watch out. There's a new billionaire in town–the X software and hardware industry. According to XBG's newly released year-end figures, in 1993, the total value of the X market passed the one billion mark–specifically, it was $1.3 billion, up 51% from 1992's total of $819 million.

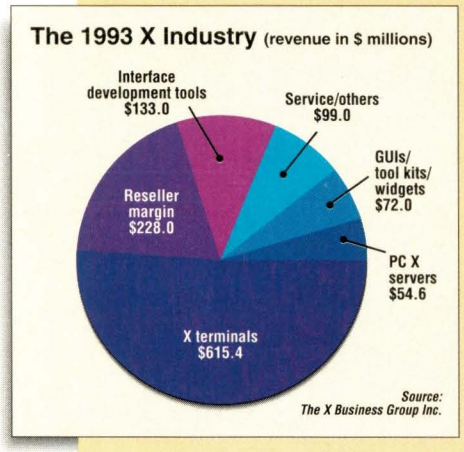
XBG breaks the X market up into several smaller sections, including X terminals, interface development tools, GUIs and attendant software, PC X servers, services and so on. Of this pie, the largest slice in 1993 was the X terminal market, at 51%, or $615.4 million in revenues. The X Business Group says that the X terminal market grew some 35% from 1992, to a total of 265,712 units worldwide.

XBG says that the leading vendors, Network Computing Devices Inc. (NCD) and Hewlett-Packard Inc., were neck and neck, at 22% and 23% of the market's revenues, respectively. The other major players were all workstation vendors, except for Tektronix Inc., which had 11% of the market.

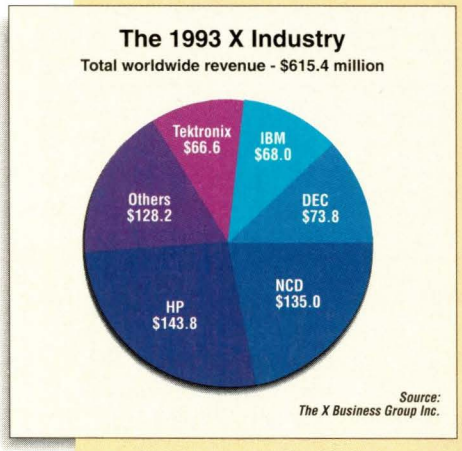
The other big winner in the X sweepstakes was X on personal computers–PC X servers. Here, XBG says the market grew more than 100%. In 1992, the revenues for PC X servers reached $26.5 million. However, in 1993, the revenues reached $54.7 million.

In PC X, the leading vendors were Hummingbird Communications Ltd. with $17.1 million, or 31% of the market revenues, closely followed by NCD with $9.3 million, or 17% of market revenues. Other major players included VisionWare, AGE Logic Inc. and Digital Equipment Corp.

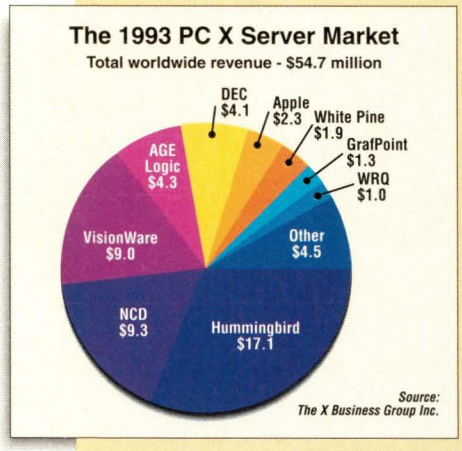
Meanwhile, XBG says that development technology–GUI builders, tool kits, etc.–also did well in 1993. The firm says that such products generated about $135 million in revenues.



Revenues for the whole of the X industry just topped a $1 billion, says market research firm the X Business Group. Leading the market were X terminals, with 51% of the X business.



Within the X terminal market, the leaders were NCD, with 22% of the market, and HP, at 23%. The X Business Group says that the total market for X terminals is now worth $615.4 million.



Running X on PCs is a growth market. The total market for PC X servers was $54.7 million in 1993, with the lion's share of the shipments going to Hummingbird, NCD, VisionWare and AGE Logic.

to Scott Hebner, program manager, application enabling strategy, object technology products. "IBM will fall more into the gateway camp, but our approach is different from Sun's," says Hebner. Sun provides gateways in pairs, says Hebner. A new gateway has to be created for each of Sun's partners. IBM's encapsulator, on the other hand, is a single solution that will work with any combination of objects. IBM is proposing a gateway, admits Hebner, because IBM doesn't believe a group of vendors as large as the OMG's can agree on a protocol. "A protocol might be a little more efficient, but it's a question of being practical."

The OMG hopes to have the CORBA 2.0 spec outlined by September. In the end, the decision has to be approved by a two-thirds vote of the OMG's 70 corporate members. What camp will prevail is still anyone's guess. The situation may not be as hopeless as it appears, says Seybold's Rymer, since feeling on the CORBA 1.1 spec was just as divided. But, warns Rymer, "the future of this whole effort hangs in the balance. If the OMG doesn't come up with a good solution, users will abandon it."

In the meantime, other interoperability work has been going on outside the OMG. IBM, SunSoft and Hewlett-Packard Co., for example, announced in June they plan to provide common interfaces for software developers at the ORB and Object Services level. Object Services are a set of services required by all objects for communication, identification, consistent use and management. At the same time, IBM and HP announced they would be integrating their object technologies–IBM's sockets-based SOM and DSOM and HP's Distributed Object Management Facility, which uses the RPC-based Open Software Foundation's Distributed Computing Environment–into a common framework.

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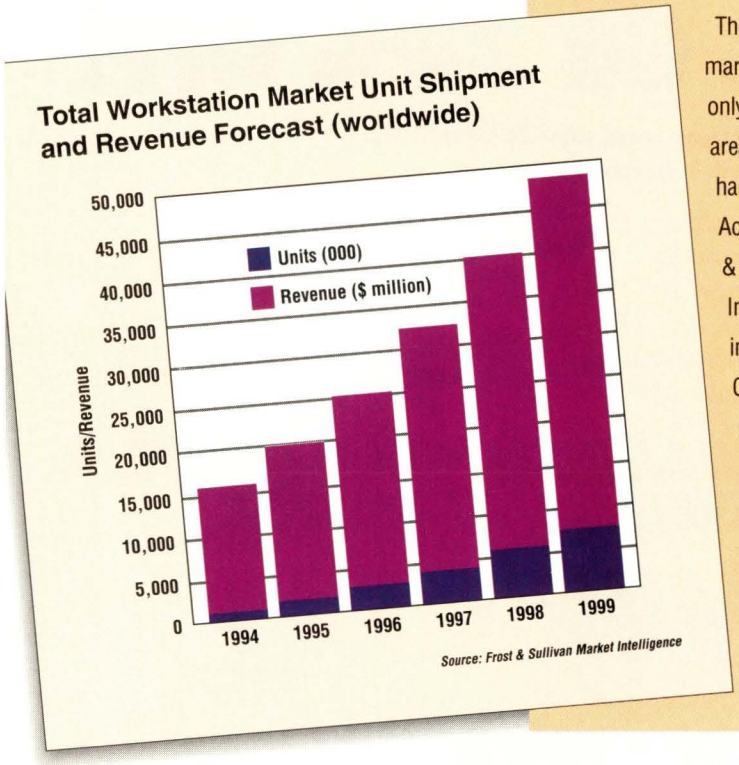
Corp. and Microsoft Corp. announced they will create a Common Object Model that will link Microsoft's Object Linking and Embedding utility, which is not CORBA-compliant, with DEC's ObjectBroker, which is. That will provide interoperability among several platforms including Windows, Windows NT, Macintosh, Open VMS, OSF/1, AIX, HP-UX, SunOS and Ultrix. In January, SunSoft also promised Windows and Windows NT interoperability when it announced a deal with Dublin, Ireland-based IONA Technologies Ltd. Through that agreement, which includes SunSoft investing in IONA, developers using Distributed Objects Everywhere (DOE), Sun's ORB implementation, will be able to access objects on Windows and Windows NT running IONA's Orbix product. Orbix is a hardware-independent ORB that runs on Solaris, SunOS, Windows NT and Silicon Graphics Inc.'s IRIX, with plans for Windows 3.1 and OSF/1, OS/2, HP-UX, SCO UNIX and AIX in mid-1994 at the earliest, according to Sean Baker, IONA's vice president. IONA will also add SunSoft's Common Object Services Specification to Orbix as part of the deal.

Another distributed ORB is available from San Diego-based Expersoft Corp., which won Object World's Best New Object Technology Award in January. The product is XShell 3.0, a distributed object management environment comprising the XShell Distributed ORB and a set of integrated tools and services. It supports Windows and Windows NT (clients only), Solaris, HP-UX, AIX, SCO UNIX on Intel Corp.'s 386 and 486, and SGI's IRIX. According to David Curtis, Expersoft's vice president and chief technical officer, XShell, which predates the OMG's CORBA, will be CORBA-compliant within the next few months.

A platform-independent development tool will be available mid-year from NetLinks Technology Inc., Nashua, NH. ORBitize will be available on Windows, SunOS, HP-UX, AIX and OS/2. It will help developers using ORBs define interfaces using the Interface Definition Language and define servers and methods. It will also help developers browse the implementation and interface repositories, says Mark Roy, chief executive officer, NetLinks.–*Anne Knowles*

Workstation Makers Party in 1999



The workstation market may be the only high-growth area left in the hardware industry. According to Frost & Sullivan Market Intelligence, based in Mountain View, CA, the market will more than quadruple in revenue and grow by more than 10 times in unit sales by the end of the century.

New X Standard

The X Window System is being extended to enable high-performance imaging. AGE Logic Inc., which was awarded the contract to develop the new standard, delivered the X Image Extension Sample Implementation (XIE-SI) to the X Consortium Inc. late last year. AGE expects to be the first to deliver a commercial product based on the standard when the company rolls out its enhanced PC X Server software before the end of this quarter. According to AGE, XIE outperforms basic X by a factor of 20 because it adds significant functionality to the server and it supports standard compression formats such as TIFF, FAX and JPEG. A white paper that explains XIE is available from AGE by calling (619) 550-3112. –*Anne Knowles*

SNAP Gets Gordon Bell Prize

One of the IEEE Computer Society Gordon Bell Prizes for 1993 has been awarded to HNC Inc., San Diego, for its SIMD Numerical Array Processor (SNAP). The SNAP coprocessor gives Sun Microsystems Computer Corp. workstations supercomputer-like performance for certain tasks.

"We developed it internally [for modeling neural networks]...and then we thought we might like to sell it," jokes Dr. Robert Means, senior staff scientist at HNC.

HNC has for some years marketed hardware and software for the modeling of neural networks. Originally, the company sold SBus and VME boards using a variety of processors–most recently, the Intel Corp. 80860. However, when Intel's support of the i860 was thought to weaken, HNC decided to develop its own processor. "We have a gate array chip," says Means, "that has four processors on each chip. Each processor provides it with 40 MFLOPS...so we have a 160-MFLOP chip."

Up to 64 processors can then fit into VME chassis, which gives 2.56 GFLOPS. It then links to a Sun via a cable and an SBus connector. Then, the Sun can farm out number crunching to the SNAP via HNC's own

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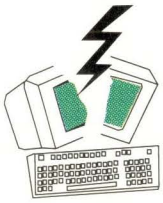

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library of functions, which can be called from a C program. "The goal in writing a program," says Means, "is to do all the numerically intensive operations on the SNAP."

The SNAP was originally developed to model neural nets–"The type of SIMD machine we've built, where the processors execute the same instruction on different streams of data, is good for matrix algebra, and most of neural nets are basically that," says Means–but HNC has found it was useful for a good many other tasks. It could be applied to such things as molecular modeling, finite element analysis and so forth. As a result, it is being sold as a general-purpose number cruncher, and that brought it to the attention of the IEEE.

The Gordon Bell Prize honors significant advancements in parallel processing. SNAP won the award for best price/performance at the Supercomputing 93 conference in Portland, OR.

Cognos Comes to Client/Server

Fourth-generation language maker Cognos Corp., headquartered in Ottawa, Ontario, has finally joined the client/server game. On the table is Cognos' new development tool, dubbed Axiant, scheduled for mid-1994 release. In the meantime, Cognos has beefed up its PowerHouse 4GL to provide a migration path for using Axiant. The PowerHouse scripting language is the core technology within Axiant.

Axiant was designed to help customers deploy second-generation client/server applications, says Cognos Vice President of Marketing Patrick O'Leary. O'Leary says a spate of tools on the market, including such popular ones as PowerSoft's Powerbuilder, are PC-centric and don't scale well to handle larger scale, mission-critical applications. The tools also make it difficult to split applications between clients and servers, he adds, without having to drop back to using third-generation languages. Axiant, on the other hand, is built around an object-based repository and will let users split applications by presentation, application and data access logic. Axiant will not compete, however, with tools from companies like Dynasty or Forte, which allow developers to split applications dynamically, O'Leary says.

Eventually, the PowerHouse 4GL will be subsumed into Axiant, O'Leary notes. A recently released version of the 4GL, which has traditionally succeeded in proprietary minicomputer environments like VAX/VM, broadens database support to include ANSI 92 SQL syntax and direct interfaces to Sybase Inc. SQL Server, Hewlett-Packard Co. AllBase/SQL and Interbase. Oracle 7 support is expected in April or May. In addition, PowerHouse Series 7 supports additional servers including HP/UX and MPE ix, IBM AIX and AS/400, SCO UNIX, SunOS and Solaris, Data General Corp.'s Aviion and Digital Equipment Corp.'s Ultrix and Open VMS.-*Jane Majkiewicz*

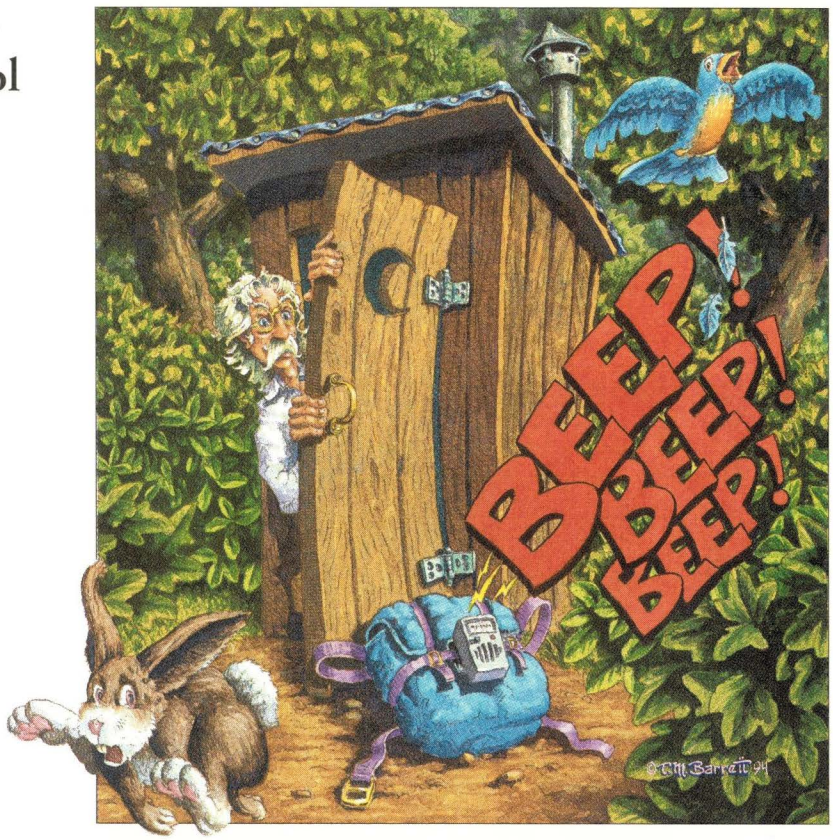
MS LAN Manager for Suns

Unipress Software, Edison, NJ, is looking for a few good betas–for the Solaris 2.x version of Microsoft Corp.'s LAN Manager.

MS LAN Manager is one of the most important of the PC LAN management tools. As such, there had been a powerful need for some means that would allow network administrators to link their UNIX systems and network managers with the LAN Manager they were using to manage their PCs and PC LANs.

Microsoft itself, however, has not been eager to commit the resources necessary to take the product to UNIX, the very operating system the company is attempting to rival with NT. However, Unipress, a distributor, publisher and developer of UNIX-oriented software, licensed and ported the product to, first, UNIX for Intel Corp. systems. It is now undertaking the port to Solaris 1 (a k a SunOS).

To this end, it is looking for beta-site volunteers. Anyone interested should contact Unipress' director of sales, Sue Glassberg, at the company headquarters, which is at 2025 Lincoln Highway, Edison, NJ, 08817. ➸



TOM BARRETT

Beep! Beep! Beep!

by MICHAEL O'BRIEN

"Hen-RY!"
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–Ranks right up there with, "The check is in the mail."

Q: Now, let's see, you promised if I sat through all that boot protocol stuff, you'd show me how to use the Internet to find Teri Hatcher's home phone number, right? Well, this sure seems like a fine time to… BEEP! BEEP! BEEP! BEEP! Damn! My beeper!

A: Oh dear. Yes, it does appear that we'll have to defer that discussion. Meanwhile, I see that terrible, nagging sound has made Mr. Protocol all misty-eyed, which means he's reminiscing again and will be completely useless for the rest of the day. In his usual condition, anything over 10 years ago is indistinguishable from Edwardian times, so I'll bet I know what he's remembering. He's remembering Geoff Goodfellow, without a doubt.

Geoff was always the first person to take advantage of any nifty new Internet service, generally by building it himself. It was probably around 1978 or 1979 that he came up with the Arpanet's first mail-driven pager, mainly by building it himself. Being a good Tenex hacker (back when "hacker" had not been debased by the media and was still an honorable, law-abiding term), Geoff wrote a program that watched for mail incoming to his mailbox, parsed the RFC 733 header, and then dialed up his pager using an autodialer connected to the mainframe. It then negotiated the protocol of his alphanumeric pager to send him the From: and Subject: lines from his mail. Geoff had one of the very first alphanumeric pagers. In fact, Geoff had one of the very first of everything. He was (and is) an interesting person to know. He also really, really knows his way around a Chinese restaurant.

Be that as it may, Geoff's Patent Email Pager was a one-of-a-kind phenomenon. Just as the Internet has

grown (read, "exploded") out of the Arpanet, so pagers have grown to be a very large business. And, given also that alphanumeric pagers have much larger capacity and much smaller cost than earlier models, it seems natural to marry the two. You ought to be able to bother people wherever they are, via the Internet. And it's probably just this sort of attitude that makes Western technology seem frivolous and pointless to non-Western thought. Why in the world should you be able to bother people wherever they are? Why should people even agree to wear pagers so they can be bothered? And for heaven's sake, why should anyone want to use the Internet to further this senseless scheme?

Because they can, that's why.

And because it serves to lessen the more dehumanizing tendencies of the pager, and that's reason enough for Mr. Protocol.

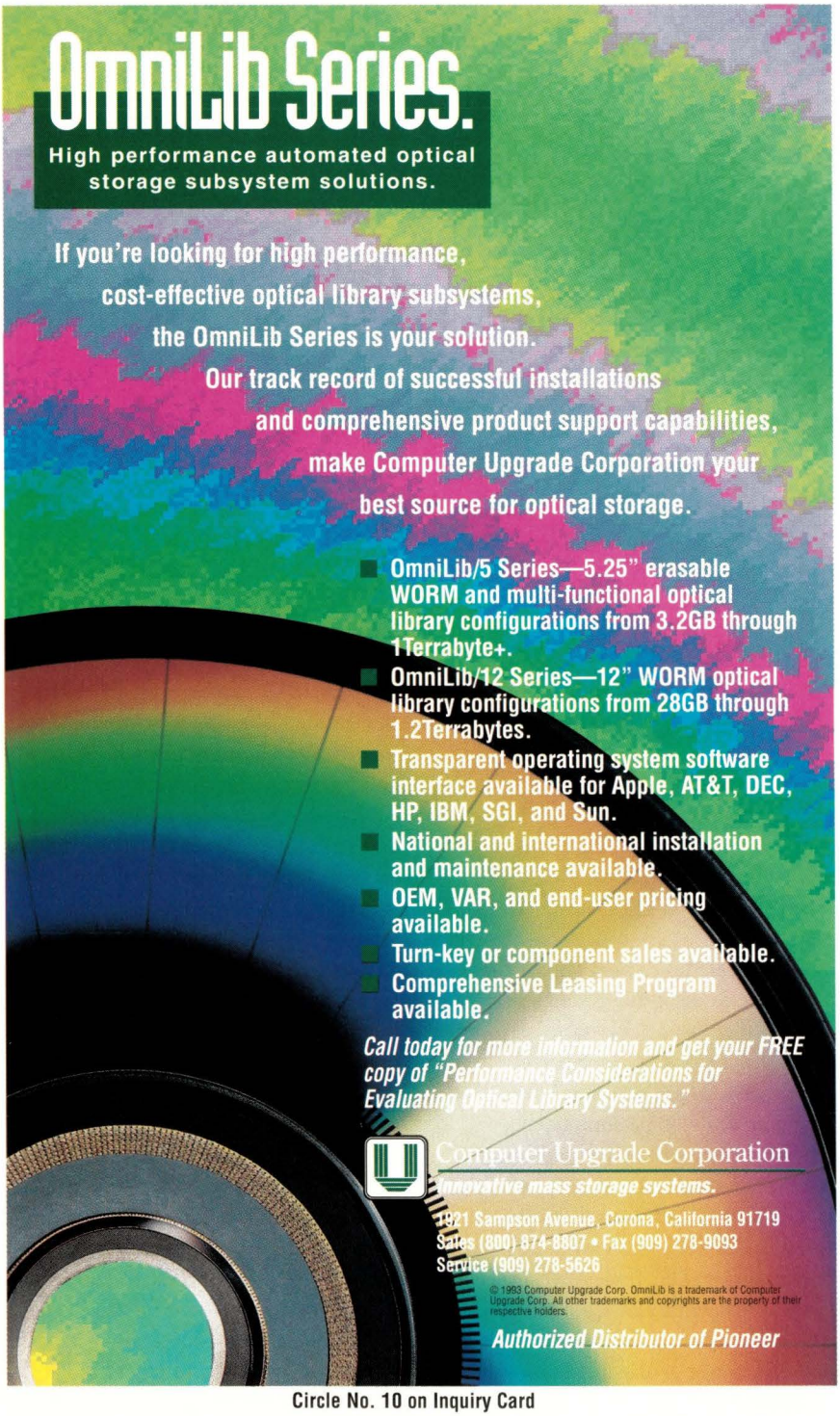
Consider: The entire reason why the pager is so annoying is because of the implicit message that it carries. (No, we're speaking in general. We'll admit that in my neighborhood, the implicit message is, "This person sells great dope," which is why you can't wear them to school any more.)

The implicit message *to the wearer* when a beeper goes off is, "I have no idea what you may be doing but it for damn sure can't be any more important than what *I'm* doing so just you drop whatever frivolity you're engaged in and call *me, right now!*"

Of course, there is another type of pager. This is the one that allows the person issuing the page to actually speak into the telephone, where his voice will be specially processed by audio circuitry salvaged from a public address system first installed in Rangoon in the days of the Raj, finally issuing from a dime-sized loudspeaker in the pager. This is enough to make even Patrick Stewart's enunciation sound like Urdu, encrypted with DES. It's then up to the poor schlumpf with the pager to use his or her finest ratiocination to construct a theoretical model of what the page actually said, based on no real information whatsoever (certainly, none from the pager). This method works about as well as it did when Aristotle used it to determine the whole of natural history.

There is just no negotiating with this type of attitude. This is also why beepers always have the power switch right on top, where as a battery-saving measure you can turn the fool thing off in midbeep, and then just sort of leave it that way for oh, say, the next 47 years or so, oops!

Which is why, of course, alphanumeric pagers are so much handier. Now, the pagee has some idea of just why he is in such demand, and can make his own decision on the actual degree of urgency involved. In fact, current alphanumeric pagers have so much room that the paging services have taken to filling them up with random material such as CNN Headline News in addition to any actual personal page messages that might come along. Of course, the problem with alphanumeric pagers is that while the user has all these neat new capabilities,



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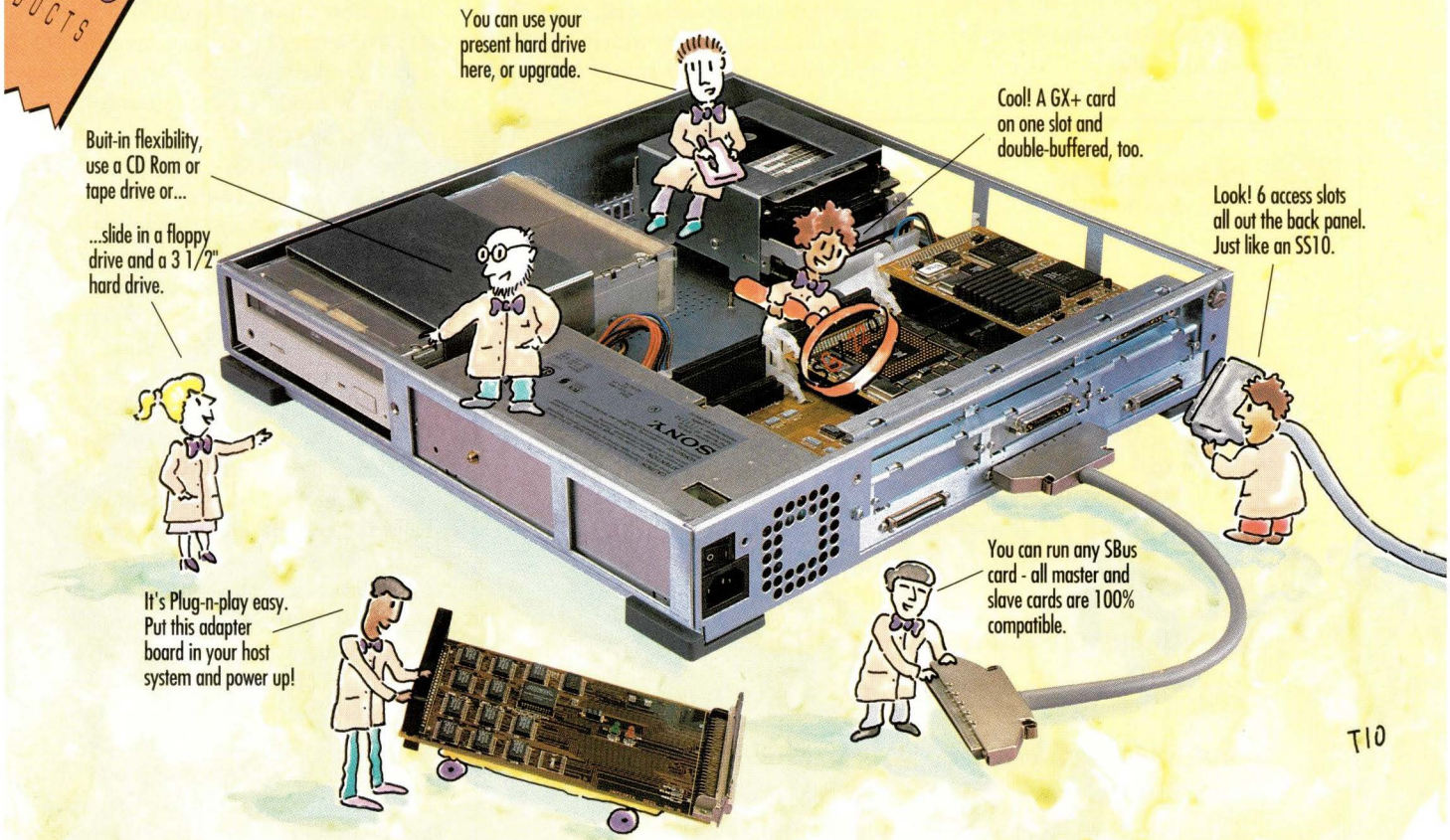

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the user at the other end, who is trying to issue the page, has to have something more powerful to work with than a push-button phone. Yes, it is possible to use coding schemes to issue arbitrary (usually upper-case-only) text from a DTMF phone pad. No, no one who has actually had to do this more than about four or five times is ever actually willing to try it again. Paging companies have dial-up data lines for this sort of thing now.

The trouble is, they also have their own protocol. So, how are people supposed to use it? Mr. Protocol is glad you asked.

Certainly, one common way of using one of these paging services is via an existing message service. However, there are as many of these as there are "competitors" to the Internet, not to mention the Internet mail standard itself. Compu$erve has one, certainly. If the Internet is to be widely accepted as it stands, it should at least have provisions for such activity. And that's where things get interesting this month. Instead of one movement toward a standard, there are two.

Two Internet requests for comment (RFCs) have been issued simultaneously, detailing two alternate approaches to the problem of creating an Internet interface to existing radio-paging services. One takes the attitude that a new protocol is needed to satisfy the semantics of radio paging, and the other has the view that existing services should be modified and expanded whenever possible. This means that even aside from any intrinsic value that it may have, radio paging is an interesting subject for study because it shows the Internet dynamic: two different viewpoints at work on the net simultaneously, attempting to demonstrate which solution is superior.

Taking first things first, we have RFC 1568, on the Simple Network Paging Protocol. The author, R. Allen Gwynn of Southern Methodist University, states up front that he has taken his idea before an IETF working group and three Internet Engineering Steering Group members, all of whom believe that the weight and trouble of establishing a new network protocol isn't worth the effort for a service that can be handled through existing services. Mr. Gwynn, obviously, takes a contrary view. His argument is a simple one. The most obvious way of shoehorning a paging service into the Internet structure is via mail. In fact, many companies have already instituted in-house paging interfaces, just as the esteemed Mr. Goodfellow did many years ago. The problem is that mail is a store-and-forward system, not an interactive one, and such timeouts as exist are generally on the order of days rather than minutes. Sending an emergency page to inform the boss of a sudden and critical meeting that starts in half an hour does very little good if the mail queue is jammed. Three hours later, when the page is finally delivered, it will probably produce more sorrow than joy. Mr. Protocol has borne personal witness to such delays in one mail-based paging interface system.

Mr. Gwynn's alternative is the use of an interactive system, via a new network protocol. A new protocol, of course, has the luxury of fitting exactly into a new service. The Simple Network Paging

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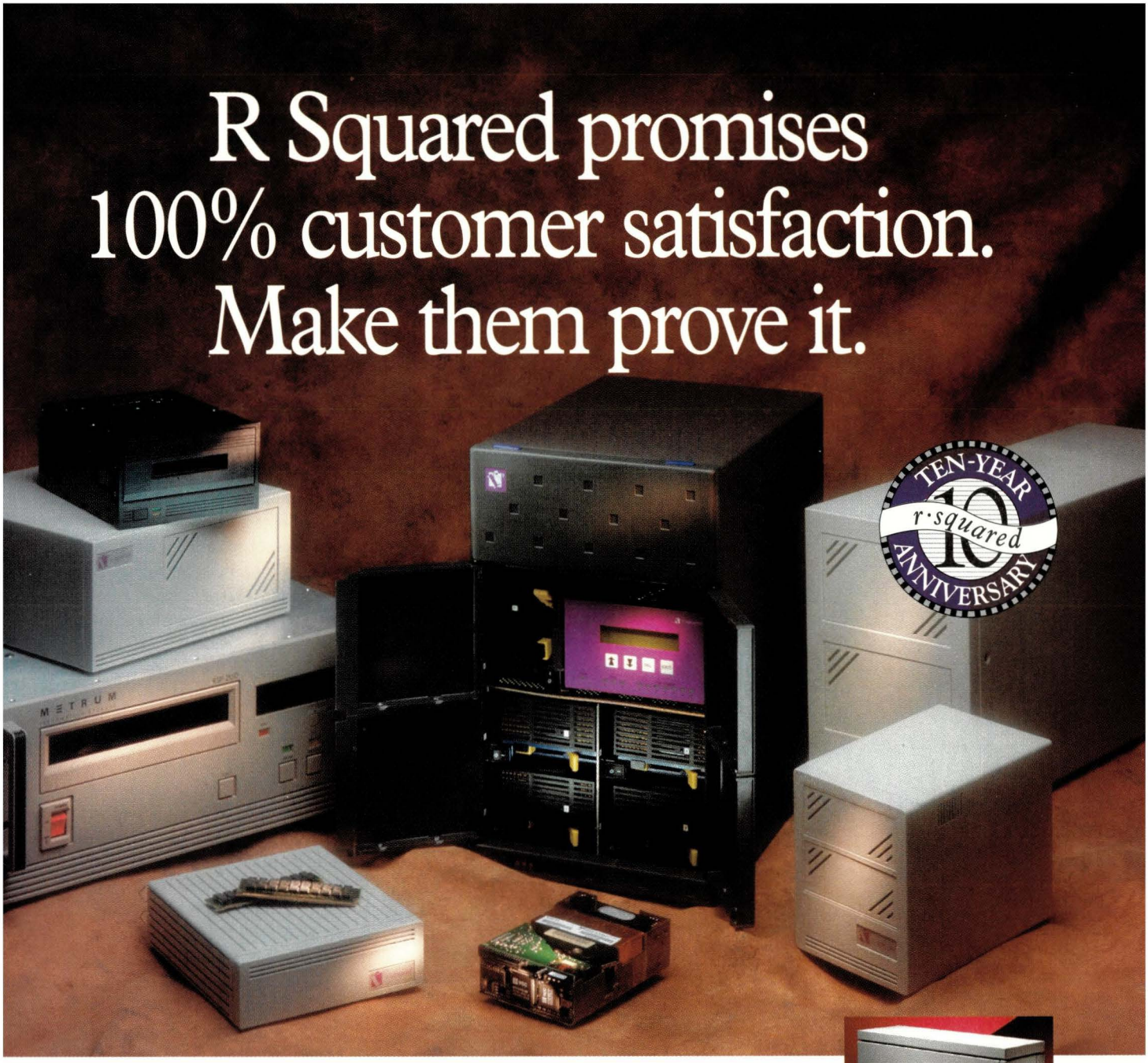

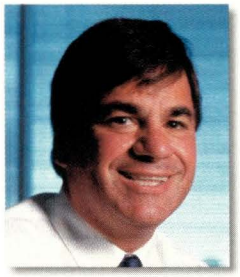

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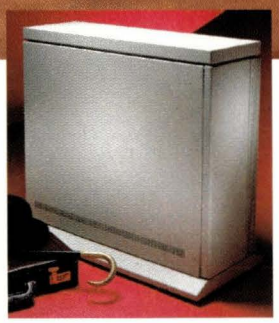

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Protocol, SNPP, looks rather like FTP or SMTP, in that it defines clients that use four-letter command abbreviations, and servers that issue three-digit numerical replies indicating success, temporary failure or permanent failure.

SNPP servers, in turn, feed the client information into the telephone network, to the actual paging company. Most such paging company lines speak a protocol called TAP, for Telocator Alphanumeric Protocol. This protocol is also known in the industry as IXO. As far as we are concerned, its primary characteristic is its interactive nature.

The interaction as envisioned under RFC 1568 is very like SMTP. It consists of a client/server dialog, at the end of which the client is either assured that the page has been delivered, or that it cannot be delivered, either for temporary or permanent reasons. After a connection has been established, the first client command is PAGE, which gives the telephone number of the desired pager. (The server cannot actually check the validity of this number yet, because TAP provides no channel for doing so.) The next command is MESS, which contains the alphanumeric or numeric information to be sent to the pager. One peculiar thing about this protocol is that it does not seem to have provisions for multiline messages. This strikes Mr. P. as curious in the extreme, but he doesn't see it in there.

The next command is SEND, which causes the page to be sent to the TAP terminal equipment, and the response to the SEND command encapsulates the TAP results. A QUIT command ends the session.

Standing on the other side of the fence is the author of RFC 1569, which espouses quite a different viewpoint. This august personage is none other than Marshall Rose, who points out that new protocols have difficulty with "market penetration," given the current size of the Internet, and that current services can do all the work of RFC 1568 without the necessity of instituting a new protocol. In particular, they point out that SMTP sports the little-used SEND command, which is used to send messages directly to the terminal of a logged-on user, and return an error status if this cannot be done immediately. This, they claim, gives the immediate feedback necessary to pager operation.

In fact, Mr. P. is not convinced of this. It is true that, seemingly, the two largest causes of delayed mail are "Destination Down" and network routing flaps. These can last for hours, or days (in the case of "Destination Incredibly Down"). Such sources of delay would as readily affect the SNPP protocol as well, but the question is not so much which implementation would be delayed more (pretty clearly it would be SNPP since reattempts at delivery of a page would have to be manual, while SMTP would keep trying at intervals). However, while mail systems usually do attempt delivery at the moment of first submission of the mail, any delay in mailing winds up divorcing the user from the mailer, so the user has no idea how long his page request may sit out in the mail queue. SNPP, whether used by a client program or directly, at least gives immediate feedback on the succession of events.

What is most interesting about RFC 1569 is that it attacks one problem the

Circle No. 22 on Inquiry Card

competing RFC ignores almost entirely: naming and addressing of the gateways. Dr. Rose suggests the use of the domain TPC.INT, which is a domain specifically for services that interface directly with the phone system. In the TPC.INT domain, phone numbers and partial phone numbers are broken into individual digits, each of which is a domain. For example, an alphanumeric pager service at the number +1 415 555-1234 would be reachable as `pageralpha@4.3.2.1.5.5.5.1.4.1.tpc.int`. This address format allows wild cards, so that a service willing to pick up calls to pagers anywhere in the 415 area code could install MX records in the Domain Name System announcing that mail for the `*.5.1.4.1.tpc.int` domain should go through the given MX host. This eliminates a problem that was glossed over in the prior proposal, namely, how the client finds the server in the first place. The user names `<pager-alpha>` and `<pager-numeric>`, obviously, determine whether the target pager is alphanumeric, or numeric only. Once the Domain Name System has a candidate site, the actual work of talking to the paging system can start. The actual communication protocol is unspecified and is supposedly located in a database tied to the phone number encoded in the mail address.

It seems, then, that we have two solutions that concentrate on different parts of the problem. RFC 1568 concentrates on the real semantics of paging, whereas RFC 1569 looks more to the problem of integrating radio paging with existing services. Mr. Protocol thinks this is a fine example of the collision of philosopies in the real world, which is the primary method used by the Internet in choosing between alternate approaches.

Mr. Protocol suggests that even if you are not in a position to vote with your feet, you at least sit back and watch the war.

Remember When?

Some time back, Mr. P. asked for volunteers to send in their candidates for "longest hop count in the Internet," using `traceroute` ("How Wide Is Round?" *SunExpert*, December 1992, Page 22). Mr. Protocol was startled to note that in fact, most entrants were shorter than his own large example. The Internet, it would seem, has a maximum diameter somewhere around 25 hops. ⊸

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

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

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

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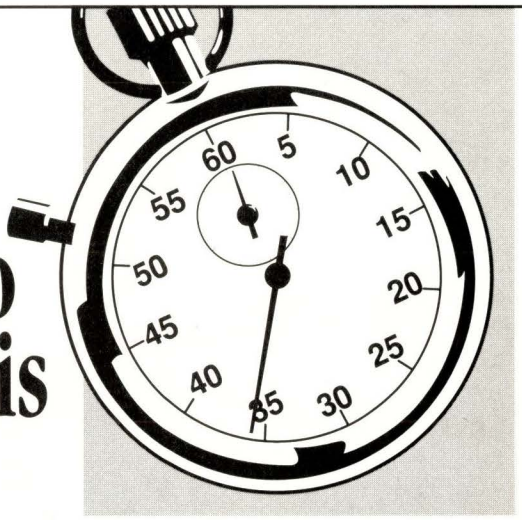

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Macro Processing

by PETER COLLINSON,
Hillside Systems

KEITH GRAVES

Bizarre word "macro," isn't it? My English dictionary says that it means "long, large or large-scale." We talk about "macrocosm," meaning some totality, the great world, the universe. "Life, the universe and everything," as a compatriot of mine wrote. We also apply it to settings on camera lenses, allowing you to focus clearly on small things–making the object bigger. In computing, we take a "macro" to be the textual replacement of a word on a line of data by something else. This may make the final text bigger, but it doesn't need to.

On a UNIX system, you use shell variables all the time. These behave a little like macros and serve to introduce the idea. For example,

```
HOME=/usr/pc
export HOME
```

now allows us to use the string in a command:

```
$ cp file $HOME/mycopy
```

When the shell reads the command, it expands the variable, replacing the `$HOME` by its definition value `/usr/pc` before the command is executed. All shells use this construction, although the syntactic details of the definition will vary.

Shell variables should not really be classed as macros. Most macro processors do not require you to indicate a variable to be replaced by preceding it with a magic character–dollar for shells. They will scan arbitrary text looking for strings that are to be replaced.

A more important feature of macros is rescanning. When a token is found, the replacement is done and the preprocessor scans the new text that has been created, looking for other definitions that are now applicable.

If we look at the C preprocessor, we can see the rescanning at work. By the way, if you are not a programmer, don't switch off and think "this one's not for me." I'm not about to exclude you from this article.

The C Preprocessor

If you *are* a C programmer, then you use a macro processor every time you write a program. You don't think about it; it's part of the language. Your program is passed through the preprocessor as the first part of its compilation. The preprocessor scans the C text looking for words

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that it understands. Let's use the word "token" instead of "word." We mean that it looks for an object on the line that looks like the name of an identifier in the C language. When it finds the token, it looks it up in its internal dictionary. If the token is present in the dictionary, it will already be associated with a value. This value replaces the token found in the source line.

We load the internal dictionary by the `#define` statement:

```
#define MAXBYTES      1024
#define MAXBUF        MAX
```

This tells the preprocessor that when it finds the string `MAXBYTES`, it should be replaced by the value "1024." We can now become good programmers, writing C without magic numbers embedded in the code.

```
char buf[MAXBYTES];
```

defines a section of memory holding 1,024 characters. We can change the size by altering one line of source code, the `#define` statement at the top.

Similarly, when the preprocessor finds the string `MAXBUF`, it will be replaced by the string `MAX`. Most people use capitalized names for constants, following the lead of the original users and designers of C, although this practice is not strictly necessary.

What happens if now, further down the program, we say

```
#define MAX MAXBYTES
```

setting `MAX` to 1,024, the current value of `MAXBYTES`. We now define some code:

```
char buf[MAXBUF];
```

The preprocessor will replace `MAXBUF` by `MAX`, rescan the string and replace `MAX` by 1024. Of course, this is overelaborate and is not normally done, but it does illustrate the power of rescanning. It allows us to redefine values after the initial definition of a macro.

The C preprocessor also illustrates another problem of macro processing. We need to have some way to define the macros themselves. This is done in C by giving the preprocessor a "magic" line. When the line starts with a "#" symbol, then it is taken as an instruction to the preprocessor and not passed into the compiler.

General Macro Processors

Macro processors started life as aids to programmers. They were mostly used to enhance the limited facilities of assembly languages. Assembly language programmers found themselves writing the same code steps again and again. They wanted some way to minimize typing. It was much easier to type something like

```
INC A
```


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to add one to a memory location, rather than

```
LDA A
ADD #1
STA A
```

Note that I have also introduced one new desirable feature of macro processing: the need to supply arguments to a macro. The "A" given to the `INC` instruction is an argument whose value is plugged into the macro expansion by the processor.

The code is some imaginary assembly language for a simple computer with one register. If this is baffling, then pull out your calculator with a single memory register and try adding one to the value in the memory register. You will find yourself going through the same steps: Pull the memory value into the main calculator register, press add, enter the constant 1, press equals, put the value back in the memory. Yes, this is really how computers are programmed. I digress slightly.

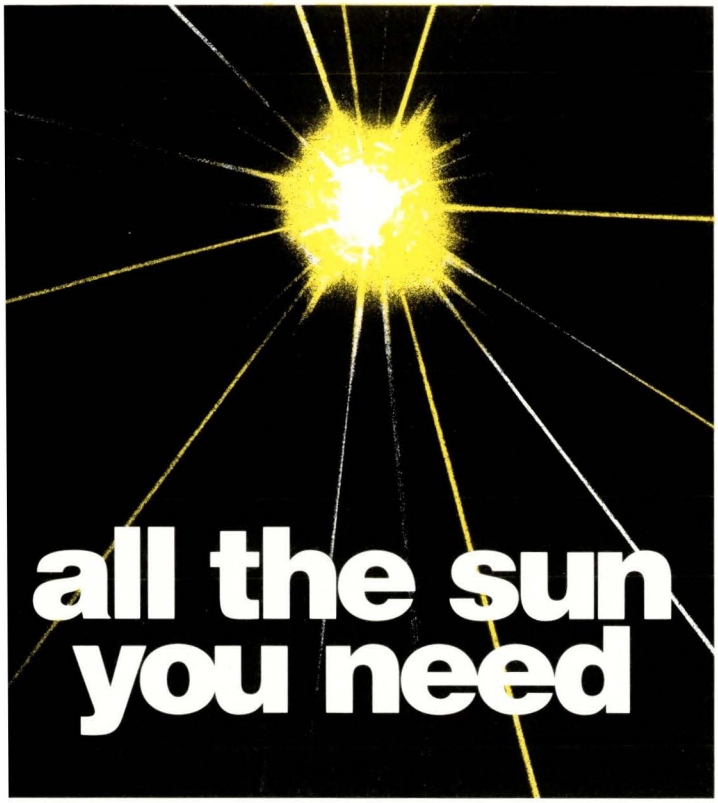
Anyway, you can see that it's easier to write the single `INC` statement to do the job of adding one to a memory location. It's also easier to understand what is going on.

Later, it was realized that if you wrote your program entirely in macro statements, then it should be possible to get some measure of code portability. You can rewrite the macro definition for `INC` so that it would work on a completely different machine. In reality, this didn't work too well, often because the program steps are only half the story. An assembler program is written to fit onto the architecture of a particular machine, and machine architectures differ widely. Full source code portability had to wait until high-level languages came along. High-level languages use very simple machine models, and compilers can make intelligent decisions about the actual assembler code needed.

Several people realized that it would be useful to be able to use the same techniques on plain text. In the United Kingdom, Peter Brown at the University of Kent created `ML/1`, a general-purpose macro processing language. `ML/1` is "general purpose" in the sense that the language makes no assumptions about the format of the text it is scanning. There are two areas of consideration: First, there are sets of macro definitions giving keys to be used to find macros in the text. Second, there is the text to be scanned looking for macros and their possible arguments. You have to allow the user to redefine any syntax that is used to define macros so that it doesn't conflict with any strings in the user's data. You must not make any assumptions about what the macro call will look like when it is found in the user's text, nor about the format of arguments that the macro call might take. `ML/1` is so general purpose that it is a little daunting to use. Unfriendly, we would call it now.

m4

UNIX has always come along with its own general-purpose macro processor, called `m4`. This is somewhat less general purpose than `ML/1` but is still a useful tool. It is probably



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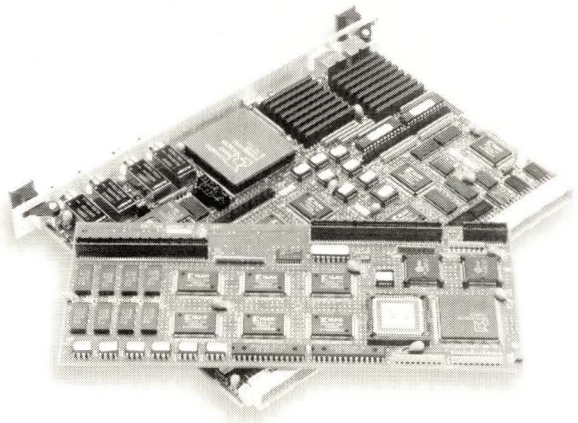

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underused, perhaps because people do not realize that it is there. I tend to use it for generating form letters, where I want to replace some known tokens by a different value every time. It's sometimes used to permit selection of different parts of a file, depending on the value of some macro variables.

The m4 program scans the source text for alphanumeric tokens, series of letters, digits and the underscore character (sounds familiar? yes, it's C identifiers again).

In addition to single word replacement, macros may be called with arguments. The call looks like a standard programming language function call:

```
macro(arg, arg, arg)
```

and this limits the usability of m4. You might want to scan text where arguments were just words like

```
macro arg arg arg
```

and m4 will not cope with that. However, the function-with-argument structure is natural to programmers and does fit in well with programming applications for languages that use the same format for calling routines.

Macros are created using the define statement.

```
define(Jan, 1)
define(Feb, 2)
define(Mar, 3)
```

will convert dates from a short string to a numeric value. When m4 finds the string "Jan", it will change it to the string "1". It won't alter "January" because that forms a different token.

Notice that an attempt to do the reverse operation won't work

```
define(1, January)
```

because the string "1" does not follow the rules for generating tokens; it doesn't start with an alphabetic character or an underscore.

The define statements do not need to be at the start of the source line. They are recognized anywhere in the text. There is also sympathetic treatment of white space within the definitions. Inner space is preserved, but leading space is eliminated. So

```
define(pc, Peter Collinson)
```

will replace my email name pc by Peter Collinson, preserving the internal space. It's possible to insert newlines into the define statement at the comma:

```
define(pc,
Peter Collinson)
```

and I'll be doing this in later examples for printing reasons.

Quoting

It's better to quote the macro definition *and* the replacement text.

```
define('pc', 'Peter Collinson')
```

Quoting is done with a pair of characters: open and close quote. This aids nesting of commands within quoted sections. Quoting prevents m4 from expanding objects at inconvenient times. For example

```
define('left', 'LEFT')
```

This defines left as LEFT. Now if we say

```
define('now', left)
define('wait', 'left')
```

The unquoted left in the now definition will make now be defined as LEFT. Quoting the string will make wait be defined as left, and full expansion will not be done until you invoke wait. So if you had two source lines,

```
now
wait
```

you would see the output

```
LEFT
LEFT
```

These look the same, but one substitution was done on now and two on wait.

You can add levels of quotes to prevent interpretation of the strings:

```
define('onestep', 'left')
define('twostep', "left")
onestep
twostep
```

will output

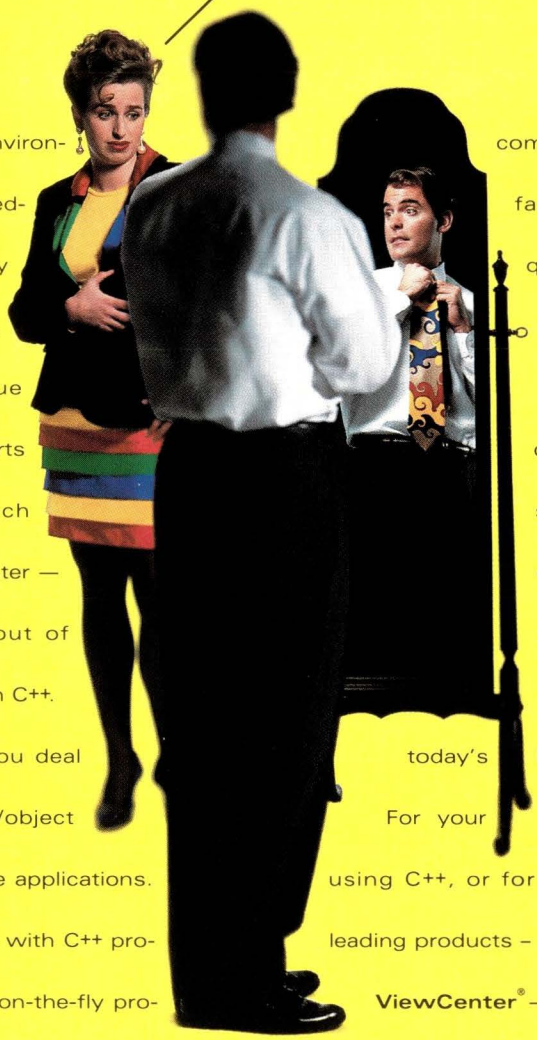
```
LEFT
left
```

The define statements store the right-hand side with the outermost quotes removed. When the onestep macro is invoked, it expands to left and in turn this is expanded to LEFT. However, when the twostep macro is invoked, it expands to 'left', the quotes are stripped, but the text is not expanded.

You can use quotes to enclose new lines as well as white space:

```
define('ADDRESS',
'Sun Expert
1330 Beacon Street
Suite #220
Brookline, MA 02146'
)
```

"THAT TIE'S HIDEOUS."



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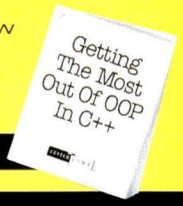

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Now when we see ADDRESS, it will be expanded into the complete address, newlines and all. I often use this technique for generating form letters, or adding an address from my address database into a letter that I have just written. In my letter source (usually in troff), I will insert the word ADDRESS where I want the address to appear. I will then contrive some way to generate a define statement to set the ADDRESS string appropriately.

If you need to use the word define or any other macro name in the source that is being scanned, you need to quote it

```
when I 'define' this
```

would result in the text

```
when I define this
```

being output. This may be inconvenient. If you have finished creating macros, you can always remove the meaning of define by

```
undefine('define')
```

This works for all macros.

The quote characters can be altered, if needs must, by using

```
changequote({,})
```

to make the new quote characters be curly braces. You revert to the default settings by

```
changequote
```

Newlines and Diversions

If, by now, you have reached for your UNIX console and started typing things into m4, you might have noticed that a number of extra blank lines are injected into the output stream. The processor will consume all the text in a statement like

```
define('a','b')
```

but it is followed by a newline, and this newline will be copied to the output. We probably don't want this, and we have to suppress it manually. The built-in command dnl will "delete up to and including the newline." To remove the unwanted newline, you say

```
define('a', 'b')dnl
```

You will find that people use dnl as a comment facility in m4 scripts because dnl loses all the text up to and including the newline.

If you place several define statements on the same line separated by spaces, then those spaces will also be inconveniently passed to the output. To gain complete freedom when laying out macro definitions, you can divert the output of m4 into a black hole by saying:

```
divert(-1)
output now blackholed
....
loads of defines
....
put it back and lose the newline
divert dnl
```

The call to divert with a minus-one argument is a special use of a more general-purpose command allowing you to reorder the data. A call like

```
divert(1)
```

sends all the data into temporary storage. Up to nine different output diversions are supported by m4. The data can be inserted back into the normal output stream by using

```
undivert(1)
```

or simply

```
undivert
```

if no other diversions have been used. When data is reinserted, it is not rescanned for possible macro replacement, so diversions only allow you to split and recombine the data.

Testing

The m4 processor supports some tests that can be used to see if a macro exists or not. This uses a new keyword, ifdef. For example,

```
ifdef('SELECTOR',
  'add some text into the output file')
```

If the macro SELECTOR is defined, the text will be added to the output. The text will be ignored if SELECTOR is not defined.

You can add two different options:

```
ifdef('SELECTOR',
  'add some text into the output file',
  'add me when SELECTOR is not defined')
```

You can nest tests too:

```
ifdef('SELECTOR',
  'ifdef('ANDNULL', '',
  'add some text into the output file'
    )'
)
```

says add the text into the file 'if SELECTOR is defined and

ANDNULL is not defined'. Note the use of the empty string '' here.

Using these techniques, it's a simple matter to build up a template file that is scanned by m4. The text in the template file is quite readable and bears good relation to the actual data that will end up in the final working file. It is also easy to generate the defined macros needed to select parts of the file. All that is needed to include part of the template is a line like

```
define('SELECTOR', 'yes')
```

The other type of useful test is string comparison. This is done using the ifelse built in. Something like

```
ifelse(select, 'on',
  'insert this',
  'else this')
```

If the macro select is set to the string on, then the first string will be inserted into the output; otherwise, the second string will be inserted. Notice that the word select is not quoted because we want m4 to expand it when it meets the statement.

You can use an 'elseless' form:

```
ifelse(select, 'on',
  'insert this')
```

and also can add several tests with different results.

```
ifelse(select, 'on',
    'insert this',
  select, 'off',
    'no, add this',
  select, 'nearly',
    'or nearly add this')
```

performs a number of comparisons until it finds one that matches.

Odds and Ends

So far, we have only defined macros that are single words. We can also define macros with arguments. This does not change the define statement format; all you do is invoke the argument on the right-hand side definition string:

```
define(swap, '$2 $1')
```

The dollar syntax is the same as that found in shells. The dollar symbol is followed by a number giving the parameter that is to be replaced. Invoking swap with

```
swap(first, me)
```

will generate

```
me first
```

The $n symbols do not need to be separated by white space; you can delete the space to concatenate the arguments. As I have said, I find that the need to use function-style formats is a hindrance.

The m4 processor interfaces well with the operating system. Built-in commands allow you to include files,

```
include(filename)
```

Remember that the filename argument can be a macro definition too. Also, you can insert the output from normal UNIX commands by using the syscmd built in.

Built-in commands also exist to do integral arithmetic and string manipulation. Here's a bit of fun, the standard recursive factorial function in m4.

```
define(fact,
  'ifelse($1,1,1,
    'eval($1 * (fact(decr($1))))'
      )'
)
```

This defines a macro called fact that has one argument, $1. It is defined as a test: If the argument is the digit one, then return the number one; otherwise, evaluate the argument multiplied by the result of the macro called with the argument decremented by one. It's integer arithmetic and will run out of bits. It gives incorrect results when called with fact(13) on my 32-bit SPARC.

Finally

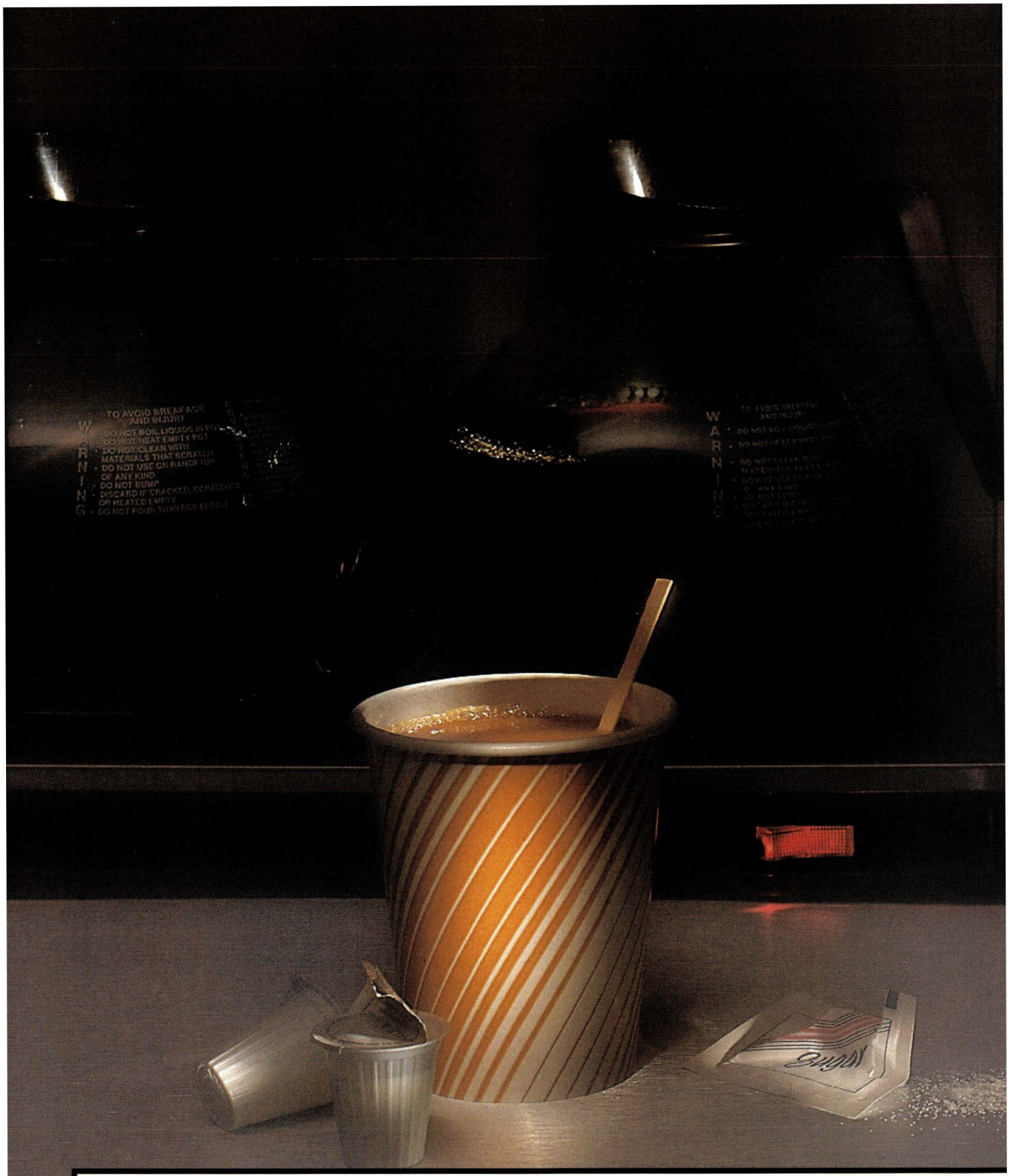
I hope that I have given you enough to make you take a look at m4. It's very powerful and worth getting to know. It is available on DOS machines in the excellent MKS tool kit. You should beware that, like many commands, m4 has been "improved" several times, and the current standard System V version has several features that may not exist on other systems. For example, the decr built in is not present in older versions. It's trivial to make.

```
ifdef(decr, '',
  'define(decr, 'eval($1-1)')')
```

creates the decr operation if it is not already defined.

Ah yes, if you are interested in ML/1, then contact Bob Eager at the University of Kent, Canterbury, United Kingdom at +44 227 764000 or rde@ukc.ac.uk. ⊷

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



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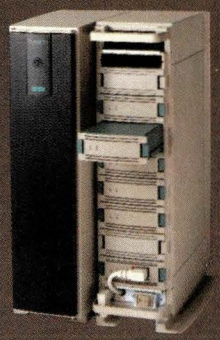

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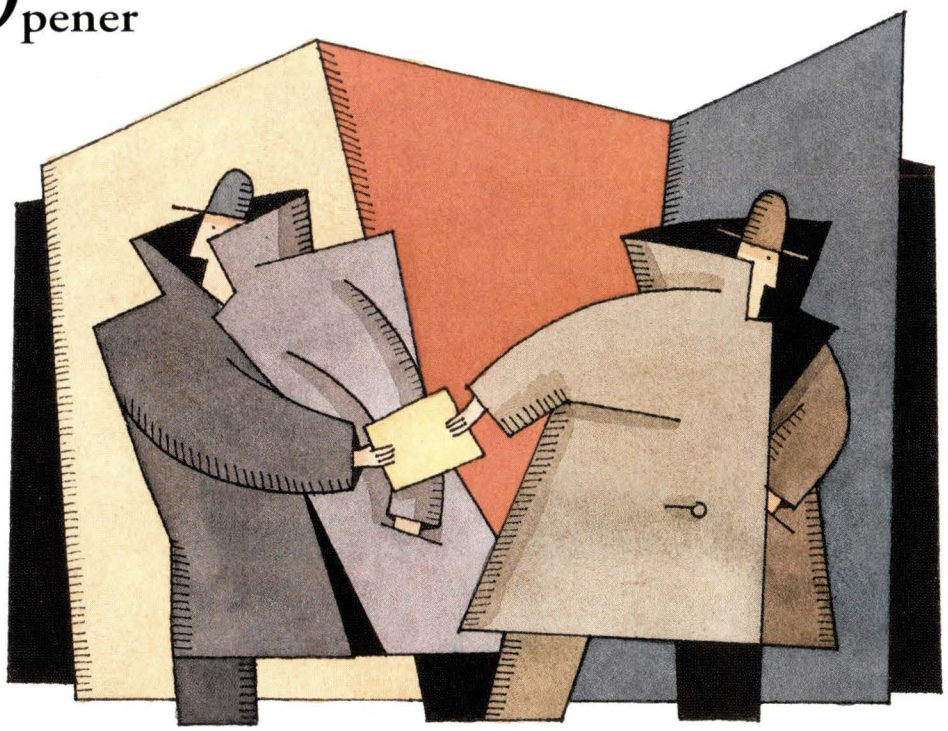

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by RICHARD MORIN,
Technical Editor

Dangerous Technology

I'm about to tell you about some dangerous technology and even show you how to use it. Then I'm going to talk about some actions being taken by our government in an attempt to suppress this sort of technology. Finally, I'm going to talk about what we can and should do to keep the government off our backs and out of our private lives. If all of this makes you nervous, please skip to safer sections of the magazine. We'll keep very quiet over here, so as not to disturb your repose.

Let's start by examining the "exclusive or" (xor) operator. When xor is run on two strings of bits, it yields a bit string containing ones wherever there is a one in either, but not both, of the original strings. The xor of three (011) and five (101) is thus six (110).

The interesting thing about xor is its ability to regenerate either of its input values from its output and the other input. For instance, the xor of five (101) and six (110) gives us back the original three (011). This feature has been used in a lot of places. There is even an infamous patent on its use with cursors on bit-mapped displays. But I digress.

A simple Perl script can extend xor's reach to include entire files. Listing 1 is one I hacked up. The code is very simple, but it works and is even fairly sprightly. On my ELC, it xor's `/usr/dict/words` with `/vmunix` in a fraction of a second.

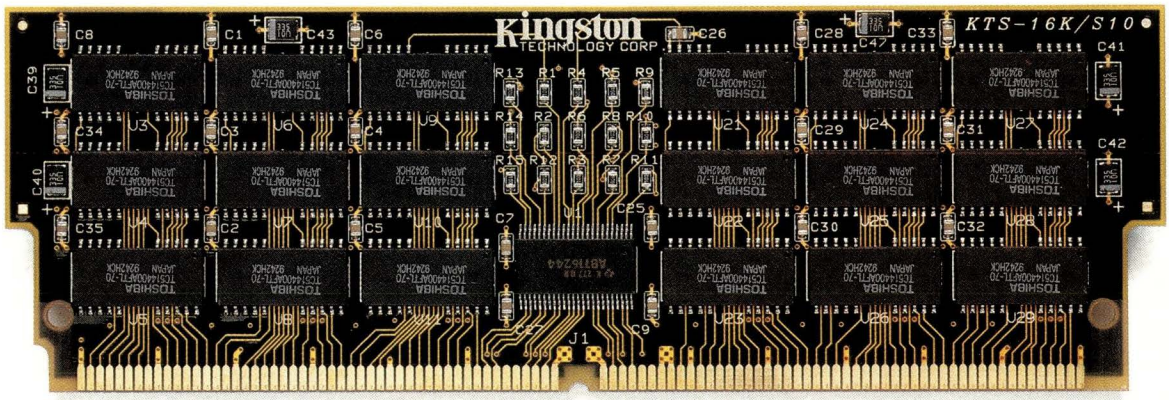
The resulting file is the same length as `/usr/dict/words`, but reconstituting either original from the result is likely to be a bit of a challenge.

Practicum

Let's say I have a file I want to send you, very privately. First, I compress copies of it and `/usr/dict/words`, mostly to remove any obvious patterns. I then xor the two compressed files and send you the result. Upon receiving the file, you reverse the process: xor the transmitted file with the reference file, then uncompress the result.

This technique, known as a "one-time pad" (OTP), is virtually immune from prying eyes, even if assisted by massive computers. If the reference file is truly random, and the pad is only used once, it is absolutely secure. As I understand it, the one-time pad is the only encryption method that is known to be truly secure on an information theoretic basis.

It is also fast to run (even in Perl!) and very simple. Extremely paranoid folks can complicate it, of course, providing further obfuscation. Headers on compressed files have some recognizable patterns, so skipping the first kilobyte or so of compressed `/usr/dict/words` might make sense. Assorted arithmetic, logical and other operations are also easy to add. These will only help, however,



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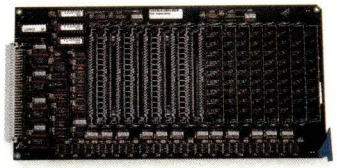

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if the reference file is not truly random.

Which, of course, my suggested reference file is not. It is just one of many files that could be used for this purpose, however, and the combinatorics of searching for the sender's exact algorithm and reference file can be made almost arbitrarily difficult.

To get a nicely unpredictable string of bits, record a children's birthday party, using a digital audio tape (DAT) recorder. Send copies of the tape to all your friends. You now have a distributed one-time pad of excellent quality. The low-order bits in audio samples are quite unpredictable. Concatenate the bottom few bits from your DAT samples and you get about a gigabyte of usable pad.

Sending tapes around can be risky, however, or at least a hassle. Fortunately, Tower Records is happy to distribute pads for all of us to use. To take advantage of this service, I only need to tell you that I like Simon and Garfunkel's album, "Bridge over Troubled Water." Some time later, I send you a message, using "4" as the subject line. You run my message against track four ("Keep the Customer Satisfied"), and extract my original message.

Listing 1

```
#!/usr/bin/perl
#
# xor - byte-wise xor of two files.
# 2nd file must be as large as 1st.
#
# Usage: xor in1 in2 [out]
#
# Written by Rich Morin, CFCL, 1993

open(IN1, $ARGV[0]);
open(IN2, $ARGV[1]);

$ARGV[2] = '-' if ($ARGV[2] eq '');
open(OUT, ">$ARGV[2]");

vec('', '', 0);  # deep magic

while (read(IN1, $b1, 16384)) {
   read(IN2, $b2, length($b1));
   print OUT $b1^$b2;
}
```

Getting the bits off the CD is pretty trivial. Several modern CD-ROM drives, including the AppleCD 300, allow programs to extract exact binary images of specified tracks. Apple's QuickTime software will pull off any specified track. Doing the same thing on a Sun requires a bit of coding, but not all that much, especially if you have a user-mode SCSI interface like `/dev/scsi` (Vulcan Laboratories, [415] 863-7988).

There is at least one technical difficulty with this scenario. Single-bit errors occur fairly frequently on audio CDs. Transmission links can also suffer from errors. This could create a serious problem, if we let it, because decompression routines like to work with very clean data. So, we add an error-correcting code (ECC) before doing the xor, and use it to detect and remove any errors that arise at the other end.

There may be other problems. I am not a cryptographic expert, and I may well have overlooked some pesky detail. My cryptophile friends tell me, however, that I am basically clear on the concept. They also point out that there are many other ways, ranging from digital broadcasts by satellites to compressed archives of popular freeware packages, to acquire widely distributed pads.

There are also many other ways to ensure reasonable digital privacy. Quite robust (though not OTP-level) cryptographic freeware is widely available on Internet archives around the world. DES, PGP and many other packages float by on the Usenet quite regularly.

But isn't that illegal?

Well, it isn't yet (at this writing :-), but it may be soon. Our government is making a lot of noise about how they need to control the assorted folks on the "Group W Bench" ("Alice's Restaurant," Arlo Guthrie). They need to catch all these bad guys, see, and other enemies, both domestic and foreign, need to be watched, as well.

Consequently, it isn't *safe* to allow U.S. citizens to have unrestricted access to encryption technology. It certainly isn't safe to let cryptographic software leave the country, so we have at least two government departments trying to make sure that it doesn't. Isn't it a blessing that our government is so interested in our safety?

Actually, as you may gather, I don't think so. Please understand that I am not a defender of child pornographers, foreign spies or the Mob. I am, however, a defender of the right of citizens to have private discussions, even if these discussions are carried out electronically. I'm not a big fan of anarchy, but I'll take it over totalitarianism every time.

Besides, if I can implement a robust cryptographic solution in a few hours, a large part of the battle is over. If the technical community wants privacy, we'll have it. More to the point, so will any sufficiently motivated nogoodnik. The police forces will simply have to find other ways to spy on really bad folks (as I'm sure they will :-).

Meanwhile, however, Joe and Sally Sikspak will end up with no privacy at all. Put another way, every telephone user will be subject to surveillance. Every modem or fax user, too, along with any user of the impending "digital superhighways." It's just so many bits to Big Brother, and he buys lots of big machines to munch them.

I'll believe in widespread access to digital privacy when Radio Shack sells *robust* encrypting telephones for under $50. The cellular phone industry, with its higher price points, would be a logical place to begin. But I don't see it happening, and the government's proposed Clipper chip is a good example of the reason it's not. Sure, they say, we'll give you privacy. Except, of course, from us.

The digital communication revolution could easily go either way. Our government has tried before to enforce trap doors in encryption standards, and I expect to see them do it again. Intelligence agencies record and analyze zillions of calls, both inside and outside of our borders. Left to their

own devices (:-), the spooks (not to mention the local sheriff and his friends) could end up monitoring our every conversation.

Alternatively, if the citizens demand some breathing room, things could go the other way. Encryption technology is becoming pretty well understood, even by folks like me. When high school students can hack up robust encryption code, how can the governments of the world hope to keep a lid on things?

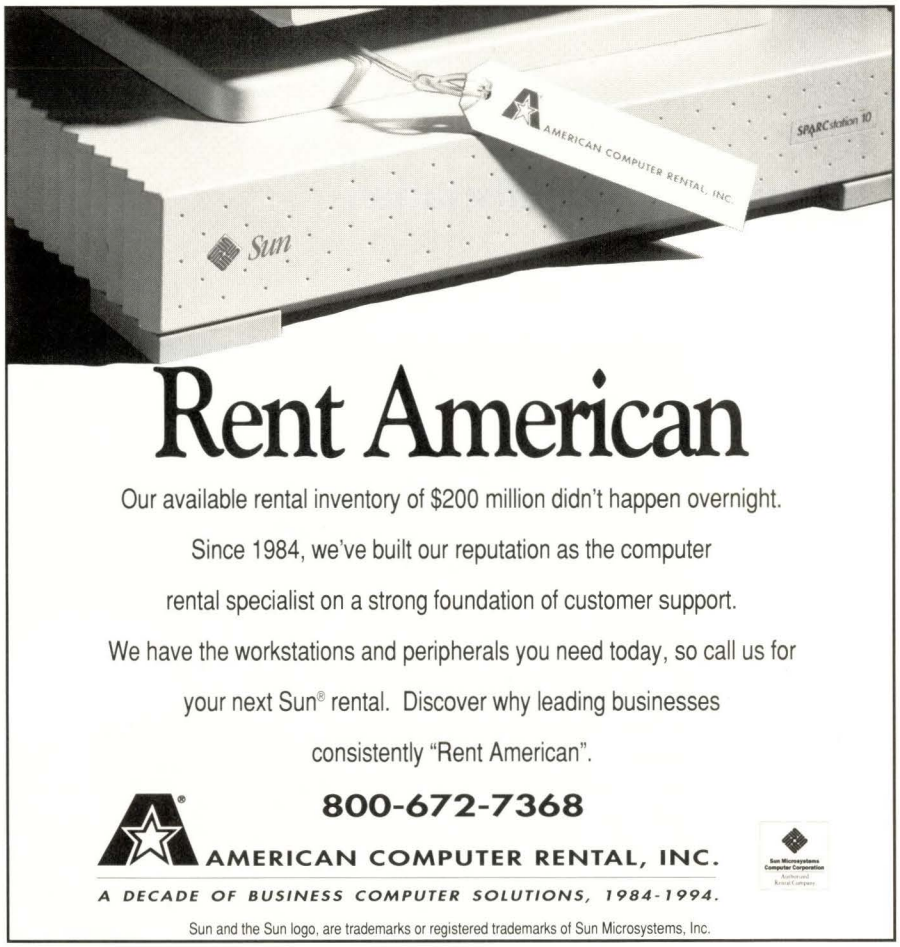
In point of fact, some have said they won't even try. The new Russian constitution reportedly contains some very interesting text. It says that citizens are guaranteed the right to be free from espionage performed by their own government.

Notwithstanding the fact that constitutions aren't always followed very faithfully, this is still a good start. Perhaps we should think about establishing a few such protections for ourselves. One way to begin would be by direct action.

If the Internet community were to establish encryption as the *preferred* way to transmit email, the total volume would swamp the spooks. Even poor encryption would accomplish this, but it might pose a danger by giving folks a false sense of security. Good encryption techniques, applied universally on the Internet, would be a powerful way of forcing the governments of the world to back off.

This is serious stuff, folks. *The First Circle*, by Alexander Solzhenitsyn, tells how a whole culture can become a self-absorbed network of spies. We don't need this in the United States, let alone in the rest of the world. If we don't fight for privacy for ourselves, we should at least do so for our children. ⊷

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



Circle No. 1 on Inquiry Card

Circle No. 19 on Inquiry Card

RUSS WILLMS

Upgrading the Old CPU

by S. LEE HENRY

Question: How many physics grad students does it take to replace a CPU?

Answer: Six!

One to admire the really fine installation guide and wonder why no one else has one quite as good. One to remind Sun that the CPU *is* socketed and can be easily removed. One to ask the question, "What does 'field-replaceable' mean anyway?" One to wonder if the socket is turned 90 degrees or the motherboard is incorrectly marked. One to answer the question "Why would you want it to go faster? Don't you have Solaris?" One to replace the CPU.

Systems administrators get involved in many different things, from fixing broken cables to repairing applications. When one of my users asked to have his CPU upgraded with a Weitek Power µp chip, I thought, "Hey, piece of cake." I thought it would be interesting to take a look at the package and see what an "almost anybody can do it" upgrade would look like.

Grad Students and CPUs

I should first mention something that may not be obvious. University CPUs are real workhorses. Stuff several physics grad students into an office with one Sun, and that Sun is going to work its little heart out. Guaranteed. My years with the federal government had not prepared me for the heavy usage these (gender-neutral) "guys" can get out of a single machine.

There were two groups in the department who wanted to take a look at what the Power µp chip would do for them. This seemed fine. But when the CPU first arrived, I was busy fighting other battles, so I handed it over to Geir, one

of our Ph.D. candidates, and asked him to give me feedback. He installed the chip in a SPARCstation 2 that he shares with three to four other grad students. Later, he deinstalled it and gave the package back to me. I installed it in the second machine.

> The little asterisk on the motherboard claimed that its corner was pin #1, while the triangular cornerpiece on the socket said that its corner was pin #1.

The rest of this column is a distillation of what we ran into and what we thought of the chip and the process of installing it.

The Package

The first thing you notice when you get the Weitek upgrade kit is the fairly slick-looking black velcro-closing box. Inside, you find a collection of tools. Nothing that you need to do the upgrade (except for the SPARCstation itself, heh heh) is missing. There is a special installation/deinstallation tool, a screwdriver, an antistatic mat and wristband and a little flashlight. The CPU itself is sitting there in this little box, awaiting the transplant. And there's a nice-looking manual.

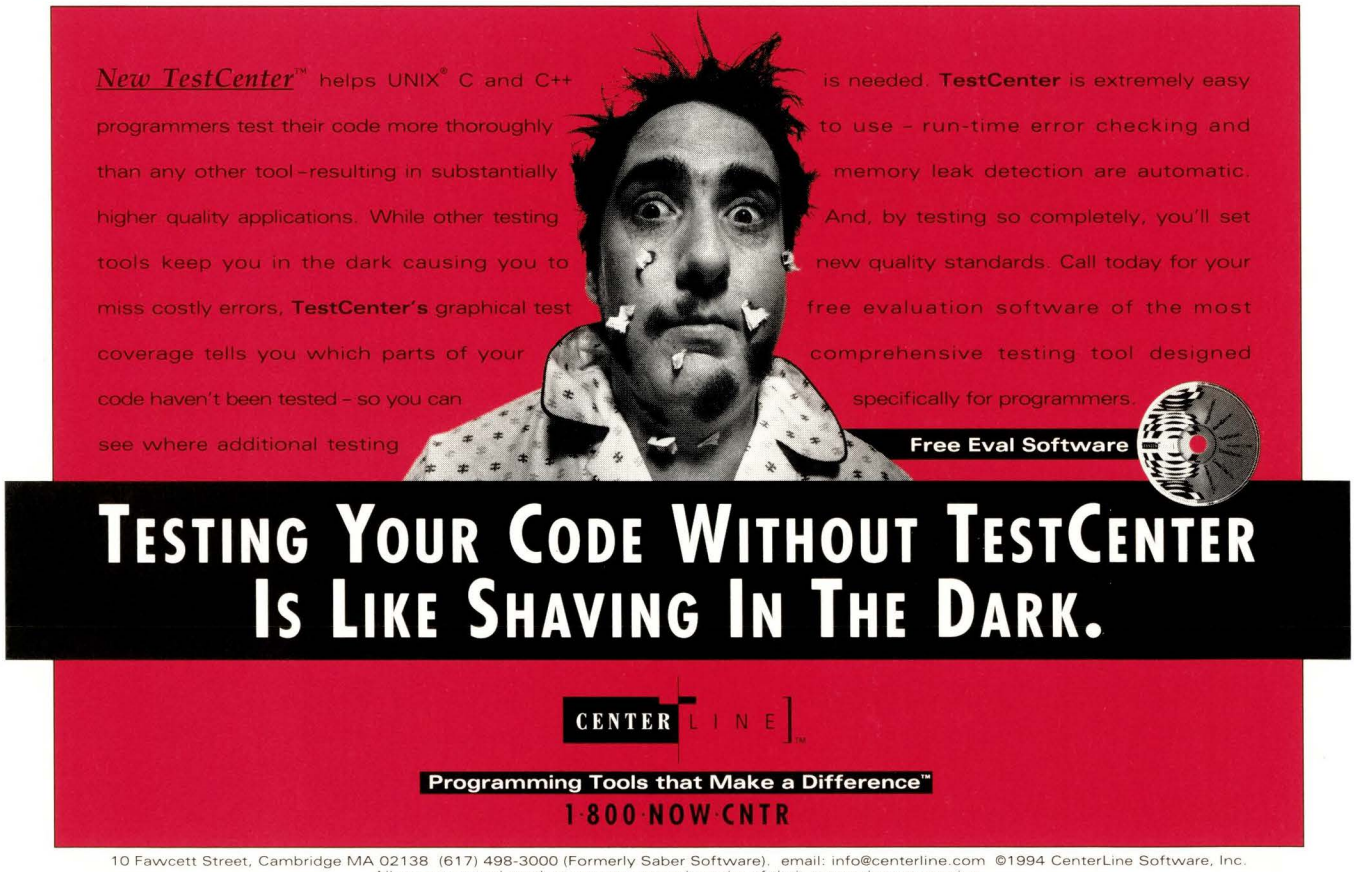
The manual is great. It has step-by-step instructions with pictures telling you everything you need to do to get the old CPU out and put the new one in. It starts with opening the case. It tells you how to remove SBus cards that might be in your way. It shows you which chip is indeed the CPU (and has a picture pointing it out). It tells you how to use the tool, step by step, and be sure that it is positioned correctly.

The Process

Most of the process was absolutely easy. Granted, Geir is brilliant, and I have opened up enough SPARCstations to know my way around the motherboard, but even if this weren't the case, it would have been easy. The classy tools weren't in the box because it's hard to pull out a CPU, but because it's important to pull it out very carefully so that none of its little feet are bent (and it has more feet than a centipede!). The same, of course, is true of inserting the new CPU.

We didn't need every step in the book to figure out what we were doing. Still, we appreciated the care that had gone into the manual, and we "played" with the tool before using it (as the book suggested) so that we understood how it was supposed to work. Much simpler than physics!

The only problem that Geir ran into was having to tug "a



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little harder than expected" to get the old CPU out. People who work with electronic equipment often do so with the ground rule "if you have to force it, something's probably wrong." He persisted and got it out just the same.

I, on the other hand, ran into a more troublesome problem. The manual told me that there were two ways to determine which pin on the CPU is pin #1. Obviously, inserting the chip in the wrong orientation would not enhance the performance of this SPARCstation! As a matter of fact, the manual said that we could ruin the chip by installing it incorrectly. The problem was that the two "ways" gave me inconsistent answers. The little asterisk on the motherboard claimed that its corner was pin #1, while the triangular cornerpiece on the socket said that its corner was pin #1. They pointed to adjacent corners, so my indicators were 90 degrees off.

Sun to the Rescue?

Straight away, I dialed 1-800-USA4SUN. Sun will not want me to ruin my new CPU, I thought. Let me ask them which component to believe. I left my name and phone number and wrote down the system service number they gave me. About an hour later, I got a call back. The conversation went roughly like this:

Sun: How can we help you?

slee: I am installing a new CPU in my SPARCstation 2. I *need* to be sure I am not putting it in sideways.

Sun: The CPU comes out the back.

slee: No. Not the board. I'm replacing the chip. This is a Weitek upgrade CPU...

Sun: Oh, we don't know about those.

slee: That's OK. I *only* want to be sure I'm not installing it incorrectly. My motherboard and the CPU socket disagree as to which corner is pin #1.

Sun: Well, that's not a field-replaceable unit.

slee: That's OK. I want to know whether the motherboard or the CPU socket is telling me the truth about pin #1. If I put the CPU in wrong, I can ruin it.

Sun: Well, you need to speak to someone in engineering.

slee: (mild sarcasm) Oh, OK. Why didn't *they* call me back then?

Sun: They don't answer Sun Service calls.

slee: (dejectedly) Oh. I get it. I just didn't want to ruin this thing. I suspect the socket is in sideways.

Sun: Well, maybe you can have the board replaced.

slee: No. I don't think it should require that. It works and all...

Sun: Well, maybe you should call your Sun salesperson.

Reader Feedback

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Maybe there's an FE who can help you out.

slee: Hmmm. That's possible.

I also called Weitek and asked them the same question. They offered immediately that I should trust the board. Still, after getting such a runaround from Sun, I was hesitant to believe this was so obvious to Weitek. Then I realized that I, having spent a summer as a machinist, had done something reflexively smart–I had lifted the old CPU and sat it into the little box of antistatic foam without changing its orientation. Also (and I wouldn't bank on this in every case) I had noted that the printing on the chip had been oriented the same on all three of the large chips on my board. Clearly, the new CPU had to be inserted in the same orientation as the one I'd removed. With renewed confidence, I proceeded to swap the chip.

The only other problem that I ran into was that the little feet on the new CPU didn't sink into the socket as well as the little feet on the other chips. This left me concerned that it was not pushed in all the way. I took it out, and played with the tool some more to make sure that nothing would cause it to stop pushing prematurely. This done, I inserted the chip once more and made sure that it felt seated. It did.

Powering Up

I powered the SPARCstation back up as usual. Everything seemed to work just fine. Then, I put the case back on and put all the tools back in the slick black box. It's been working great.

In using the system, we see anywhere from 1.2 to 2.0 times the performance, depending on how memory-intensive the tasks we are running. Obviously, very memory-intensive processes won't benefit from a CPU upgrade as well as CPU-intensive processes.

To get some perspective, I also helped a friend perform a similar upgrade on an SGI. This, I thought, would give me something to compare my Weitek upgrade with. In many ways, the SGI upgrade was very similar. We turned an Indigo 4000 into an Indigo 4400 by replacing its "CPU Module." This turned out to be a little box about the size of a 3½-inch floppy drive that we installed atop little hexagonal posts on the CPU board. The book was pretty good, although Steve and I sometimes had to laugh about the steps they included and those they omitted. "Slee, did they tell us we could take it out of the bag?" Steve grinned.

Wrapping It Up

All in all, the upgrade was dead easy. For anyone who really doesn't want to open up that box, you can buy a CPU board with the upgrade already installed. But for us "old hackers," opening up the box now and then is good for the soul. ⊸

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

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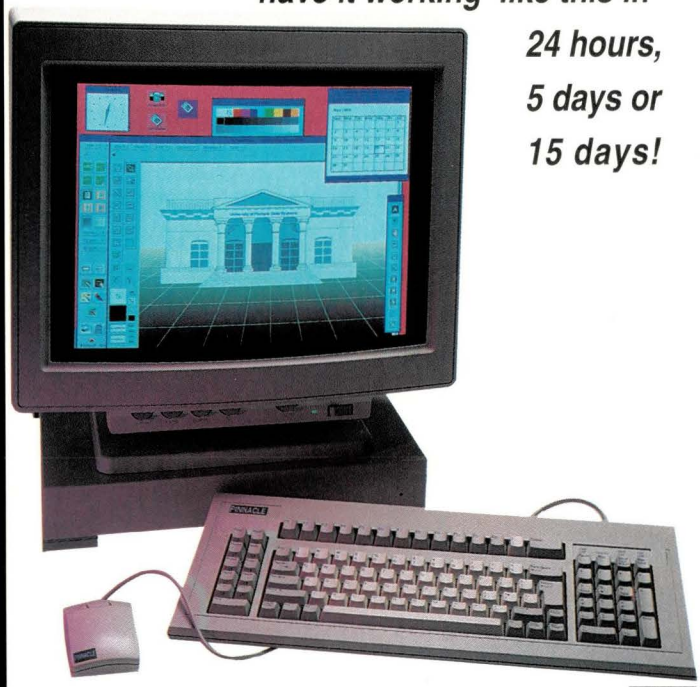

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PINNACLE DATA SYSTEMS INCORPORATED

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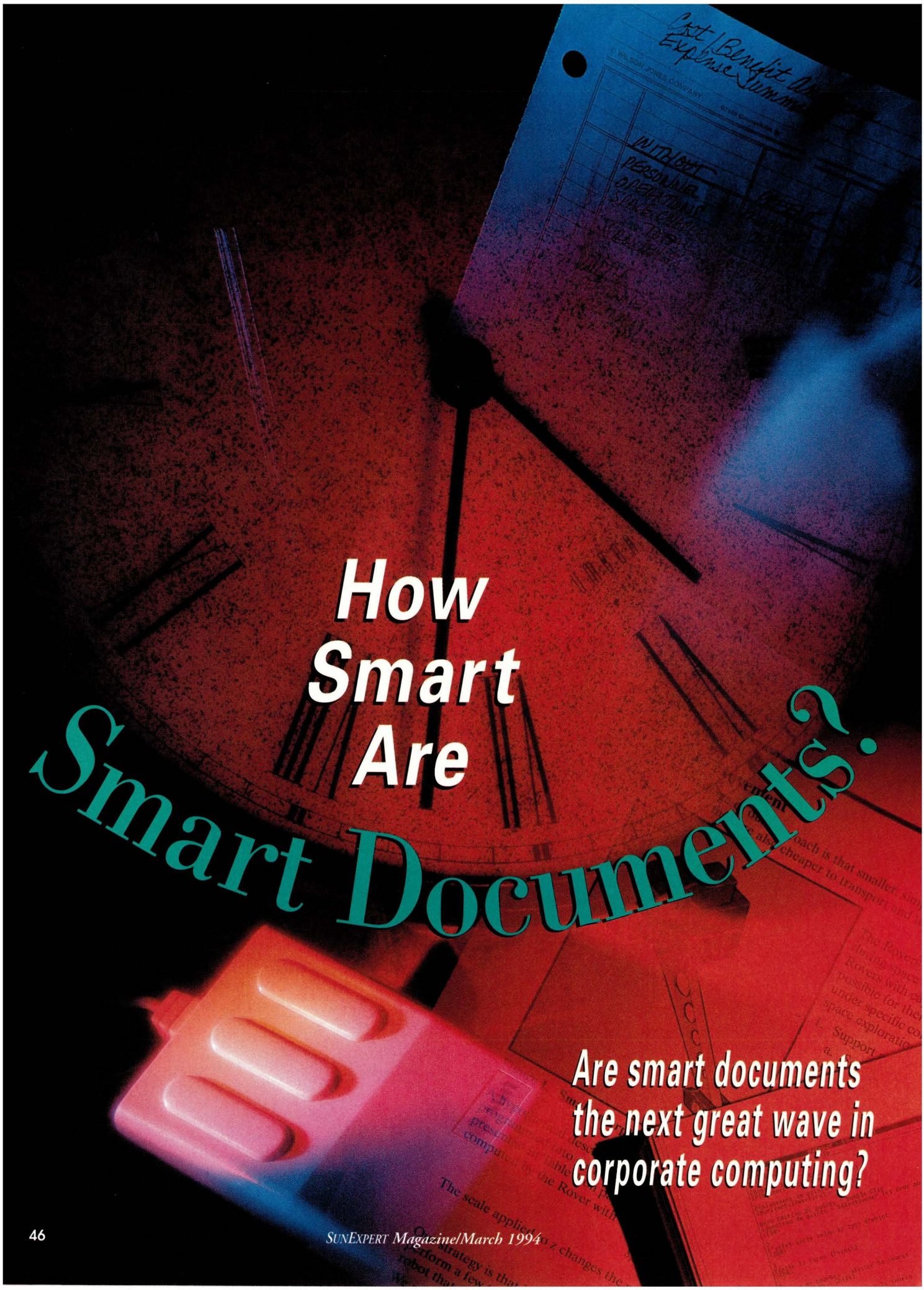
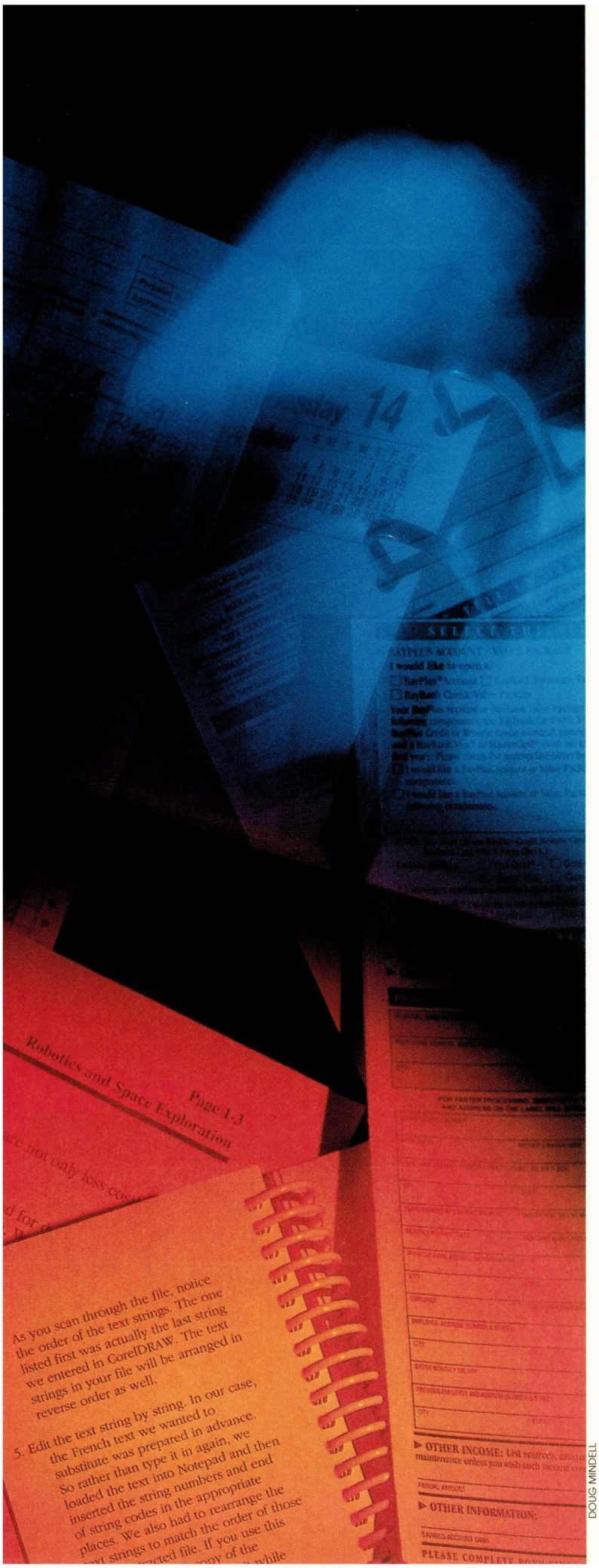

How Smart Are Smart Documents?
Are smart documents the next great wave in corporate computing?



DOUG MINDELL

DOCUMENT MANAGEMENT

Electronic document management has been around for at least a decade, but for many companies it has only just arrived. That's because a funny little piece of document management has been missing–management. Document management offerings have focused on replicating paper processes by creating and storing data electronically. But there are three functions of document management, according to Frank Gilbane, president of Arlington, MA-based research firm Publishing Technology Management Inc. (PTM): creation, management and distribution. "A lot of companies are stuck at number one...to get something more sophisticated has been too expensive and too complex."

by **JANE MAJKIEWICZ**

Editor's Note

Last month's issue of SunExpert *looked at front-office UNIX (see "BOPS and Beyond!" February, Page 42). In that article, Michael Jay Tucker speculated that for Sun workstations to be fully accepted in commercial settings they must support applications that go beyond mere personal productivity tools. They must, instead, become executive information systems linking desktops with corporate databases.*

Tucker argued that the first steps of such a development will be smart documents. These are intelligent forms that can modify themselves to fit the tasks of their users, route themselves through a network, and query corporate data. Several vendors and analysts are touting smart documents as the next major development in corporate computing.

But how real are smart documents? In this month's issue, Jane Majkiewicz asks if smart documents are a technology, or merely the hottest nonevent since cold fusion.

Client/server computing has made document management less expensive than traditional mainframe solutions, but it hasn't solved the complexity problem. Managing distributed compound information, including text, graphics, images and, increasingly, multimedia, is still a daunting challenge.

Fortunately, document management providers are filling in gaps with features like object orientation and integrated workflow. More importantly, though, vendors have undergone a major attitude change. With document management paralleling client/server computing, vendors are realizing it is really about people, not paper. "It's about giving people access to information that happens to be in document form," explains David Weinberger, a marketing fellow at Interleaf Inc., an electronic publishing, distribution and document management provider. One document management user, Roger Volk, manager of computer-aided engineering at St. Louis, MO-headquartered manufacturer Monsanto Co., takes that idea a step further: "It's about getting access to exact, up-to-date, approved information."

Defining a Moving Target

Defining the core components of a document management system depends upon which vendor you ask. A 3D chart (see "The Doument Web") created by New Science Associates, a market researcher based in Westport, CT, illustrates the host of technologies that make up document management. The chart's circles are widening as more vendors get into the game, leaving users confused. Should text management be the focus? Or should it be the imaging capability, or electronic mail? Systems integrators have played a major role in tying together various components, particularly for vertical markets. They will continue to assist vendors, but increasingly vendors are offering cross-industry, integrated solutions through their own development or partnerships.

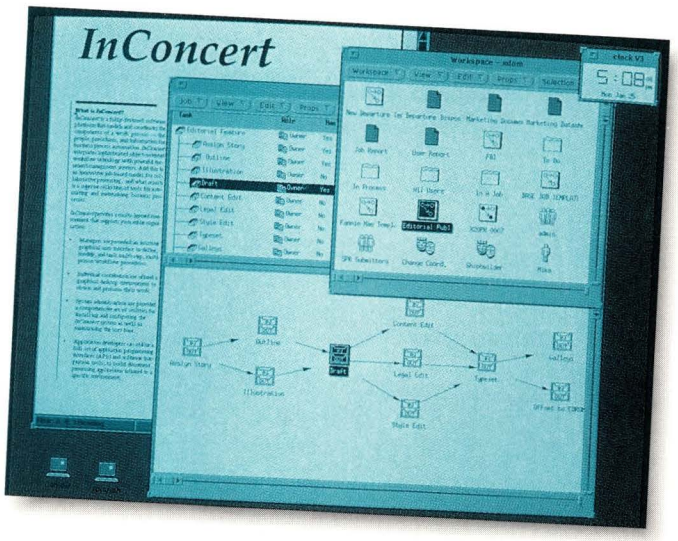
Document management is a $2 billion market and growing, according to PTM's Gilbane. If you look at a recent barrage of announcements from database to word processing to electronic mail software developers, it seems as if everyone is jumping on the document management bandwagon. That's no surprise. Documents represent 90% to 95% of all corporate data, according to Stamford, CT-based research firm The Gartner Group Inc.

"The industry has been predicting this market would take off for the past eight to 10 years," says Rob Reid, vice president of marketing for newcomer Documentum Inc. Documentum was founded in 1990 and released its first document management product supporting Sun Microsystems Inc. workstations and PC clients this past year, with Apple Computer Inc. Macintosh client and Hewlett-Packard Co. and IBM Corp. workstation server support on the way this quarter.

Why hasn't document management taken off? Two reasons, says Reid: Point solutions haven't been glued together, and the idea was ahead of the technology. But that's changing. Reid says the Gartner Group predicts document management will be the most pervasive application in the industry by 1996. "Now we've really hit the apex to start meeting true requirements," says Reid.

On the hardware side, companies' requirements for more powerful processing are being met by workstation servers connected to either low-end workstation or PC clients. On the software side, Steven Kiser, vice president of business development at XSoft, believes companies need a new generation of tools. Evolving document management tools should help companies deal with information combining multiple structures and formats, and they should also allow reusable components, says Kiser.

XSoft will facilitate reusable components through its upcoming support of the ObjectStore object-oriented database from Object Design Inc. Other object database makers are moving



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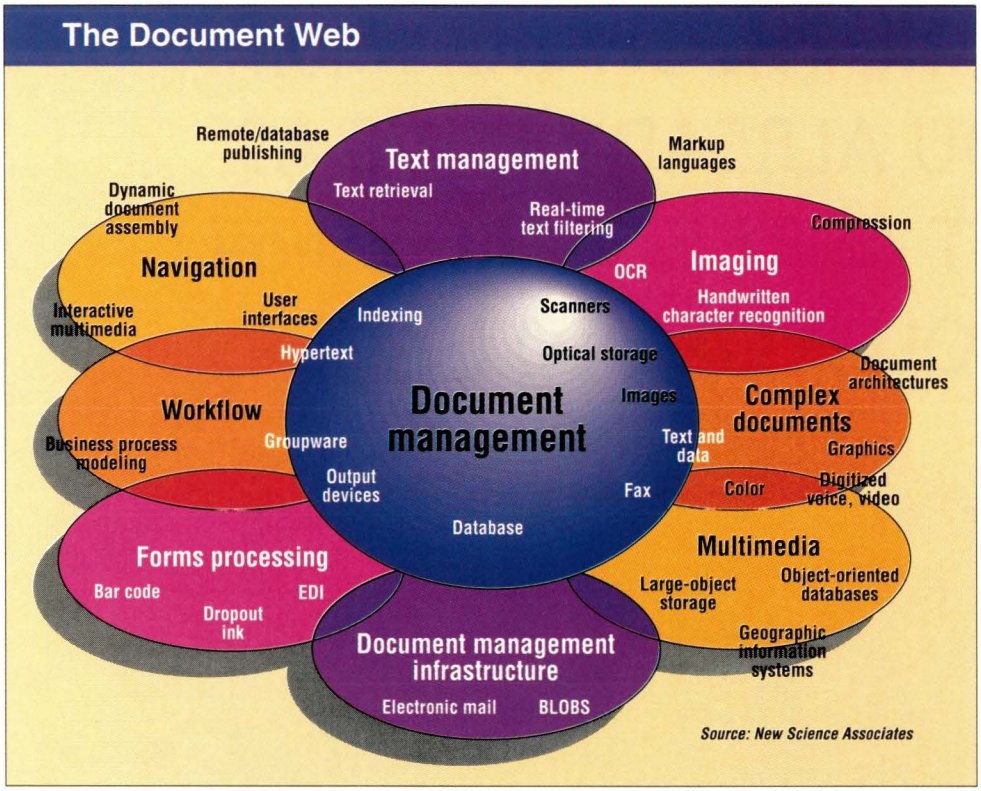


A host of technologies make up document management, leaving some users confused about where to start.

into the document management space as well, adding commercial sites to the traditional list of technical and engineering firms. Objectivity Inc., for example, has added customers like Mead Data Central Inc., Dayton, OH, which uses a legal document management system built on top of Objectivity/DB.

Interleaf recently rebuilt its document management system to be fully object-oriented. A Motif version of the software is available now, with Microsoft Corp. Windows and NT support to follow sometime this quarter.

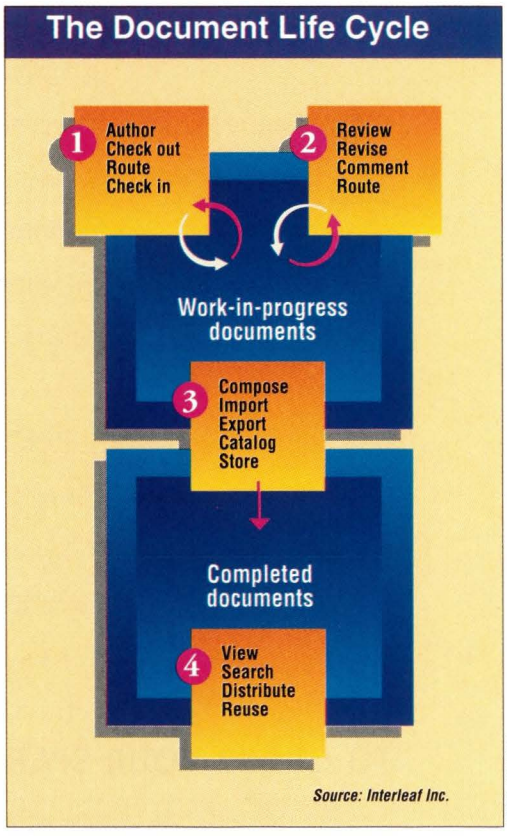
"A major problem with document management is that people have approached it by thinking of a document as a completed piece of paper," says Interleaf's Weinberger. Through object-orientation, Interleaf 6 recognizes parts of documents as objects, complete documents as objects, or groups of documents as objects for reuse. This eliminates the old "electronic file cabinet" model of document management, says Weinberger, in which users would simply access a set of "frozen" documents. What companies need is a way to handle "information of the third kind," as Interleaf calls it. This information is the next generation of mission-critical data generated from databases and office automation applications like word processors and spreadsheets. The information is distributed, complex and has a long lifetime. It also emanates from multiple sources and needs to be manipulated by work groups using multiple platforms and applications, according to Interleaf.

To manage object relationships within Interleaf, users can integrate workflow via the Relational Document Manager (RDM), which is built upon the Oracle relational database. A future feature of RDM will be an application programming interface that lets users manage information from multiple repositories, according to Ann Jackson, a product marketing manager at Interleaf. WorldView, an end-user distribution tool, can be integrated within the RDM process to allow more users to view and add comments to information, according to Karen Holt, a technical marketing manager for Interleaf's WorldView Group.

One WorldView competitor is Adobe Systems Inc.'s Acrobat, an electronic distribution tool that now supports Windows, Macintosh and DOS-based systems, with UNIX support scheduled for this quarter.

John Squire, Interleaf's director of product marketing for workstation publishing, also notes that the company's products work with existing applications such as spreadsheets and word

Interleaf says that today's documents are characterized by a long lifetime, come from multiple sources and are used by work groups.



LEE A. BARTELL

processors via standards such as Dynamic Data Exchange (DDE) and Object Linking and Embedding (OLE), which enable Windows applications to share information. In the UNIX world, information sharing is driven by the Open Software Foundation's Distributed Computing Environment and the Common Open Software Environment.

Documentum's Reid, who says Interleaf is the company's prime competitor, believes Documentum's modular architecture is one advantage its system has over Interleaf. Documentum tracks objects in a UNIX server that interacts with clients running off-the-shelf applications via an API. "Interleaf may say its approach is all objects are equal," says Reid, "except that Interleaf objects are more equal."

Besides, says Reid, Interleaf is working on an architecture designed in the 1980s that they are now making object-oriented. "That's sort of like picking up the Sears tower and trying to throw in a new foundation."

As companies reengineer their business information to include objects in addition to traditional numerical data, document management systems and information systems will merge, predicts analyst Gilbane. He says in the March 1993 issue of *The Gilbane Report,* "Information systems of the future will be document systems...The distinction between document elements and database records and objects will become even less clear in the next couple of years as platform vendors start supporting compound document elements at an operating system level." Until then, says Gilbane, middleware–or software to let users share information across platforms and different applications–will act as a conduit between the two systems.

Back to the Future

As companies deploy client/server document management, systems administrators are experiencing what Wang Laboratories Inc.'s marketing manager for desktop tools, Jerry Goguen, calls a "back to the future" phenomenon.

"Anybody who has any regulatory management requirement is an ideal candidate [for a document and image management system]," notes Goguen, referring to users such as banks and other financial institutions, legal and medical offices, and government departments–all typical document management and imaging users. These institutions want the benefits of distributed computing but need to maintain mainframe-like administration, he says. "People can't just have all kinds of information on their PC."

"A lot of the great problems still haven't been solved," says XSoft's Kiser. "There are documents on servers on different networks in lots of different places. There is a lot of work to be done," he adds.

For UNIX, that means filling in gaps in distributed systems management tools.

Besides ironing out kinks with management tools, companies have not yet adequately figured out who are the appropriate people to manage enterprisewide information, and once appointed, how these people can best do their jobs. In a report for the

Tips and Suggestions

by Frank Gilbane

Analyzing, designing and implementing a document/information management system is a complex and often challenging task. The technology for managing text elements, images and other still graphics is widely available and maturing rapidly. As a result, the technology risks are relatively low. The remaining challenges are (a) configuring and integrating all such products so they work together effectively; (b) developing a strategy that ensures the implementation maps appropriately to the company's business processes; and (c) anticipating and proactively addressing future interoperability requirements. Before selecting and implementing any document management solutions, you should do the following:

1. Analyze existing business processes and practices and determine how they might become more efficient.
2. Analyze the information flow and the characteristics of information objects that you need to manage. Here you can start thinking about the relative merits of imaging, document or other object management technology. Determine whether your use of document terminology differs from that of your vendors.
3. Decide which encoding standards make the most sense for the information objects you need to manage and the level of interoperability needed today and in the future. Where appropriate standards do not exist or are emerging, factor additional risk into your analysis.
4. Perform a cost/benefit analysis that includes both short-term and life cycle costs, as well as strategies for spreading costs over time. Validate your plan by doing cost/benefit analyses as well for other kinds of systems and for the same system under other assumptions about your future needs.
5. Choose an imaging, publishing or document/information management system that satisfies the requirements of 1, 2 and 3.
6. Implement a manageable, well-defined solution where the major risks are understood and quantifiable. (The risks may be high or low depending on your risk tolerance and market pressures.) This solution should be designed to test your assumptions about the technology and about the effect of the new technology on your business process.
7. Scale up with modifications and fine-tuning based on your experience.

Frank Gilbane *is the president of Arlington, MA-based research firm Publishing Technology Management Inc. and editor of* The Gilbane Report. *Reprinted from the March 1993 issue, Page 17, "Conclusions and Recommendations."*

Association for Information and Image Management (AIIM) that appeared in the January 1993 issue of *INFORM*, analyst Thornton May discusses research tracking the behavior of image project managers, chief financial officers, chief information officers, senior line managers, data processing managers and a long list of others working with imaging information, whom May refers to as "image persons." Tenex Consulting, a Burlington, MA-based company where May directs research, found that one of every four image persons "suffers career reversals or side-outs."

Tennis Shoes vs. Electrons

Why would a company run a document management system, an office automation package, on a Sun Microsystems Inc. workstation? Well, on the server side, it makes sense because of the workstation's processing power compared with a high-end PC. But what about the client side? Will Suns be increasingly found on commercial desktops?

Some analysts, such as Publishing Technology Management's Frank Gilbane, believe document management will drive commercial adoption of workstations mainly because of the system's ability to handle multimedia. Others, such as Documentum Inc.'s vice president of marketing, Rob Reid, flips the coin. What document management will do is prevent high-powered PCs from entering the traditional workstation environment. Reid says engineering and manufacturing departments, typical technical workstation users, won't need to go get a PC to communicate with sales and marketing, or other PC-oriented departments. Today's document management solutions for UNIX servers and PC clients will facilitate tying everyone together.

Take DSC Communications Corp., for example, a Plano, TX-based developer of digital switching systems for telecommunications companies. The company began using the Interleaf Inc. suite of document management tools to create technical documentation, says Jim Myckleby, vice president of information systems. Each of the company's switching products require separate documentation, resulting in a store of 200,000 documents averaging between 25 and 500 pages.

DSC is implementing document management via a three-phase program to span the enterprise. The company completed its first phase, which involved installing 300 seats of Interleaf's electronic publishing software on a mix of Sun, Hewlett-Packard Co. and Apollo workstations in departments generating engineering or customer documentation. Approximately 600 people are now using Interleaf 5 to handle technical publishing, according to Myckleby.

Phase two will move the electronic documentation into other areas, such as customer service and on the shop floor where people are assembling products. Phase three involves implementing Interleaf's workflow and distribution software, RDM and WorldView.

"We're not changing processes that much, we're really changing the base of information," says Myckleby. Since installing Interleaf, the company has internally coined the term that they're "swapping out tennis shoes for electrons." Rather than having users manually handing back and forth paper documents, they now have on-line access to up-to-date, error-free information, says Myckleby.

DSC's Myckleby cautions others not to expect to deploy a document management system "in six months." DSC's system will evolve over the next three to four years. Before that, just the selection process alone took 10 months of evaluating 20 different vendors' products.

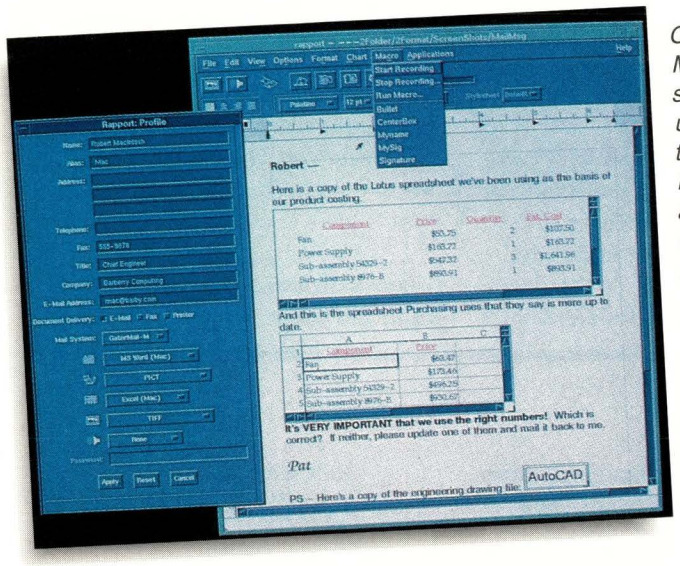
Truman Menefee, DSC's director of data center services, says implementing document management requires visionaries. "You have to look at it as a long-term project of at least three to five years. You need the support of the user community, executive management and management of IS–you need all three to do this successfully."

To find out why, Tenex conducted research based on two hypotheses: 1) because imaging technology does not deliver business value, nothing the image person does really matters, and 2) imaging fails to live up to its potential because of the processes used to introduce it into an organization. Tenex found that the high failure rate of image people isn't because the technology doesn't add value: "Imaging technology has matured to the point that the gear vendors talk about actually works." Neither is the problem related to the skill levels of the people working with imaging information. In surveying 600 imaging initiatives from a variety of companies, May says "most imaging intitiatives are still being driven by industrial age measures of success" such as head-count reductions and material and space savings. "Stated in terms of the imaging project manager, we find that this person was being asked to use world-class project management skills to install world-class technology that would perform low-value scutwork." (May participates in a program at UCLA's John E. Anderson Graduate School of Management called "Managing the Information Resource." The next course will be held October 9-14, 1994.)

Smart Documents

Now that companies have successfully learned to create documents using electronic publishing, word processing, imaging and a variety of other applications, document management tools providers are beginning to integrate workflow capabilities. Workflow stemmed from the document imaging world and automates the process of moving documents throughout an organization.

Workflow software performs routing, library management, configuration management, version control and security, says Interleaf's Jackson. Wang's Goguen provides an example: A clerk just worked on a document and it needs to be reviewed and then moved up the food chain. With workflow, the document has knowledge of what instructions to follow after it has



Clarity's Rapport Multimedia Mail software allows users to combine text, spreadsheets, images and audio and communicate across platforms, including PCs, Macs and UNIX systems.

been acted upon. Interleaf has coined the term "active documents" to denote this capability.

Some companies provide database-based workflow, like Interleaf's RDM; others such as Clarity Software Inc. with Rapport Multimedia Mail, have built capabilities on top of an electronic mail package. OPEN/image software maker Wang, which is bringing out a document management package called OPEN/profound and a workflow package called OPEN/workflow (and which plans to support Sun workstations in the near future), believes email is the cog that gets workflow in gear. Wang's Goguen says OPEN/profound will provide records management, archiving, tracking, profiles and activities, historical logs, version management, chargebacks and other tasks.

Notes, a document management system from Lotus Development Corp. for creating groupware applications, is also based on an underlying electronic mail transport system, says Joan Spindel, group marketing manager at Lotus. (Wang has announced plans to integrate its imaging software with Notes, scheduled for next quarter.) Notes has built-in workflow capabilities, but Lotus also works with third-party providers to integrate add-on workflow products. This year's release of Notes for UNIX platforms, starting with Sun, will spur customers to develop more sophisticated document management solutions with workflow, Spindel predicts.

Workflow will be the ingredient for companies to extend document management across the enterprise, believes Mark Demers, the director of channels marketing for Uniplex Integration Systems Inc., which recently added the Document Management System (DMS) to its onGO office automation software suite with built-in workflow, or active document, capabilities.

But others aren't so sure that users need to fuss with workflow to start implementing a document management solution. Documentum's Reid says of the company's 50 beta sites, users aren't yet worried about developing complex workflow strategies. The first step is to design the client interface to be easy to use, says Reid. "We originally thought people needed very sophisticated workflow capabilities," he notes. "What we're finding is that people simply want to route information easily and get information back."

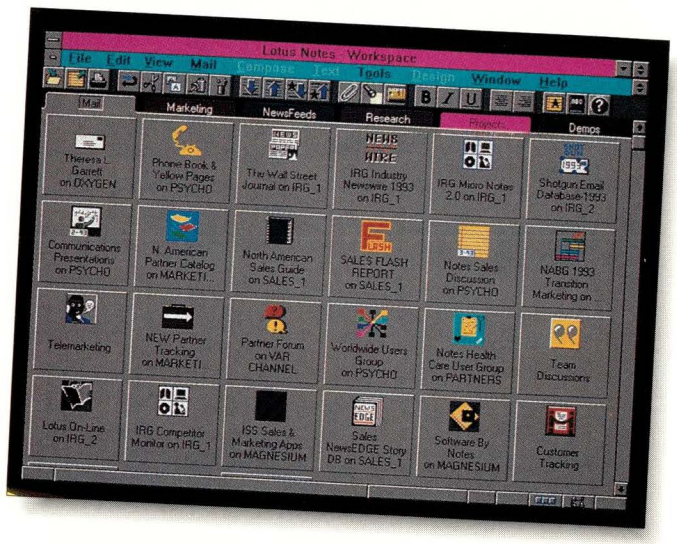
Another player in the document management game is IBM. Dave Liddell, manager of the company's ImagePlus Brand Strategy, believes adding workflow to document management systems adds value today, but ultimately document management needs to be a subset of the broader concept of work management. Work management automates the process of getting information to workers, but it also deals with resource management of people as well as equipment. Explains Liddell: "When a problem comes up in business, work management will invoke a team to handle it."

Liddell believes companies desperately need to catch up in understanding their business processes. "A lot of people who have done small pilots discover that the stuff works [document management], and then all of these larger issues loom in front of them." By "larger issues" Liddell is referring to process functions like configuration management, security and authorization.

Are They Real?

So, do smart documents have value? Or, at least, do they have enough value to make it worth companies' time and effort to implement them in their organization?

The answer, curiously, is both yes and no. As with any other tool, they are neutral in themselves. Used properly, they can be a powerful device with which to link the office worker with corporate data.



Lotus Notes is a graphical client/server computing environment that allows work groups to access, track, share and organize information. The icons represent a wide range of Notes databases.

However, no amount of automation can save a business process if its underlying principles are unsound. If, for example, the form in front of a telephone order entry clerk is misleading or difficult to read...if the active document on the screen of the account manager fails to provide the right information...if the intelligent display on the terminal of the executive creates more work than it saves...then a smart document only codifies existing problems, and may make them worse.

Thus it is that Sun, for one, is exercising caution in its approach to what it calls the active documents market. "We've a group working in the area, and they are devising a strategy," says a Sun spokeswoman. "But we're not at the point where we can say anything definite yet." Mostly, she hints, because the company wants to make certain that what it does with smart documents isn't very, very stupid. ⊸

Jane Majkiewicz is the senior editor of *RS/Magazine.*

Document Management Melange

The following list includes companies mentioned in the story, as well as a sampling of other suppliers offering document/image management tools. Please note, this is not meant to be all-inclusive.

Advent Imaging Inc.
P.O. Box AN
Princeton, NJ 08542
Document imaging
Circle 141

Alliance Data Systems
555 Twin Dolphin Drive
Suite 240
Redwood Shores, CA 94065
Document imaging/workflow
Circle 142

Applix Inc.
112 Turnpike Road
Westboro, MA 01581
Office automation/workflow
Circle 143

Bristol Technology Inc.
241 Ethan Allen Highway
Ridgefield, CT 06877
On-line documentation development Tools
Circle 144

BRS Software Products
8000 Westpark Drive
McLean, VA 22102
Text search and retrieval
Circle 145

Cimage North America
3885 Research Park Drive
Ann Arbor, MI 48108
Technical document management
Circle 146

Cincom Systems Inc.
2300 Montana Ave.
Cincinnati, OH 45211
Text management
Circle 147

Clarity Software Inc.
2700 Garcia Ave.
Mountain View, CA 94043
Office automation, multimedia mail
Circle 148

Computron Technologies
301 Route 17 North
Rutherford, NJ 07070
Workflow/imaging
Circle 149

Documentum Inc.
4683 Chabot Drive
Suite 102
Pleasanton, CA 94588
Document management
Circle 150

Excalibur Technologies Corp.
9255 Towne Centre Drive
San Diego, CA 92121
Text/multimedia search and retrieval
Circle 151

Frame Technology Corp.
1010 Rincon Circle
San Jose, CA 95131
Office automation, electronic publishing
Circle 152

Fulcrum Technologies Inc.
785 Carling Ave.
Ottawa, Ontario
Canada K1S 5H4
Text search and retrieval
Circle 153

Innovatech Corp.
12770 High Bluff Drive
Suite 140
San Diego, CA 92130
Electronic image management
Circle 154

InterCAP Graphics Systems Inc.
116 Defense Highway
Suite 400
Annapolis, MD 21401
Technical text and graphics authoring
Circle 155

Interleaf Inc.
Prospect Place
9 Hillside Ave.
Waltham, MA 02154
Electronic publishing, document management, distribution
Circle 156

Lotus Development Corp.
55 Cambridge Pkwy.
Cambridge, MA 02142
Groupware/document management
Circle 157

Paragon Imaging Inc.
73 Princeton St.
Chelmsford, MA 01863
Document imaging, office automation
Circle 158

Recognition International Inc.
2701 E. Grauwyler Road
Irving, TX 75061
Document imaging, workflow
Circle 159

SoftQuad Inc.
56 Aberfoyle Crescent
Suite 810
Toronto, Ontario
Canada M8X 2W4
Text authoring and management
Circle 160

Uniplex Integration Systems Inc.
600 E. Las Colinas Blvd.
Suite 1400
Irving, TX 75039
Information management system
Circle 161

Wang Laboratories Inc.
1 Industrial Ave.
Lowell, MA 01851
Document imaging, workflow
Circle 162

WordPerfect Corp.
1555 N. Technology Way
Orem, UT 84057
Office automation
Circle 163

Work Group Technology Corp.
81 Hartwell Ave.
Lexington, MA 02173
Product data management
Circle 164

XSoft
A division of Xerox Corp.
3400 Hillview Ave.
Palo Alto, CA 94304
Electronic publishing, office automation, workflow
Circle 165

Xyvision Inc.
101 Edgewater Drive
Wakefield, MA 01880
Electronic publishing, document management
Circle 166

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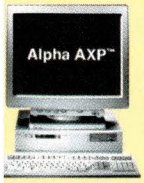

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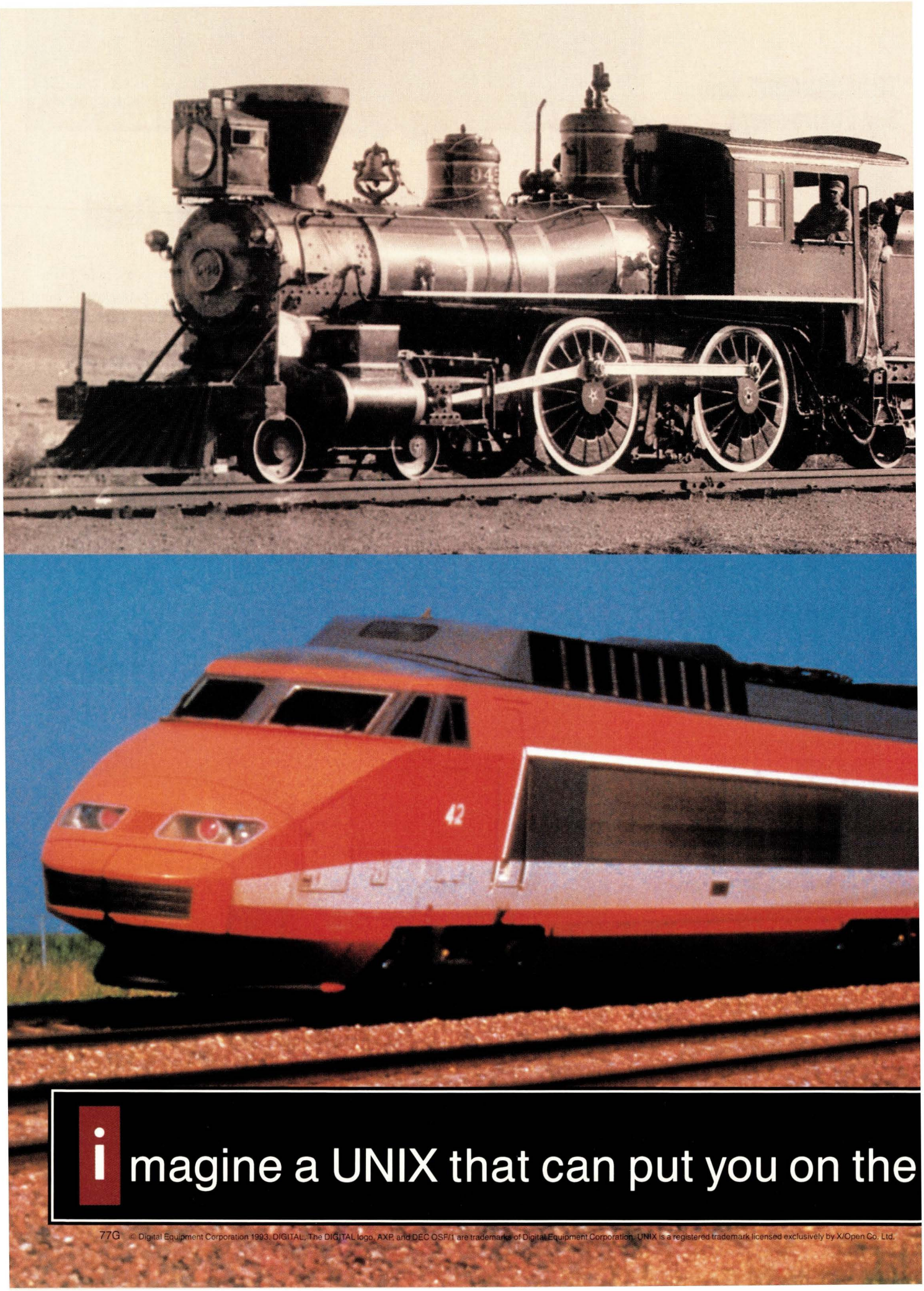

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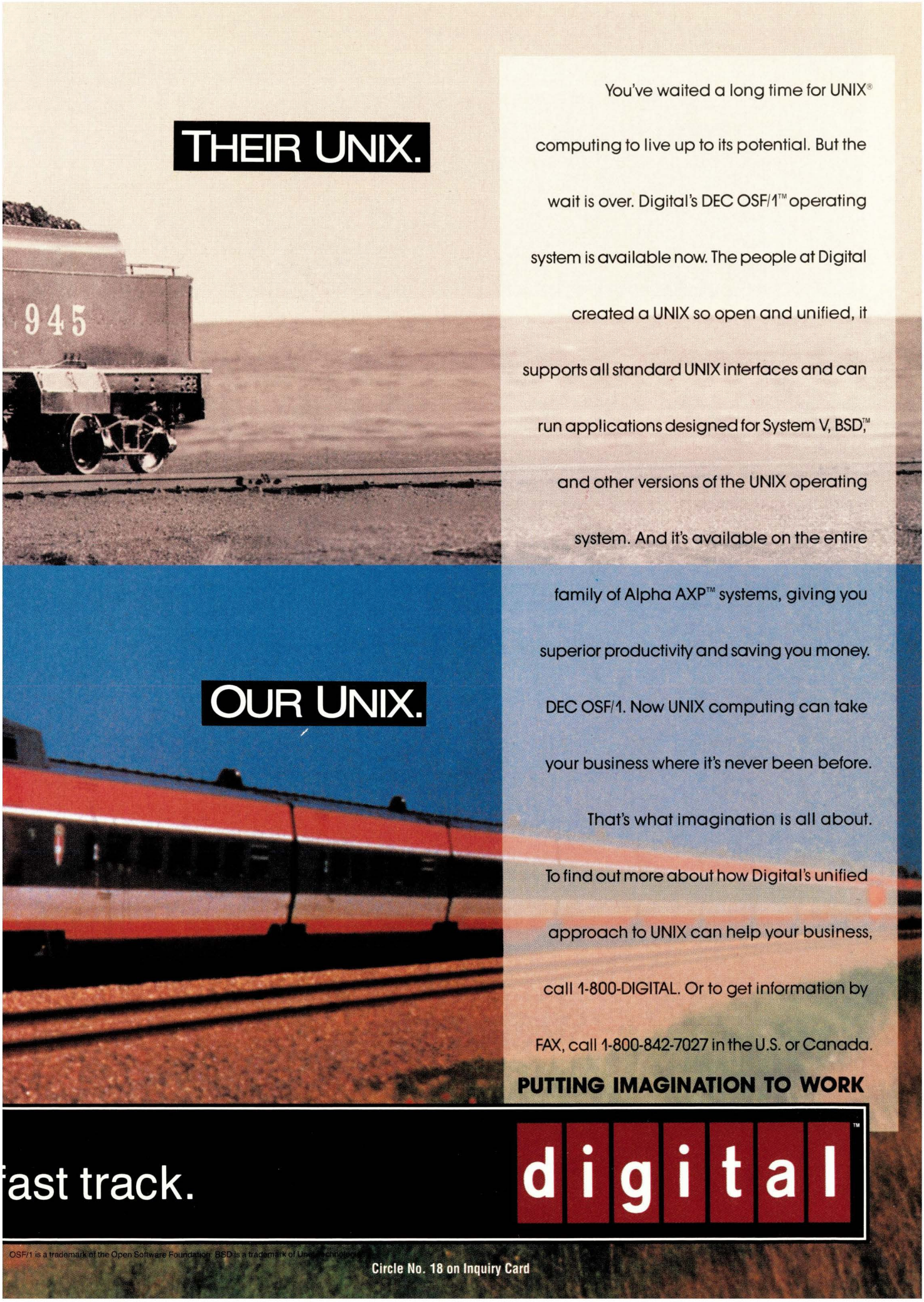
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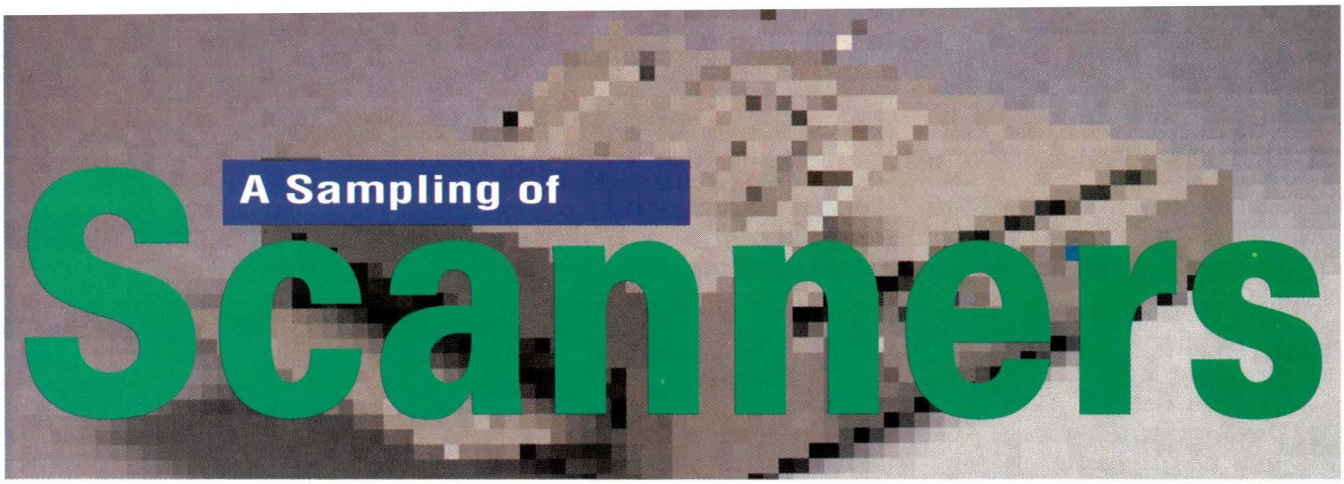

A Sampling of Scanners

Company/Manufacturer Model	Hardware interface(s); Software supported	Base resolution (dpi); Maximum resolution (dpi)	Graphics formats supported	Number of gray scales supported; Color, bits per pixel	Maximum scan area (inches); Type of scanning supported	Bundled software	Line edge enhancements	Local-area adaptive thresholding	Direct-to-disk scanning	HP ScanJet emulation	Twain support	Color separation	Merge scans	OCR software	Price ($)
Advent Imaging Inc., P.O. Box AN, Princeton, NJ 08542. **Circle 200**															
HP ScanJet IIp	SCSI; AIX, SunOS, Solaris	300; 1,200	Sun raster, TIFF (Group 3, 4), CALS, RLC, DSI, PCS, JFIF	256	8.26 x 11.7; one-pass	Imager Desktop				✗					1,750
HP ScanJet IIcx	SCSI-2; AIX, SunOS, Solaris	400; 1,600	Sun raster (Type 1, 2, and CCITT Group 3, 4), TIFF, CALS, RLC, DSI, PCX, JFIF	256	8.5 x 14; one-pass	Imager Desktop				✗					1,995
Apunix Computer Services, 5575 Ruffin Road, Suite 110, San Diego, CA 92123. **Circle 201**															
Sharp JX-325 True Color	SCSI-2; Solaris 1.x, Solaris 2.x	300; 600	Sun raster, TIFF , PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 30	8.5 x 11; one-pass	OpenScan software kit: includes GUI, device driver, API, command line scanning, Scan-Server Daemon	✗	✗					✗		1,950
Ricoh IS-50	SCSI-2; Solaris 1.x, Solaris 2.x	400; 2,450	same as above	256; 8	8.5 x 14; one-pass	same as above	✗	✗					✗		1,950
Ricoh IS-60	SCSI-2; Solaris 1.x, Solaris 2.x	600; 2,450	same as above	256; 8	8.3 x 14; one-pass	same as above	✗	✗					✗		1,950
HP-2CX	SCSI; Solaris 1.x, Solaris 2.x	400; 800	Sun raster, TIFF, PostScript, JPEG, URT, PBM, 25 others through supplied conversion software	256; 24	8.5 x 14; one-pass	same as above	✗	✗					✗		2,060
Fujitsu Scan-Partner 10	SCSI-2; Solaris 1.x, Solaris 2.x	300; 300	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 8	8.5 x 11; one-pass	same as above	✗	✗					✗		2,745
Ricoh FS-2 True Color	SCSI-2; Solaris 1.x, Solaris 2.x	600; 2,540	Sun raster, TIFF, PostScript, JPEG, URT, PBM, 25 others through supplied conversion software	256; 36	8.27 x 12.75; one-pass	same as above	✗	✗					✗		3,550
Ricoh IS-410	SCSI-2; Solaris 1.x, Solaris 2.x	400; 800	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 8	11 x 17; one-pass	same as above	✗	✗					✗		5,400
Fujitsu M3096G	SCSI-2; Solaris 1.x, Solaris 2.x	—; —	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 8	11.7 x 17; one-pass	same as above									6,380
Fujitsu M3097G	SCSI-2; Solaris 1.x, Solaris 2.x	400; 1,600	Sun raster, TIFF, PostScript, JPEG, URT, PBM, 25 others through supplied conversion software	256; 8	11.7 x 17; one-pass	same as above	✗	✗					✗		10,500

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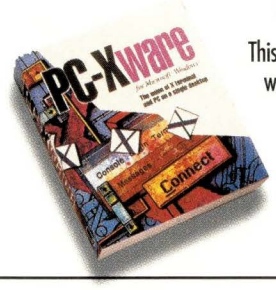

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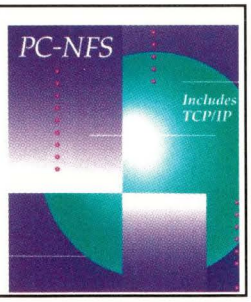

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Apunix Computer Services (continued)															
Sharp JX-610	SCSI-2; Solaris 1.x, Solaris 2.x	600; 1,200	Sun raster, TIFF, PostScript, JPEG, URT, PBM, 25 others through supplied conversion software	256; 36	11 x 17; one-pass	same as above	✗		✗				✗		11,400
Bell and Howell Model 6338 Duplex Scanner	SCSI-2; Solaris 1.x, Solaris 2.x	300; 300	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	—; 1	11.8 x 17; one-pass	same as above	✗		✗				✗		21,550
Ricoh IS-510 Simplex Scanner	SCSI-2; Solaris 1.x, Solaris 2.x	400; 800	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 8	12-inch width by any length	same as above	✗		✗				✗		22,500
Ricoh IS-520 Duplex Scanner	SCSI-2; Solaris 1.x, Solaris 2.x	400; 800	Sun raster, TIFF, PostScript, JPEG, URT, PBM, CALS, 25 others through supplied conversion software	256; 8	12-inch width by any length	same as above	✗		✗				✗		32,620
Bell & Howell Co., Document Management Products Co., 6800 McCormick Road, Chicago, IL 60645. **Circle 202**															
Copiscan II Simplex 2135/2135i	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	8.5 x 17; one-pass	—	✗	✗							5,995
Copiscan II Simplex 2137	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	8.5 x 17; one-pass	—	✗	✗							7,195
Copiscan II Simplex 2137A	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	8.5 x 17; one-pass	—	✗	✗							9,195
Copiscan II Simplex 3338/3338i	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							9,995
Copiscan II Simplex 2137A-R	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							10,395
Copiscan II Simplex 3338A	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							11,995
Copiscan II Simplex 3338A-R	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							13,195
Copiscan II Simplex 2138A	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	8.5 x 17; one-pass	—	✗	✗							15,995
Copiscan II Simplex 2138A-R	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							17,195
Copiscan II Duplex 6338	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							19,995
Copiscan II Duplex 6338A-R	SCSI-2; Berkeley Software Systems	200; 300	TIFF	256; 8	11.8 x 17; one-pass	—	✗	✗							22,395
Cranel Inc., 8999 Gemini Pkwy., Columbus, OH 43240. **Circle 203**															
Fujitsu M3093E	SCSI, SCSI-2, serial and video	200; 400	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,000+
Fujitsu M3096E	SCSI, SCSI-2, serial and video	200; 400	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,000+
Fujitsu M3096G	SCSI, SCSI-2, serial and video	200; 400	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,000+
Fujitsu M3097E	SCSI, SCSI-2, serial and video	200; 400	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,000+
Fujitsu M3097G	SCSI, SCSI-2, serial and video	200; 400	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,000+
Bell & Howell Model 2135-Model 6338	SCSI, SCSI-2, serial and video	200; 300	TIFF, PICT	256	11.8 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			5,995-23,395
Eastman Kodak Imagelink 923 & Imagelink 990	SCSI	200; 300	TIFF, PICT	256	11 x 17; one-pass	—	✗	✗	✗	✗	✗	✗			97,700+

SCANNERS

Company/Manufacturer Model	Hardware interface(s); Software supported	Base resolution (dpi); Maximum resolution (dpi)	Graphics formats supported	Number of gray scales supported; Color, bits per pixel	Maximum scan area (inches); Type of scanning supported	Bundled software	Line edge enhancements	Local-area adaptive thresholding	Direct-to-disk scanning	HP ScanJet emulation	Twain support	Color separation	Merge scans	OCR software	Price ($)
Dextra Corp., 1120 Steward Court, Suite A, Sunnyvale, CA 94086. **Circle 204**															
DF-1200/ DF-2400T	SCSI-2; Image Hunter	300; 2,400	Sun raster, TIFF, GIF, PCX	256; 24	8.5 x 14; one-pass	Image Hunter	✗	✗			✗			✗	1,599/ 3,599
Digital Equipment Corp., 146 Main St., Maynard, MA 01754. **Circle 205**															
MD30C (3 versions)	SCSI; VMS, Ultrix, RISC	300 x 300	—	256, 24	8.5 x 14; three-pass	Image-In-Color, Perceive OCR software								✗	1,349+
MD410	SCSI, Parallel; VMS, Ultrix, RISC	400 x 400	ADF	—; 8	11 x 17	—									6,995
Dupont Co., Printing & Publishing, Barley Mill Plaza, 18-1130, Wilmington, DE 19880-0018. **Circle 206**															
Crossfield Magnascan Plus	SCSI-2; Solaris	variable; 8,000	TIFF (CMYK), TIFF (RGB)	256; 8	20 x 25; one-pass	Solaris 1, Heilios Either Share, X Windows, Motif, Crosfield Image Bureau			✗			✗			99,000
Eastman Kodak Co., 343 State St., Rochester, NY 14650. **Circle 207**															
Imagelink 900S/ Imagelink 900D	SCSI, serial	67; 400	CCITT G3, G4	—	—; one-pass	—	✗	✗						✗	76,800/ 93,500
Imagelink 923S (simplex)	SCSI, serial	200; 300	CCITT G3, G4	—		—	✗	✗						✗	78,900
Imagelink 923D (duplex)	SCSI, serial	200; 300	CCITT G3, G4	—		—	✗	✗						✗	97,900
Imagelink Scanner/ Microimager 990S	SCSI-2	200; 200	CCITT G3, G4	—		—	✗	✗				✗		✗	—
Fujitsu Computer Products of America, 2904 Orchard Pkwy., San Jose, CA 95134-2009. **Circle 208**															
ScanPartner 10	SCSI-2; IBM ImagePlus	300; 300	—	256	8.5 x 14 ADF, 8.5 x 11 flat-bed; one-pass	—									2,095
M3093E	video; IBM ImagePlus	200; 400	TIFF	64 dither	8.5 x 14 ADF 8.5 x 11 flat-bed; one-pass	—	✗	✗							5,000
M3096E+	video; IBM ImagePlus	200; 400	TIFF	64 dither	11.7 x 17; one-pass	—	✗	✗							6,300
M3097E	video; IBM ImagePlus	200; 400	TIFF	64 dither	11.7 x 17; one-pass	—	✗	✗							10,995
M3097G	SCSI-2; IBM ImagePlus	200; 400	TIFF	64 dither	11.7 x 17; one-pass	—	✗	✗							12,995
Hewlett-Packard Co., P.O. Box 58059, MS1L-SJ, Santa Clara, CA 95052. **Circle 209**															
ScanJet IIp	SCSI; FrameMaker, UNIX, CorelDraw, VarMaker, VAX, NestorReader, Perceive	300 x 600; 1,200 x 1,200	PICT, TIFF, EPSF, PCX, BMP	256	8.5 x 11.7; one-pass	Aldus PhotoStyler SE for Windows environment	✗	✗	✗	✗	✗		✗	✗	879
ScanJet IIcx	SCSI; FrameMaker, UNIX, CorelDraw, VarMaker, VAX, NestorReader, Perceive	400 x 800; 1,600 x 1,600	PICT, TIFF, EPSF, PCX, BMP	256; 8 per color	8.5 x 14; one-pass	Aldus PhotoStyler SE for Windows environment	✗	✗	✗	✗	✗	✗	✗	✗	1,179
Howtek Inc., 21 Park Ave., Hudson, NH 03051. **Circle 210**															
Scanmaster D4000	SCSI, GPIB	32; 4,000	All	4,096; 12 per channel-RGB	10 x 11; one-pass	—					✗				39,700

SCANNERS

Company/Manufacturer Model	Hardware interface(s); Software supported	Base resolution (dpi); Maximum resolution (dpi)	Graphics formats supported	Number of gray scales supported; Color bits per pixel	Maximum scan area (inches); Type of scanning supported	Bundled software	Line edge enhancements	Local-area adaptive thresholding	Direct-to-disk scanning	HP ScanJet emulation	Twain support	Color separation	Merge scans	OCR software	Price ($)
IDEAL Scanners & Systems Inc., 11810 Parklawn Drive, Rockville, MD 20852. **Circle 211**															
FSS 10000 MP	SCSI-2; AIX 3.2, Solaris 2.x on Sun	556; 25 x 1,000	TIFF, PackBITS, PCX, ImgCM, ImgCC, ImgGEM, Rlc, Rlc2, RleIN, Scn, Rnl, Rst, Cut, Hrf, VifAB, TifWW, PICT (Ver2), CALS & ISO-ODA compliant CCITT Group 4, Tif4, CitIN, Sun raster, DXF/DXB (raster) trace, EPS, HPGL, VER, CCRF, LTX, PCL, JDL, HPRTL	256; 8	36 by any length; one-pass	CADImage/Scan, IBM RS/6000 AIX SCSI interface control for MP model scanners, with complete scan, convert, view and plot support. Includes CALS CCITT Group 4 compression.	✗	✗	✗						23,900 plus interface software
FSS 8000 MP	SCSI-2; AIX 3.2, Solaris 2.x on Sun	417; 25 x 800	see above	256; 8	36 by any length; one-pass	see above	✗	✗	✗						19,900 plus interface software
FSS 5000 MP	SCSI-2; AIX 3.2, Solaris 2.x on Sun	277; 25 x 500 selectable	see above	256; 8	36 by any length; one-pass	see above	✗	✗	✗						13,900 plus interface software
FSS 3000 MP	SCSI-2; AIX 3.2, Solaris 2.x on Sun	139; 25 x 300 selectable	see above	256; 8	36 by any length; one-pass	see above	✗	✗	✗						9,900 plus interface software
Intergraph Corp., 1 Madison Industrial Park, Huntsville, AL 35894-0001. **Circle 212**															
ANAtech Eagle 3640 Scanner	SCSI; SunOS, Solaris	400 x 800; I	Intergraph binary and gray-scale formats, TIFF Class B, CALS Type 1, RLC, HRF	256; —	36 by any length; one-pass	driver software	✗	✗	✗						25,000
Microtek Lab Inc., 3715 Doolittle Drive, Redondo Beach, CA 90278. **Circle 213**															
ScanMaker IIG	SCSI	300 x 600; Interpolation to 1,200	TIFF	256; 24 pixel per	8.5 x 11; one-pass	—									649
ScanMaker II	SCSI	300 x 600; Interpolation to 1,200	TIFF	256; 24 pixel per	8.5 x 14; three-pass	—									649 - 699
ScanMaker IISP	SCSI	300 x 600; Interpolation to 1,200	TIFF	256; 24 pixel per	8.5 x 11; one-pass	—									850 - 950
ScanMaker IIXE	SCSI	300 x 600; Interpolation to 1,200	TIFF	256; 24 pixel per	8.5 x 14; three-pass	—									1,049 - 1,099
Perfect Byte Inc., 909 North 96th St., Suite 6, Omaha, NE 68114-2593. **Circle 214**															
XRS Rayven RSU-1	SCSI-2; Solaris 2.3, SunOS, AIX, HP-UX	150 x 150	TIFF, PostScript, CCITT G3 &G4, Sun raster, JPEG	256; 8-12	14 x 17; one-pass	PerfectScan software (installation script, loadable SCSI device driver, OpenWindows & Motif GUI, Command Line Interface and optional API)	✗		✗	✗			✗		—
XRS 12 CX	SCSI-2; Solaris 2.3, SunOS, AIX, HP-UX	300 x 600, 1,200 x1,200	TIFF, PostScript, CCITT, G3 & G4, Sun raster, JPEG	256; 24	8.5 x 13.5; three-pass	see above	✗		✗	✗	✗		✗		—
Microtek ScanMaker 2SP	SCSI-2; Solaris 2.3, SunOS, AIX, HP-UX	3 to 300 dpi in 1% increments; 1,200 x 1,200	TIFF, PostScript, CCITT G3 &G4, Sun raster, JPEG	256; 24	8.5 x 10.75; one-pass	see above	✗		✗		✗	✗	✗		—
Improvision 6001	SCSI-2; Solaris 2.3, SunOS, AIX, HP-UX	200-600; 600	TIFF, PostScript, CCITT G3 &G4, Sun raster	mono-chrome	8.3 x 17; —	see above	✗	✗	✗		✗		✗		—
Improvision 4008	SCSI-2; Solaris 2.3, SunOS, AIX, HP-UX	200-400; 400	TIFF, PostScript, CCITT G3 &G4, Sun raster, JPEG	256; 8	11 x 17; —	see above	✗	✗	✗		✗		✗		—

SCANNERS

Company/Manufacturer Model	Hardware interface(s); Software supported	Base resolution (dpi); Maximum resolution (dpi)	Graphics formats supported	Number of gray scales supported; Color, bits per pixel	Maximum scan area (inches); Type of scanning supported	Bundled software	Line edge enhancements	Local-area adaptive thresholding	Direct-to-disk scanning	HP ScanJet emulation	Twain support	Color separation	Merge scans	OCR software	Price ($)
Perfect Byte Inc. (continued)															
Ricoh IS-510	SCSI-2; SunOS, AIX, HP-UX	200-400; 400	TIFF, PostScript, CCITT G3 &G4, Sun raster	mono-chrome	11 x 17; —	see above	✗	✗	✗		✗		✗		—
Ricoh IS-520	SCSI-2; SunOS, AIX, HP-UX	200-400; 400	TIFF, PostScript, CCITT G3 &G4, Sun raster	mono-chrome	11 x 17; —	see above	✗	✗	✗		✗		✗		—
Fujitsu ScanPartner 10	SCSI-2; SunOS, AIX, HP-UX	300; 300	TIFF, PostScript, CCITT G3 &G4, Sun raster, JPEG	256; 8	8.5 x 14; —	see above	✗		✗		✗		✗		—
Fujitsu M3096G	SCSI-2; SunOS, AIX, HP-UX	200-400; 1,600	TIFF, PostScript, CCITT G3 &G4, Sun raster, JPEG	256; 8	11.7 x 17; —	see above	✗	✗	✗		✗		✗		—
Fujitsu M3097G	SCSI-2; SunOS, AIX, HP-UX, MAC, Windows	200-400; 1,600	TIFF, PostScript, CCITT G3 &G4, Sun raster	64 dither	11.7 x 17; —	see above	✗	✗	✗		✗		✗		—
Ricoh Imaging Corp., Peripheral Products Division, 3001 Orchard Pkwy., San Jose, CA 95134. **Circle 215**															
Ricoh IS50	SCSI-2, parallel	40; 1,600 —	—	256; 8, 4	8.5 x 14; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Ricoh IS60	SCSI-2, parallel	300; 600 —	—	256; 8, 4	8.27 x 14; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Ricoh IS410	SCSI-2, parallel	400 —	—	256; 8	11.7 x 17; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Ricoh IS510	SCSI-2	200; 400	—	256; 8	12 by any length; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Ricoh IS520	SCSI-2	200; 400 —	—	256; 8	12 by any length; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Ricoh FS2	SCSI-2	50; 1,200 —	—	1,024; 8	8.27 x 14; one-pass	—	✗	✗	✗	✗	✗	✗	✗	✗	—
Scan-Graphics Inc., 700 Abbott Drive, Broomall, PA 19008. **Circle 216**															
CF 400/36	SCSI	100; 400	TIFF	256; 8	36 by any length; one-pass	driver	✗	✗	✗						19,900
CF 300/44	SCSI	100; 300	TIFF	256; 8	43 by any length; one-pass	driver	✗	✗	✗						24,900
CF 500/44	SCSI	100; 500	TIFF	256; 8	43 by any length; one-pass	driver	✗	✗	✗						26,900
CF 1000/44	SCSI	100; 1,000	TIFF	256; 8	43 by any length; one-pass	driver	✗	✗	✗						32,900
Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430. **Circle 217**															
JX-325	SCSI-2; Pectronics	300; 600	TIFF, PICT	256; 24	8.5 x 11; one-pass	PhotoShop	✗				✗				—
JX-450	GPIB; Mentalix, Pectronics	300; 300	TIFF, PICT	256; 24	11.7 x 17; one-pass	PhotoShop	✗				✗				5,995
JX-610	SCSI-2, GPIB; Mentalix, Pectronics	600; 1,200	TIFF, PICT	256; 12-bit color, 36 bits per pixel	12 x 17; one-pass	PhotoShop	✗				✗				13,500
Tamrack Technologies Inc., 1544 Centre Pointe Drive, Milpitas, CA 95035. **Circle 218**															
6000C	SCSI-2	600; 1,200	TIFF, TGA, BMP, GIF, PIX, EPS, JPEG	256; 8	8.5 x 11.75; three-pass	ColorShop, PhotoShop 2.5, PhotoStyler 2.0	✗				✗	✗	✗	✗	795

Company/Manufacturer Model	Hardware interface(s); Software supported	Base resolution (dpi); Maximum resolution (dpi)	Graphics formats supported	Number of gray scales supported; Color, bits per pixel	Maximum scan area (inches); Type of scanning supported	Bundled software	Line edge enhancements	Local-area adaptive thresholding	Direct-to-disk scanning	HP ScanJet emulation	Twain support	Color separation	Merge scans	OCR software	Price ($)
Tamrack Technologies Inc. (continued)															
8000C	SCSI-2	800; 1,600	TIFF, TGA, BMP, GIF, PIX, EPS, JPEG	256; 8, 24	8.5 x 11.75; three-pass	ColorShop, PhotoShop 2.5, PhotoStyler 2.0	✗				✗	✗	✗	✗	949
1200C	SCSI-2	1,200; 2,400	TIFF, TGA, BMP, GIF, PIX, EPS, JPEG	256; 8, 24	8.5 x 11.75; three-pass	ColorShop, PhotoShop 2.5, PhotoStyler 2.0	✗				✗	✗	✗	✗	1,295
UMAX Technologies Inc., 3353 Gateway Blvd., Fremont, CA 94538. **Circle 219**															
UC630	SCSI; Core Software, PhotoShop, Photo-flash, etc.	600 x 300; 1,200 x 1,200	TIFF, GIF, PICT, PCX, JPEG	256; 24, 8	8.5 x 14; three-pass	Core Software for Sun	✗	✗	✗	✗	✗	✗		✗	1,495
UC840	SCSI-2	800 x 400; 1,600 x 1,600	TIFF, GIF, PICT, PCX	256; 24, 8	8.5 x 14; three-pass	Core Software for Sun	✗	✗	✗	✗	✗	✗	✗	✗	2,155
UC1260	SCSI-2	1,200 x 600; 2,400 x 2,400	TIFF, GIF, PICT, PCX	256; 24, 8	8.5 x 14; three-pass	Core Software for Sun	✗	✗	✗	✗	✗	✗	✗	✗	2,645
UC1200SE	SCSI-2	1,200 x 600; 2,400 x 2,400		10 gray; 30	8.5 x 11.8; one-pass	Core Software for Sun	✗	✗	✗	✗	✗	✗	✗	✗	4,795
VEMCO Corp., 305 S. Acacia St., San Dimas, CA 91773. **Circle 220**															
FSS 3000	SCSI	25; 300	PCX, ImgCM, ImgCC, ImgGEM, Rlc, Rlc2, Ig4, Scn, Rnl, EPS, Cut, Hrf, Gp4, Rst, Gr4AB, VifAB, CitIN, RleIN, Tif4, TifCO, TifWW, TifUN, PICT, Fax, Fax2, PcxMU,Dxftr, Dxbtr, TifUN, Igs, Pcl, Plt, Ver, Ltx, Crf, Jdl, Atl, Con, Scm, Oce, Rtl, Gra	256	36 by any length	CADImage/Scan	✗	✗	✗						9,900
FSS 5000	SCSI	25; 500	same as above	256	36 by any length	CADImage/Scan	✗	✗	✗						13,900
FSS 8000	SCSI	25; 800	same as above	256	36 by any length	CADImage/Scan	✗	✗	✗						17,900
FSS 10000	SCSI	25; 1,000	same as above	256	36 by any length	CADImage/Scan	✗	✗	✗						21,900
Vidar Systems Corp., 520 Herndon Pkwy., Herdon, VA 22070. **Circle 221**															
T-XF, X-ray digitizer	SCSI; developers tool kit for Sun	257; —	—	256; gray-scale only	14 by any length; one-pass	—	✗	✗	✗						11,995
T-XF, X-ray digitizer	SCSI; developers tool kit for Sun	750; —	—	256; gray-scale only	14 by any length; one-pass	—	✗	✗	✗						11,995
TruScan 800, Large Document Scanner	SCSI; SunOS 4.1.x, Solarix 2	400; 800	CALS, CalComp, Cimage, RLC, JPEG, PCX, Sun raster, CCITT G3 & G4, TIFF	256; —	36 by any length; one-pass	scanner control, clean-up and editing software		✗	✗						14,500
VXR-12, Film Digitizer	SCSI; developers tool kit for Sun	300; —	—	4,096/ 256; —	14 by any length; one-pass	—					✗				15,995
4250, Large Document Scanner	SCSI; developers tool kit for Sun	500; —	CALS	256; —	36 by any length; one-pass	—		✗							26,500
AC20, Aperture Card Scanner	SCSI; developers tool kit for Sun	200; 6,000	CALS	256; —	36 by any length; one-pass	—		✗							31,500

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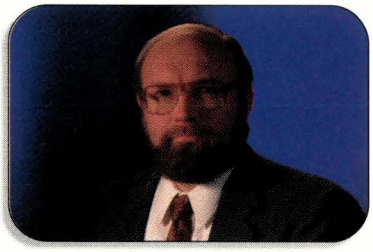

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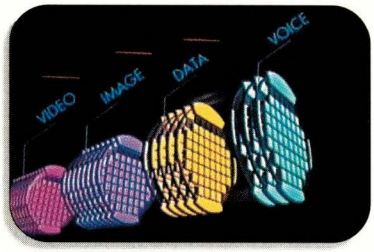

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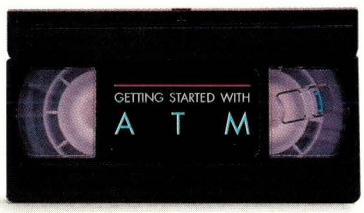

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Tropical Sun: The ASEAN Market

BRIAN J. MALLOY

Though modest in size, the ASEAN region bears watching as one of the fastest growing Sun markets in the world.

by GENE MESHER

Even in a global recession, the Association of Southeast Asian Nations (ASEAN) region continues to show strong economic growth with no signs of letting up. ASEAN includes Indonesia, Thailand, the Philippines, Malaysia, Singapore and Brunei. Vietnam and Laos will also probably join soon, with Burma not too far behind. Gross domestic product growth rates are high here: Malaysia and Thailand are at 8% annually, while those for Singapore and Indonesia are at a lower, but still impressive, 6% per year. Even the Philippine economy is starting to turn around under the new administration of President Fidel Ramos.

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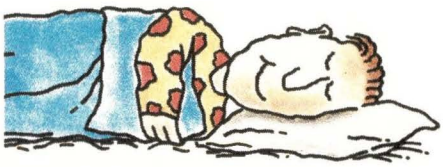

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According to International Data Corp.'s annual information technology briefing, *Directions '93*, growth in the computer industry has made it a leading sector in the region's recent economic strength. The ASEAN bloc makes up about 30% of the total Asian information technology market excluding Japan, a market that is growing at about 20% per year. Unlike in the Japanese market, U.S. companies dominate the hardware market in the rest of Asia, accounting for an average of 80% of all systems sold in every market segment except PCs. Also, in the ASEAN region, the use of English is widespread, especially in Singapore, Malaysia and the Philippines, making these markets that much more accessible to U.S. companies.

Last year's meeting of the Southeast Asian Regional Computer Confederation (SEARCC) in Kuala Lumpur made the open systems concept its theme, demonstrating the importance that the UNIX environment is now given in this part of the world. This, in turn, has created a renewed interest in Sun solutions.

"We currently have an installed base of about 3,500 systems in the region. For fiscal year '92, which ended in June, we are estimating that 1,700 new systems will have come on-line, and we are projecting an additional 2,500 systems being added during FY '93," says Ramesh Nawa, director of marketing for Sun Microsystems Pte. Ltd. in Singapore, where Sun has its ASEAN headquarters.

Rapid growth is being seen in the ASEAN market for Sun products in the areas of banking, where small banks see Suns as a cost-effective solution, and telecommunications, which is growing explosively in the region. Other areas of rapid growth include the public sector and manufacturing, especially in resource-based industries such as oil and gas.

The Sun business model, which relies strongly on working through local partners, is especially effective in the ASEAN region, where each country's business environment is unique.

Unlike in the Japanese market, U.S. companies dominate the hardware market in the rest of Asia.

Because each country is so different from the others, we have drawn up a brief country-by-country description of the region.

Singapore

Singapore is the largest and oldest ASEAN Sun market. The installed base there is now more than 1,000 systems. Sun products have been marketed in Singapore since 1985. Because it is a small country with few natural resources, Singapore's Sun market is different than in the rest of the ASEAN region. Resource-based applications, for example, such as those for the oil and gas industry found in other ASEAN countries, do not exist in Singapore.

The Singaporean Sun market has been strongest at universities and research institutes, where research and development is strong, and in the manufacturing sector, especially at companies in the electronics industry, and to a lesser extent within the commercial sector.

Advanced applications have been developed in Singapore, such as DRUID, a Motif-based interface management system that rapidly generates GUIs, produced by Gurminder Singh at the Institute for Systems Science at the National University of Singapore.

"We find Sun systems especially attractive in our research environment. Many UNIX-based products are developed on Sun platforms, and so the Sun-based version is available much sooner than those for other systems. They are also cost-effective: For what we pay in maintenance costs for our mainframe, we could afford to buy a new Sun workstation every month," reports Dennis Sng, program manager for the GINTIC Institute of Manufacturing Technology at Nanyang Technological University.

Malaysia

Malaysia, with an installed base of about 500 systems, is the next largest Sun market after Singapore. Market growth for Sun products is currently projected at about 25% per year.

"Our long-term strategy is to move away from direct selling and work more through channels. We want to help Sun's market in Malaysia grow as fast as possible by getting as many SIs and VARs involved as we can," says Robert Leong, country manager for Sun products at Computer System Associates (CSA), which has been distributing Sun products in Malaysia for the past five years. A second company, Applied Business Systems (ABS), also distributes for Sun in Malaysia.

Major areas for expansion include the banking industry, where the right-sizing concept is gaining popularity, and Malaysia's burgeoning telecommunications industry, which needs network management systems and ISDN applications.

One very interesting development in Malaysia is the SPARCware Catalyst Centre, which was recently opened by MIMOS, the Malaysian Institute of Microelectronic Systems, in cooperation with Sun and CSA. The goal of this facility is to aid local entrepreneurs interested in developing local

Making ASEAN Connections

Readers interested in knowing more about the ASEAN market and how to participate in it are invited to send electronic mail to the country contacts given above, by contacting Celestine Tan at Sun's ASEAN headquarters in Singapore at ctan@Singapore.Sun.com, or by contacting the author at gmesher@bpa.arizona.edu.

software products, especially for client/server applications.

"We set up the SPARCware Centre to make it easier for companies to develop software here in Malaysia," says Dr. Mohamed Awang Lah, director of MIMOS' Computer Systems Division. "It's a one-stop center which includes office space, machines, connectivity and administrative support. Our goal is to facilitate software development for groups which don't have their own equipment, whether they are small users or large companies which don't have software development facilities. Joint ventures would also be welcome to apply."

Thailand

Thailand's booming economy is seeing rapid growth in the computer marketplace. There are currently about 500 systems within the country, and the use of Sun products is growing at about 70% per year. So far, the main areas in which Sun-based solutions have been implemented are the technical, insurance and banking markets.

The Thai market is unique in the ASEAN region in that neither English nor the Latin alphabet is used within the business community. A locally developed 8-bit code for the Thai alphabet, called Thai Industry Standard (TIS), was developed some years ago, and Sun engineers have developed a Thai extension to Solaris, called the Thai Language Environment, or TLE, for client/server applications.

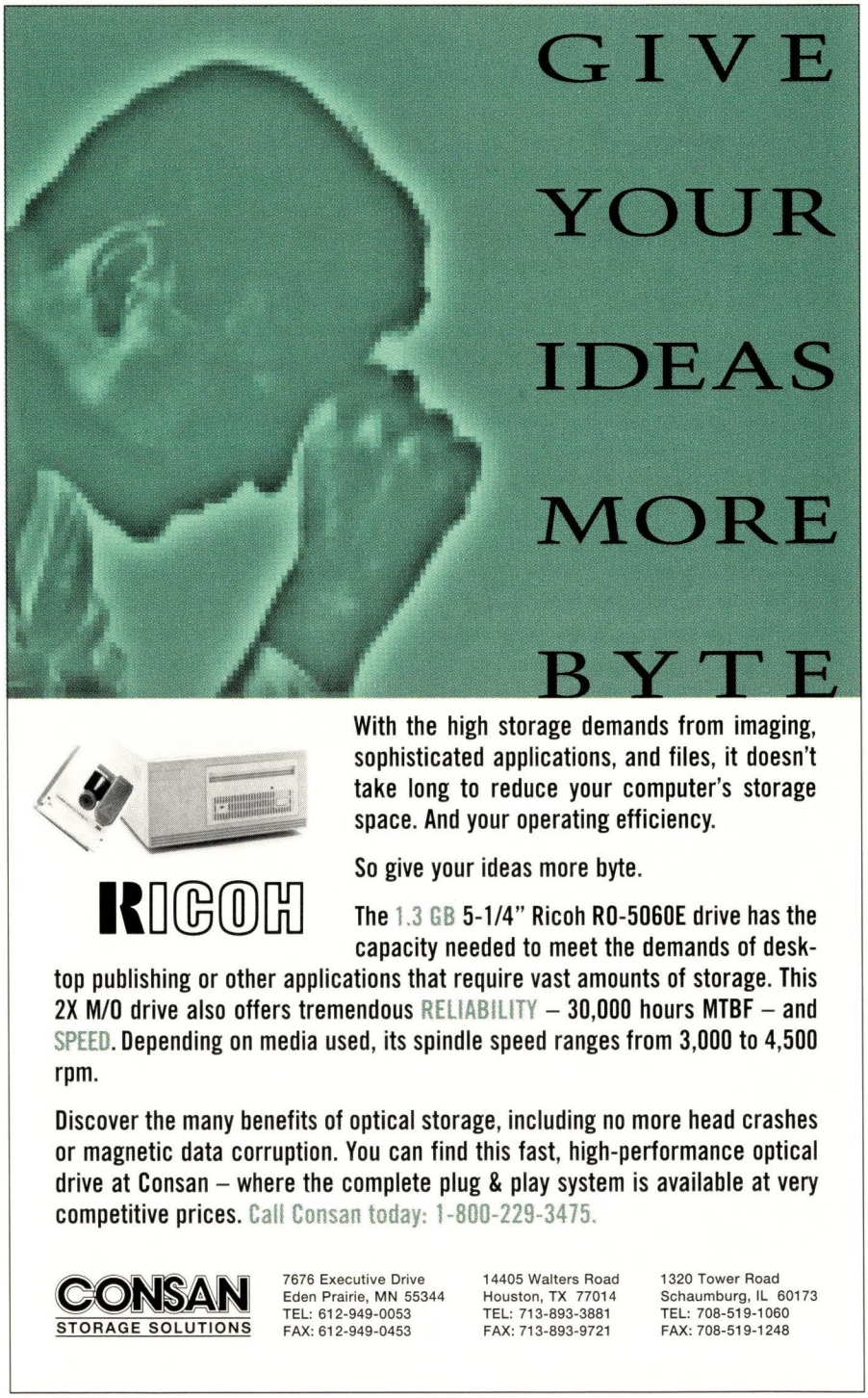
"You need to have the solution in Thai, especially for the commercial and government sectors, but less so in the more technical fields. Even then, some output nearly always needs to be produced in Thai," reports Srithong Charoenkornvijit, marketing director for Open Computing Technologies, Ltd., in Bangkok.

"Open systems and client/server solutions are now being promoted. The UNIX market is only about three years old in Thailand, so there are still good opportunities for foreign firms here, if they are patient enough to make it through the start-up period. Foreign firms interested in the Thai market need to expect a lead time of 12 to 18 months in the most dynamic sectors because of the differences in local culture, laws and business practices," says Charoenkornvijit.

"In general, 10% to 30% of a software package needs to be rewritten for the Thai market because of the need for a Thai interface. The only exception is with technical products, where nearly all of the users have a good background in English," says Suthep Oonmettachit, marketing manager for Logic Company Ltd. of Bangkok.

Indonesia

"In Indonesia we have a balanced market with strengths in the commercial, oil and gas and government sec-



Circle No. 11 on Inquiry Card

tors," reports Rene Widjaja, marketing director for Jarkarta-based PT Metrodata Electronics. Indonesia's installed base currently stands at about 200 systems, not including drop shipments to multinationals.

Market growth is brisk: A 50% growth rate is projected for this fiscal year, and 60% to 70% growth is expected for next year.

"Open systems and UNIX are just being accepted now. Two years ago, these were new concepts, but now they are gaining acceptance in Indonesia," says Widjaja.

Because of support issues, new market entrants need to work through local partners. For medium-size companies, English-based systems are the norm. Sometimes though, especially for small companies, software must be converted to Indonesian. Also, depending on the end users, such as bank tellers, an Indonesian interface may be needed. This is relatively simple, though, compared with the Thai case, since Indonesia uses the Latin alphabet.

Hot growth areas in Indonesia include the telecom sector, especially network management systems; construction applications, especially those related to road construction; and stock trading systems. "The financial sector is currently undergoing consolidation but is very promising and should start growing rapidly in the near future," according to Widjaja.

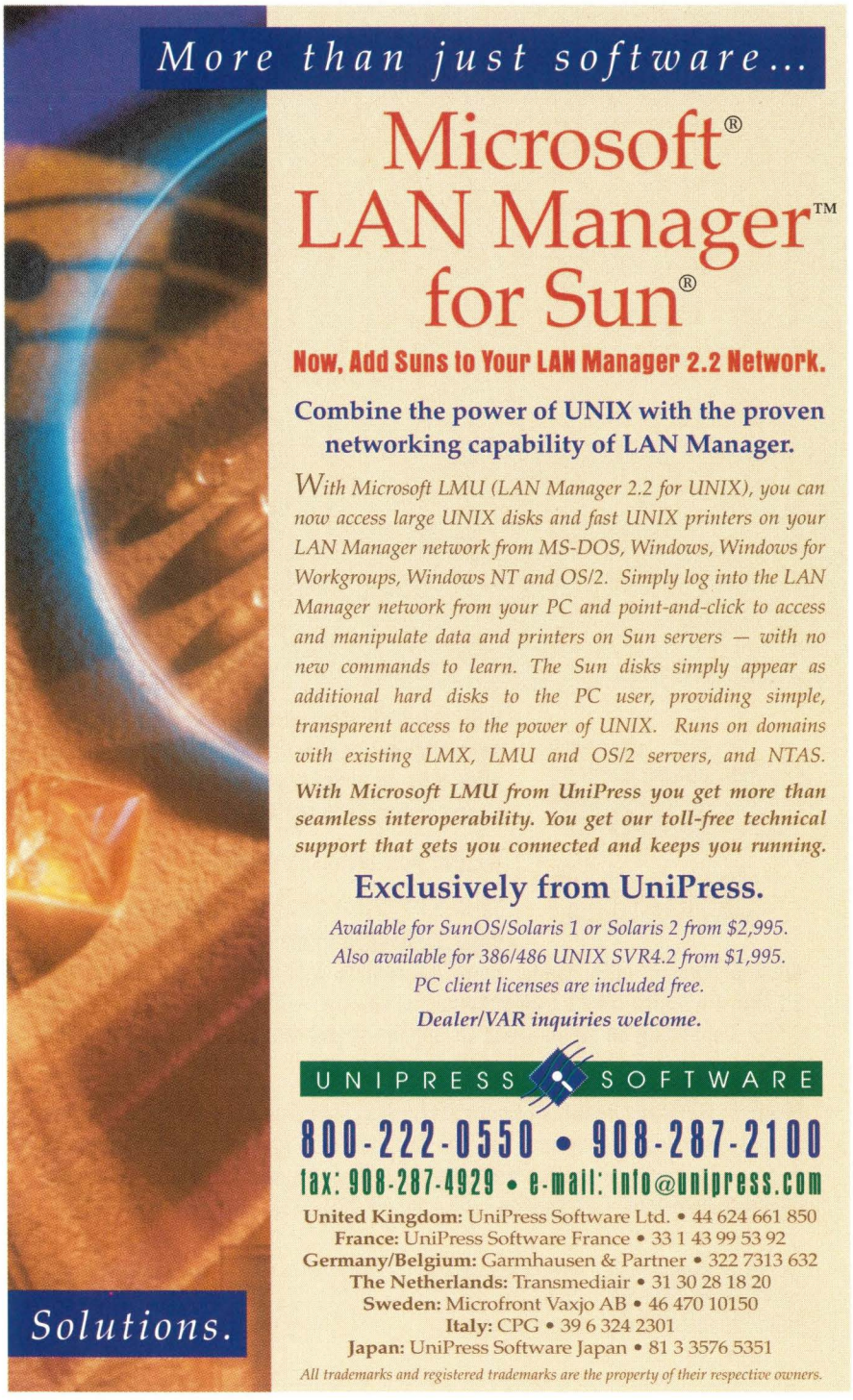
The Philippines

"Now that the Philippine economy has turned around, we are starting to see strong market growth. UNIX awareness is very strong in the Philippines," says Cynthia Romero Mamon, president of Philippine Sunsystems Products Inc. (PSPI). "Last year we achieved a market growth rate of 100%, and we are aiming at a 50% growth rate for this year," says Romero.

PSPI has marketed Sun products in the Philippines for the past three years and now has an installed base of about 200 systems representing 22% of the UNIX market there. Sun's strongest areas in the Philippines have been in the manufacturing and government sectors.

"We are now targeting the banking sector. This is not only a large area for automation, but in the Philippines, the banks are viewed as trend setters, so other industries follow their lead in the computer marketplace," reports Romero.

Gene Mesher is a free-lance writer and consultant on information technologies in Southeast Asia and other developing areas. He is currently working on a doctorate in the University of Arizona MIS department's international IT program. You can reach him at gmesher@bpa.arizona.edu.



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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 elsewhere in the magazine.

SBus Graphics Accelerator

Matrox has introduced a true-color 3D graphics accelerator for the SBus. Called the Megabar, the product uses the company's own 64-bit graphics chip to provide acceleration for 24-bit color and 3D graphics, as well as vector drawing, BitBLT, fills and image loads.

The product comes in two memory configurations for specific markets. The Megabar with 4.5 MB of VRAM is meant for applications requiring true-color performance, such as color publications, imaging, animation and business graphics. The MGA-PRO with 4.5 MB of VRAM and a 16-bit Z-buffer, meanwhile, is meant for real-time 3D applications.

Depending on the SPARC platform, the Megabar offers performance of 150,000 to 200,000 3D vectors per second, 1,540 megapixels per second fill speed, 12 megapixels per second BitBLT speed, and 20,000 to 50,000 3D Gouraud-shaded, Z-Buffered 3D triangles per second. Pricing on the Megabar begins at $1,899, or at $2,495 for the version with the 16-bit Z-buffer.

Matrox Electronic Systems Ltd.
1055 St. Regis Blvd.
Dorval, Quebec
Canada H9P 2T4
Circle 101

Two-Headed X Terms

Human Designed Systems has introduced a line of X terminals that can support two monitors simultaneously. While there have been dual-monitor X terminals before, as well as dual-headed high-end workstations, they have usually targeted high-performance applications, such as design. HDS says that these new products, the View Station Dual Series, are meant for commercial applications where a single individual has to view large amounts of data in a single glance.

The X terminals are based on the Intel Corp. i960 processor and have 4 MB of RAM, expandable to 68 MB. The machines have Ethernet, serial and parallel ports as well as two PCMCIA ports. There is a dual base option, which comes without monitors so customers can use whatever monitors they already have.

The Dual Base model is $2,299. The other models in the line include a 14-inch color display model, the Dual 14C, for $2,799; a 14-inch color display model, the Dual 15C at $2,999; a 17-inch model, the Dual 17C, at $3,999; and the 19-inch Dual 19C at $5,399.

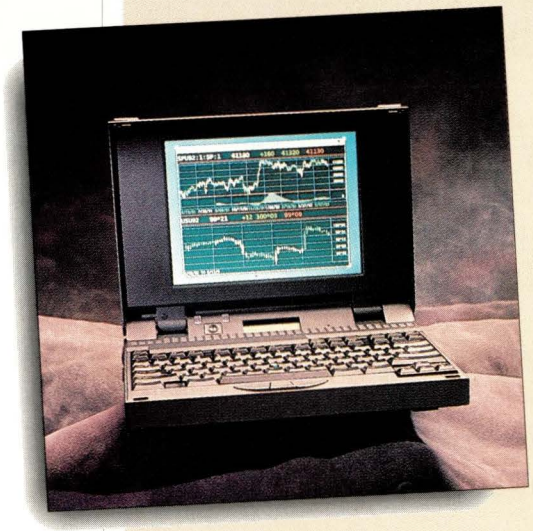
Human Designed Systems
421 Feheley Drive
King of Prussia, PA 19406
Circle 102

Graphics-Oriented SPARCalike and Board

A SPARCalike oriented to high-performance graphics applications has been introduced by Aries Research. The Marixx ds Graphics Station is a

Tadpole Shows New Portables

SPARC-based portable system vendor Tadpole has introduced two new laptops–the SPARCbook 3 and SPARCbook 3LC. Both are based on the microSPARC processor, offering up to 58.1 MIPS. Both come with the Solaris 1 or 2 operating system, and both come with Tadpole's Nomadic Computing Environment, a set of utilities that ease on-the-go computing.



The SPARCbook 3 is a portable workstation that offers functionality similar to that of a standard-size SPARCstation. It comes with a color TFT screen, a removable 2½-inch disk drive, a 2-MB frame buffer, 16-bit audio, and on-board ISDN, plus two PCMCIA slots. Pricing begins at $10,950.

The SPARCbook 3LC is a lower cost–at $7,500–system for buyers who need low weight and low power consumption. It comes with a monochrome passive display, a removable 2½-inch disk drive, two PCMCIA slots, a 1-MB frame buffer and an 8-bit audio capability. With the battery pack installed, it weighs 6.2 pounds.

Tadpole Technology Inc.
12012 Technology Blvd.
Austin, TX 78727-6208
Circle 100

SPARCstation 10-compatible with its graphics performance boosted with the company's TGX graphics accelerator board, itself a new product that can be purchased separately.

The workstation was developed under license from Sun. It comes with 50-MHz SuperSPARC (expandable to four) with 1 MB of external cache, 64 MB of RAM, two GB of internal hard drive, an internal Sony CD-ROM, a 19-inch color monitor, a floppy drive, keyboard and mouse, Solaris 1.1 or 2.3, and the accelerator board. Showing its SPARCstation roots, it comes with two MBus slots, four SBus expansion slots, on-board Ethernet and ISDN, fast SCSI, two serial ports, a parallel port and CD-quality audio. Pricing begins at $28,115.

The TGX graphics accelerator, meanwhile, comes in two models–the TRGX200 with 2 MB of VRAM and the TGX400 with 4 MB of VRAM. Based on the Sun Turbo GXPlus product, the two boards offer graphics performance of up to 1.6 million 2D vectors per second and 44,000 3D vectors per second. They come with an 8-bit color frame buffer that can display 256 colors simultaneously from a palette of 16.7 million colors. The 200 is $3,100, and the 400 is $3,400.

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

TI DSP Libraries

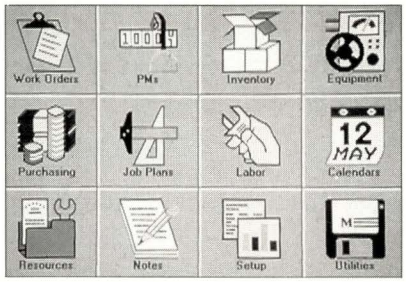
Two libraries of software for Texas Instruments Inc. digital signal processors (DSPs) have been released by Sinectonalysis. The first is STD/Mathlib for the TMS320C40 and TMS320C30 DSPs. This product is described as an optimized run-time library of 33 mathematical functions commonly used in machine control, DSP, graphics and related applications. It provides hand-coded algorithms for trigonometric, transcendental, hyperbolic, log, square roots and other math functions. Pricing begins at $695.

The second library, meanwhile, is DSP/Veclib, a set of optimized DSP functions supporting the TI TMS320C40 product. This library contains a variety of DSP routines, including Fourier transforms, convolutions and correlations, spectral analysis, filtering, image processing, bit manipulations, data compression routines and so on. It is priced at $3,000.

Sinectonalysis Inc.
24 Murray Road
West Newton, MA 02165
Circle 104

Software for Maintenance

Software maintenance is a much discussed topic in the computer community. Less well known, but equally important, is software that assists managers in the maintenance of their



investments in other things–such as trucks and buildings and all the rest.

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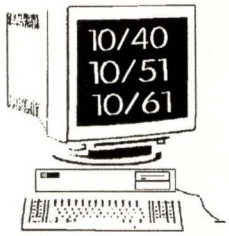

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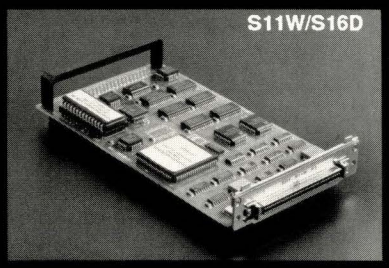

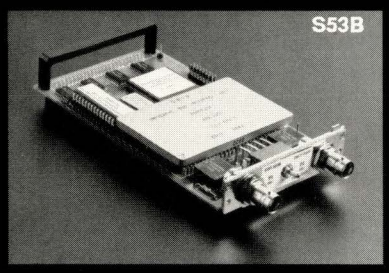

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Project Software and Development has a product that does just that. Maximo Series V uses project management technology, combined with the ability to query commercial databases, to provide managers with the tools necessary to maintain everything from computers to heavy equipment.

Maximo allows users to track records, monitor and analyze data, and recommend the most efficient and cost-effective solutions for various operations. The product is designed as a client/server application. It assumes that the client will be a PC running MS-Windows, and that the server will be a UNIX platform, particularly a Sun workstation or server. Pricing, for five clients, starts at $39,800.

Project Software and Development Inc. (PSDI)
20 University Road
Cambridge, MA 02138
Circle 105

OrionLEADS for Law

An information management system for law enforcement personnel has been introduced by Orion Scientific. Called OrionLEADS (for Law Enforcement Analysis Data System), the program provides interactive, real-time support for law enforcement data analysis, investigation and operations. It allows investigators and analysts to correlate and analyze large amounts of fragmented data from a variety of sources and in a variety of media, including text, graphics, photos, video, sound and reports.

OrionLEADS comes in several modules. Among these is NewsWatch, an information-gathering tool that can draw from in-house communications processors, wire services, national databases and so forth. There is also a trio of text-searching programs: LookUp, Matrix and MkQuery. XMap, meanwhile, provides a geographic information system, while Telephone Toll produces statistical and link analysis from standard telephone and pen traces, and XLink displays complex information in link diagrams. Finally, there is a Case Building program that allows users to compile any file, diagram or other data into a single document, a "case." OrionLEADS operates under UNIX on a number of RISC-based systems. Depending on the configuration, pricing ranges from $50,000 to $60,000.

Orion Scientific Systems
19800 MacArthur Blvd., Suite 480
Irvine, CA 92715
Circle 106

One Big Screen

For those users who need larger displays than can be had from standard monitors but who balk at video walls, Mitsubishi Electronics has introduced

a 29-inch CRT for Sun and other workstations. The Diamond Pro 29 is being marketed for workstation users who need a 29-inch display for such things as small to medium-size group presentations, but who don't need Mitsubishi's even larger displays–which range up to 42 inches.

The Diamond 29 has its own microprocessor and a 15- to 82-kHz horizontal auto-scanning range. In addition to Suns, it is compatible with Apple Computer Inc. Macintosh, IBM Corp. VESA and most UNIX graphics standards. In addition, the monitor is compatible with S-VHS, NTSC, M-NTSC, PAL and SECAM video formats and analog RGB computer resolution standards ranging from 640-by-480 to 1,600-by-1,200 noninterlaced. Pricing is $6,665.

Mitsubishi Electronics
Display Products Group
5665 Plaza Drive
Cypress, CA 90630
Circle 107

Pro CD Lets Your Mouse Do the Walking

A series of CD-ROM products are now available to help end phone book hassles. Direct PHONE is a package that contains the first national residential white pages directory to be put on

a single disk. A second disk contains a national listing of businesses. Searches can be done by name and limited by area code or address. The price is $149.

Select PHONE is a directory of businesses and residences separated onto four regional disks. The 32-bit retrieval software makes it possible to perform

Upgrades, Enhancements, Additions...

• A "Super Tuner" has been added to the Zenith Electronics HomeWorks cable modem. The HomeWorks modem is a device that allows Ethernet LANs to connect to and be run over cable TV wiring. The Super Tuner allows the modem to support high-bandwidth (750-MHz) hybrid fiber-optic and coaxial cable architectures. **Zenith Electronics Corp.**, 1000 Milwaukee Ave., Glenview, IL 60025. **Circle 108**

• UMAX Technologies has dropped the prices of its 24-bit color scanners. Formerly $999, the company's ScanOffice/CII and UC630LE are now $895 and $845, respectively. **UMAX Technologies Inc.**, 3353 Gateway Blvd., Fremont, CA 94538. **Circle 109**

• An alphanumeric pager with a PCMCIA interface has been introduced by Socket Communications. Yes, you read that right. It is a pocket beeper that can fit into the PCMCIA slot of a computer. The idea is that the user can download messages to a word processor, spreadsheet or other application running on a notebook system in the field. **Socket Communications Inc.**, 2501 Technology Drive, Hayward, CA 94545. **Circle 110**

• Care for a free Virtual X Window? At least for 45 days, at a price of $45 to cover shipping? Software Research is offering a free copy of its Virtual X-Window Server test software as a sales incentive, but the offer is good only until the end of April. The Virtual X-Window Server allows the user to simulate load for client/server applications from a single workstation. **Software Research Inc.**, 625 Third St., San Francisco, CA 94107-1997. **Circle 111**

• Pacer Software has upgraded its PacerShare and PacerPrint file and print servers for Sun systems. The new versions of the products feature easy-to-use Macintosh-based administration and management. **Pacer Software Inc.**, 1900 West Park Drive, Suite 280, Westboro, MA 01581-3919. **Circle 112**

• The Multiport/LT Router from Webster Computer has been upgraded. The product, a four-port AppleTalk Router/Ethernet Gateway, now supports remote dial-in. **Webster Computer Corp.**, 2109 O'Toole Ave., Suite J, San Jose, CA 95131-1338. **Circle 113**

• And in yet another communications-oriented upgrade, Equinox has given its multiprotocol Ethernet communications servers custom user menus. The servers, which permit serial devices such as terminals and modems to be linked to host systems via TCP/IP and other protocols, can now also support customized menus for each user or group of users. **Equinox Systems Inc.**, 6851 West Sunrise Blvd., Plantation, FL 33313. **Circle 114**

• For those who long to link Digital Equipment Corp. VMS VAX and Alpha AXP devices to TCP/IP networks, TGV is planning to release Multinet V3.3. Multinet provides TCP/IP to VMS. The new version of it will feature a menu-driven configuration utility; support for DEC's recently announced driver networking specification, Virtual Communications Interface (VCI) and several other enhancements in functionality. **TGV Inc.**, 101 Cooper St., Santa Cruz, CA 95060. **Circle 115**

• Axis Communications has announced that its Axis NPS 550 Ethernet print server now supports Simple Network Management Protocol (SNMP). The product already supports NetWare, TCP/IP, Apple EtherTalk and LAN Manager/LAN Server networks. **Axis Communications Inc.**, 99 Rosewood Drive, Suite 170, Danvers MA 01923. **Circle 116**

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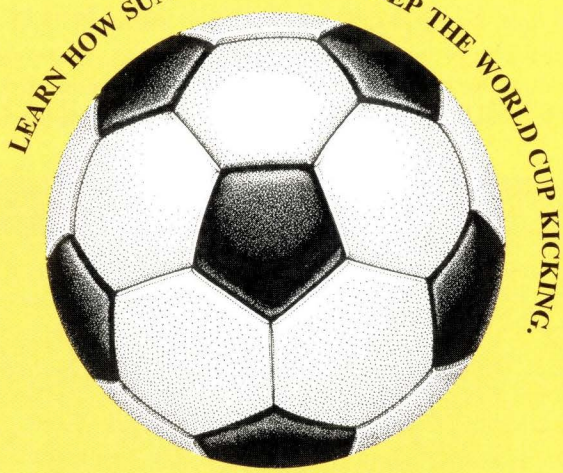

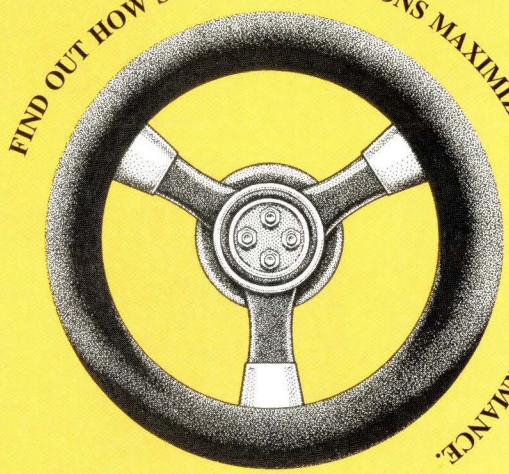

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searches by name, SIC codes, addresses and telephone numbers. Another feature of select PHONE is that users can download an unlimited number of files without restrictions or outrageous usage fees. It is priced at $299.

A third product that follows these same lines is free PHONE. An 800 number directory, free PHONE permits searches by name, telephone number or type of business. This will be the first directory to offer multimedia presentations as part of a telephone directory. This will allow businesses to add sound to the presentation, turning it into a form of advertising. Free PHONE is priced at $49.

Pro CD Inc.
8 Doaks Lane
Marblehead, MA 01945-9866
Circle 117

SpreadNet Wireless WAN

SpreadNet has announced a set of wireless linking products that allow LANs and WANs to communicate at T1 speeds, as much as 20 miles apart. Collectively known as SpreadNet, the products include SpreadNet Link and SpreadNet Wireless Link. SpreadNet Link is a bridge/router with a control processor and the company's own routing hardware. It resides in a wire- or cable-based network and provides the interface to SpreadNet Wireless Link.

SpreadNet Wireless Link, in turn, is the hardware and software that connects two or more SpreadNet sites via UHF radio spread-spectrum RF modem technology. The company says the product can support communications at ranges up to 20 miles, and in some cases–such as over water–up to 30 miles. With repeaters it can support links up to 70 miles.

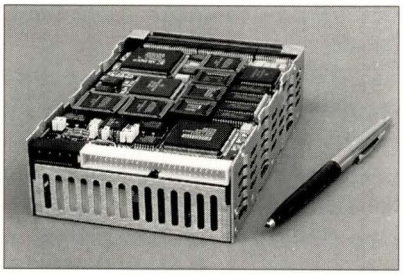
The user doesn't need a radio operator's license to operate the system. Instead, FCC regulations on this type of device require the manufacturer to undergo licensing. However, SpreadNet notes the same FCC regulations hold the user responsible for interference with the operations of other, licensed users. The company therefore strongly suggests its customers have a site survey first.

Pricing varies according to the nature of the installation. For ranges of less than five miles, SpreadNet is $9,500 per end. For ranges up to 20 miles, the cost is $13,000 per end. A site survey performed by SpreadNet is $100 per diem plus travel and expenses.

SpreadNet Inc.
11311 Stemmons Freeway, Suite 16
Dallas, TX 75229
Circle 118

3½-inch RAM Disk

Imperial Technology has announced a new solid-state RAM disk that fits into any standard 3½-inch disk bay and yet has a storage capacity of up to



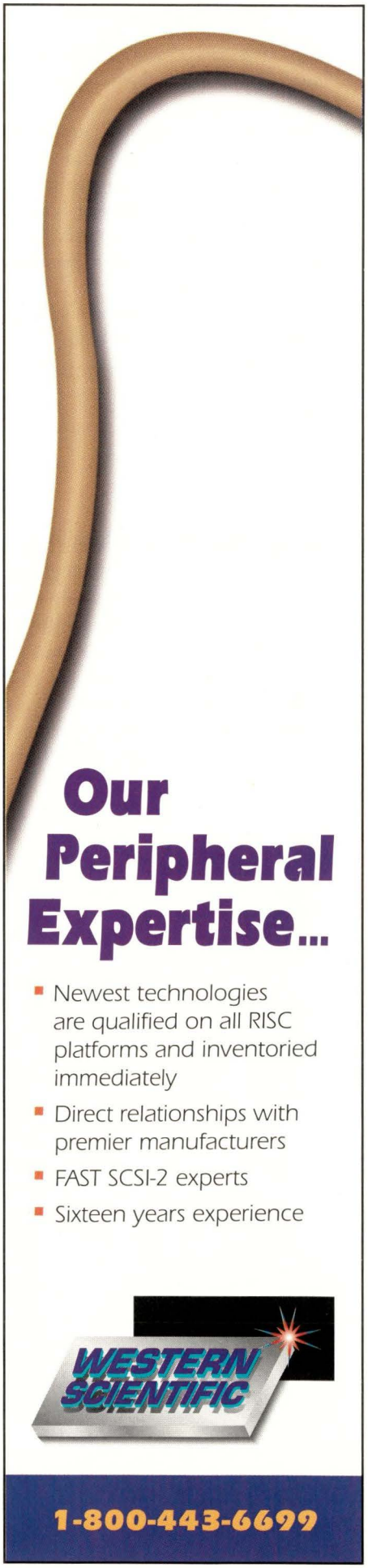
536 MB–and has the option of its own hard disk for backup. The MegaRam-35 is a solid-state disk with a SCSI-2 interface, and an access time of 35 µsec. This compares with access times of 10 to 15 msec for traditional rotating media.

The MegaRam-35 supports transfer rates of 10 MB/s. It has a optional internal battery, as well as the optional hard disk, with built-in diagnostics. It also has an RS-232 port that can be used to control and analyze the system's operation. Pricing is roughly $100 per MB of memory, with a starting cost of about $13,000.

Imperial Technology Inc.
2305 Utah Ave.
El Segundo, CA 90245
Circle 119

Desktop Video Performance Advances

A new RTV tool kit released from Parallax Graphics will allow full-motion, full-size, full-color video along with integrated audio using disk storage on video-enabled desktop computers. This could turn any video-enabled desktop into a high-performance video-editing/video-distribution system. Flexibility is added by an



Circle No. 44 on Inquiry Card

extensive API that includes RTV source code, which allows users to create custom applications.

Integrated audio accompanies 24-bit true color video presentations with CD-quality sound. The audio can be overdubbed in a multitrack format. The tool kit works with 32-bit frame buffer cards from Parallax featuring JPEG compression.

The RTV tool kit is available for Sun SPARCstations running Solaris 1 and Open Windows 3.0. The price is $995.

Parallax Graphics
2500 Condensa St.
Santa Clara, CA 95051
Circle 120

Enhanced SYSTEMWatch

OPENService SJI has added four applications to SYSTEMWatch AI-L, its automated early-warning software for UNIX. The first of these four is a file system and disk manager that tracks files and disk-usage behavior, identifies potentially dangerous growth patterns and takes action to avoid critical congestion. The second application is a swap and memory manager that monitors virtual memory and swap space and automatically increases swap space when existing space approaches capacity. Another new feature is a CPU and resource manager. This function identifies runaway processes or other problems that may impede efficient CPU operation, then initiates automated actions such as temporary stopping, reprioritizing or killing processes to manage system load. The final added feature is a daemon manager that controls background processes and averts such crises as electronic mail failure, print queue slowdown or communications breakdowns.

SYSTEMWatch AI-L monitors printers, file systems, mail queues, backups, system performance, security, user processes, customer applications and databases. System management consoles allow the systems administrator to monitor multiple hosts simultaneously. Individual hosts run a client version that gathers data, makes basic decisions and passes data and messages to the console.

Prices are $395 per host and $7,995 for the system administrator's system-management console.

OPENService SJI Inc.
9428 Baymeadows Road, Suite 132
Jacksonville, FL 32256
Circle 121

Tough and Portable SPARC Announced

Cyberchron has released a new rugged computer system capable of the highest level of computing power to date in a portable format. The CPC-

5000 is a laptop workstation featuring a Sun SPARC 10 Model 40 CPU.

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This delivers more than 96 MIPS in a 17¼- by 14½- by 4¾-inch chassis.

The most notable feature of this workstation is its ability to perform under extreme conditions. It features a welded aluminum chassis and a sealed keyboard. It has an operating temperature range of -25° to +50° C. Units are now in production, priced at $20,000.

Cyberchron Corp.
P.O. Box 160, U.S. Route 9
Cold Spring, NY 10516
Circle 122

Token Ring Print Server

Axis Communications has introduced NPS 650, a multiprotocol token ring network print server powered by a 32-bit RISC processor. The NPS 650 enables users running TCP/IP, Novell Inc. NetWare, LAN Manager or LAN Server to share printers on a network. The server works to eliminate bottlenecks with 2,000 Kb/s in throughput.

Two high-speed parallel ports and one serial port allow up to three printers to be connected to the network and simultaneously accessed by users. NPS offers SNMP support and also offers restriction options and configuration rights. The price of the NPS 650 is $995.

Axis Communications Inc.
99 Rosewood Drive, Suite 170
Danvers, MA 01923
Circle 123

CORBA Training at Last

Growing numbers of developers who want to implement CORBA can now be trained to do so thanks to a teaming of Semaphore object-oriented training specialists and IONA Technologies Ltd., developers of distributed object request broker technology.

Providing distributed object management across heterogeneous machines and operating systems has been the goal of the Object Management Group (OMG). Common Object Request Broker Architecture (CORBA) is a specification established by the OMG. Semaphore was asked to develop the course, and they came up with a five-day seminar entitled "Building Distributed Systems using CORBA." The course uses Orbix from IONA for examples and lab exercises. The cost of the course is $12,995.

Semaphore Inc.
800 Turnpike St.
North Andover, MA 01845
Circle 124

Wireless Data Link

A wireless data-link device has been announced by Communications Research and Development. Called Comrad, the product allows computers to communicate with one another

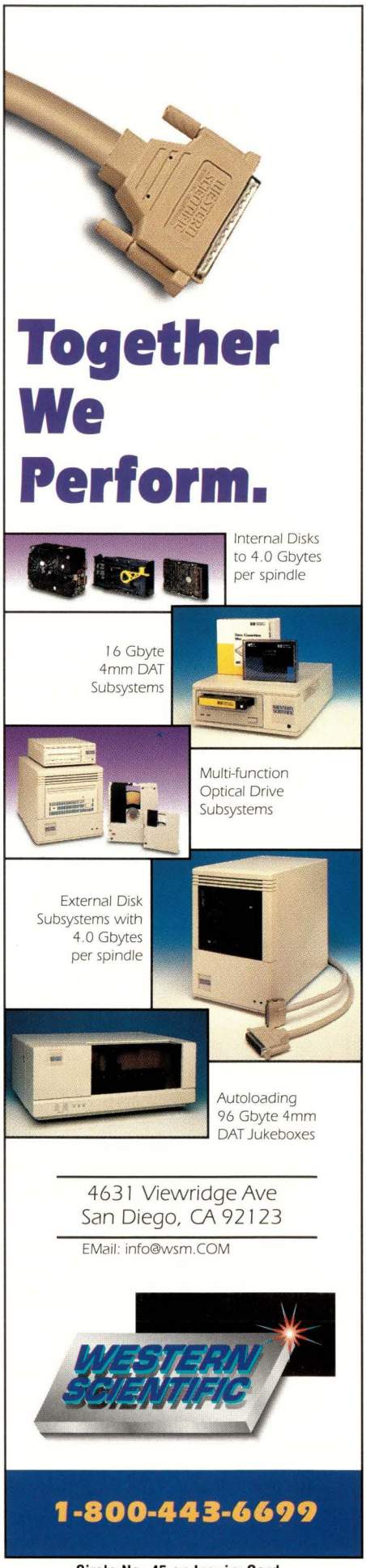
and peripherals. Each Comrad consists of a transceiver that connects to a computer, and another that connects to a target peripheral or other system. The two then communicate via ultra-high-frequency radio transmissions operating on the 900-MHz band.

The company says that Comrad can provide communications between devices even if they are separated by walls or ceilings for a range of up to 200 feet, or up to a third of a mile in unobstructed areas. The company says that because the machines operate in the 900-MHz band, they do not require FCC certification or licensing. Pricing begins at $495.

Communications R&D Corp.
7210 Georgetown Road
Suite 300/400
Indianapolis, IN 46268
Circle 125

CD-ROM Storage on a Network

Young Minds has developed a mass storage system for TCP/IP network environments. The Ultra Capacity sys-



Circle No. 45 on Inquiry Card

tem allows transparent network access to CD-ROM jukeboxes, towers and disk changers. Ultra Capacity software can be used with a Young Minds server or an existing UNIX host. All UNIX and Macintosh TCP/IP networks are supported as well as MS-DOS and Windows clients through NFS.

Network solutions include CD-ROM drive arrays, six-disk changers, 100-disk jukeboxes with one drive, 2,200-disk jukeboxes with up to 14 drives and a CD studio recording system. The price is $4,000 for the software only.

Young Minds Inc.
P.O. Box 8130
Redlands, CA 92375
Circle 126

COBOL for Solaris x86

Acucobol has completed its port of ACUCOBOL-85, an ANSI-85 COBOL compiler, to Solaris 2 for X86. This makes SunSoft's distributed computing environment available on Intel-based systems. Solaris provides transparent access to systems located anywhere on the network, including servers, printers, databases and other network resources.

ACUCOBOL includes features like programmable hot keys, advanced windowing capabilities, a user-replaceable file system and a built-in source code debugger.

A development system, which includes one run-time license and compiler, is $2,888 for 486 systems and $2,310 for 386 systems.

Acucobol Inc.
7950 Silverton Ave., Suite 201
San Diego, CA 92126
Circle 127

3Com Extends Transcend

3Com has introduced the Transcend LinkBuilder token-ring manager for SunNet Manager, NetView 6000 and HP OpenView. With it, network administrators who have chosen SunNet Manager as a network management platform can also take charge of any token-ring network in their installations.

Transcend LinkBuilder uses the RMON token-ring standard within SNMP and is said to make RMON data easier to use and understand. Transcend LinkBuilder can, for example, provide real-time graphical views of the network, perform network performance analysis, display the history of the network, and so on. Pricing begins at $4,995.

3Com Corp.
P.O. Box 58145
5400 Bayfront Plaza
Santa Clara, CA 95052-8145
Circle 128

44-GB Library

ADIC expanded its Virtual Library Systems (VLS) family of autochangers with the introduction of a 44-GB mini-data-cartridge library. The VLS-MDC is based on Exabyte's EXB-2502 high-capacity, high-speed minicartridge tape drive. It incorporates an 11-cartridge magazine for storage of up to 44 GB. The minicartridge model is the midrange entry in the VLS family that offers capacities from 5.6 GB with optical drives to 120 GB with 8mm helical-scan devices.

The changer mechanism uses the standard SCSI-2 command set. The

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Software Development in a Client/Server World

Multiplatform, multivendor, multiple databases and query languages, multiple APIs multiply the headaches for programmers who have to deliver information to the desktop. Can the current crop of development tools – portable GUIs, CASE products, 4GLs, etc. – reshape the data center to ease the migration to a client/server data model?

BONUS DISTRIBUTION
SunWorld Expo, *San Francisco, CA*

autochanger and drive SCSI ID addresses are independently set from the front panel. Cheyenne's ARCserve 5.0 and Legato's NetWorker software currently support ADIC autochangers. Pricing starts at $10,900

ADIC
14737 N.E. 87th St.
Redmond, WA 98073-9757
Circle 129

Neural Networks Made Easy

Propagator, a neural network development system from ARD, allows programmers to create accurate predictive models. Users do not need to be neural network experts to use the system. Propagator uses an intuitive point-and-click GUI to reduce the effort it takes to train on neural networks.

Three main dialog boxes control the setup of numerous variable neural network parameters including learning rate, momentum, number of layers, transfer function, noise, initial weights, stopping criteria and more. Two unique support programs are included with the system. The first, a scaling program, adjusts the network input data and sets the delimiters for efficient use. The second support program is a source-code generator program that creates the C code implementation of the trained network for use in custom applications.

Propagator runs on SPARCstations with Solaris 1.x or Solaris 2.x. Price is $499, with free technical support.

ARD Corp.
9151 Rumsey Road
Columbia, MD 21045
Circle 130

Client/Server Switching Hub

Network Peripherals gives the networking world the EIFO (Ethernet In, FDDI Out) switching hub. The hub is meant to be a low-cost migration path to high-performance networking without sacrificing existing Ethernet investments.

When connected to 100-Mb/s FDDI through the EIFO, servers can deliver speeds of 100 Mb/s. Though the hub may appear as a 10BaseT hub with an FDDI network connection added, each of the 12 10BaseT ports is a dedicated Ethernet segment, not part of a shared 10-Mb/s backplane, as with ordinary 10BaseT hubs. SNMP management is included.

Pricing starts at $7,495 for an EIFO equipped with a single-attach UTP FDDI uplink.

Network Peripherals Inc.
1371 McCarthy Blvd.
Milpitas, CA 95035
Circle 131

Software Testing for Client/Server

The uncertainties of software testing under full-load conditions may be a thing of the past thanks to an automated software testing package for client/server UNIX system developers. Mercury Interactive–manufacturers of XRunner, a single-user test package–has introduced LoadRunner, which emulates large numbers of users running in parallel to stress-test and tune an application before product shipment, rather than using the first installation as a test site.

Large numbers of users can be tested with only a few machines by running many virtual users on one machine rather than one machine for every "user." This design allows for control of all emulated users from a single station, and it collects results and organizes them for analysis. Pricing is $70,000 for one controller and a 25-virtual user license.

Mercury Interactive Corp.
3333 Octavius Drive
Santa Clara, CA 95054
Circle 132

Tadpoles Need Storage Too

A 525-MB (formatted) portable external SCSI disk is now available from Tadpole for the SPARCbook family. With a soft carrying case, an integral battery and a weight of 2.75 lbs., it's easily portable. Easy connection directly to the SCSI-2 port on the SPARCbook 2 is guaranteed by using the SCSI adapter cable and the SCSI-2-to-SCSI-2 cable supplied with the disk drive. On the SPARCbook 1, the drive is attached indirectly using the S1-SCSI parallel-to-SCSI host adapter. For in-office use, the drive has a main power connection and can be daisy-chained with other mass storage peripherals.

The disk has an average seek time of 12 msec and average burst-transfer rate of 10 MB/s. Software support for the disk is provided under Solaris running on SPARCbooks. The drive should be ordered as Part No. SB-X525HD. List price is $1,950, including cable, carrying case, user manual and cords.

Tadpole Technology Inc.
12012 Technology Blvd.
Austin, TX 78727
Circle 133

New Print Engines for OEMs

The Computer Peripheral Products Division of Canon U.S.A. has announced availability of the LBP-NX 600 laser beam printer engine for OEM applications. This engine delivers 600-dpi quality at 17 ppm. Resolution of 600 dpi ensures bold graphics and typeset-quality text. The LBP-NX 600 accommodates a user-installable duplex module for two-sided printing, and OEM proprietary controller coupling makes network printing possible.

Like other Canon LBP engines, this takes Canon's EP cartridge system, which uses ultrafine toner and has an 8,000-page print life. OEM pricing was not available at press time.

Canon U.S.A. Inc.
1 Canon Plaza
Lake Success, NY 11042-1113
Circle 134

Correction

David Bynon (*SunExpert*, January, Page 49) is manager of storage product marketing and development for Andataco, a UNIX systems integration services provider in San Diego.

Legato Systems Inc. (January, Page 52) has moved to 3145 Porter Drive, Palo Alto, CA 94304.

The correct address for Artecon (January, Page 79) is P.O. Box 9000, Carlsbad, CA 92018-9000.

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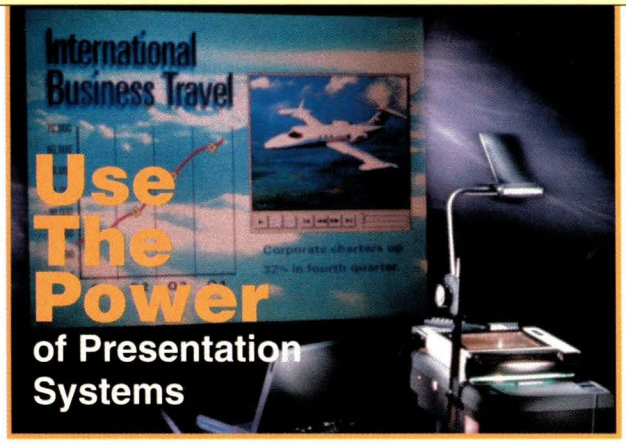

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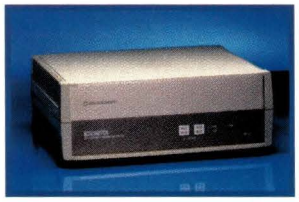

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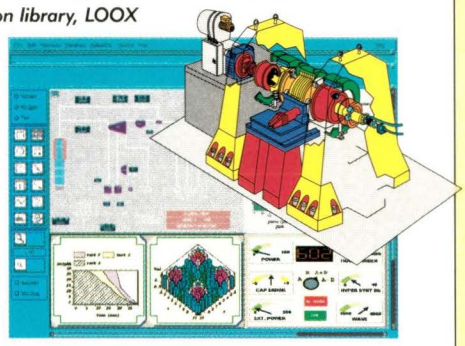

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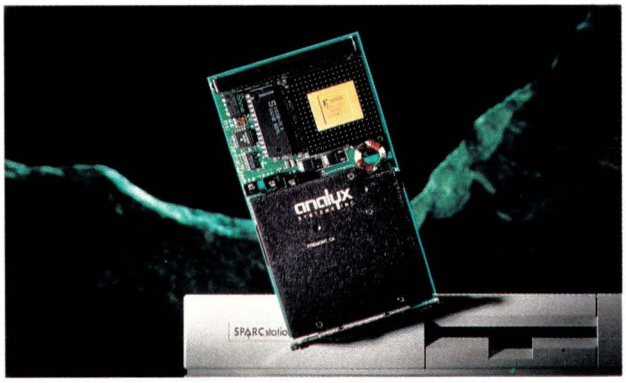

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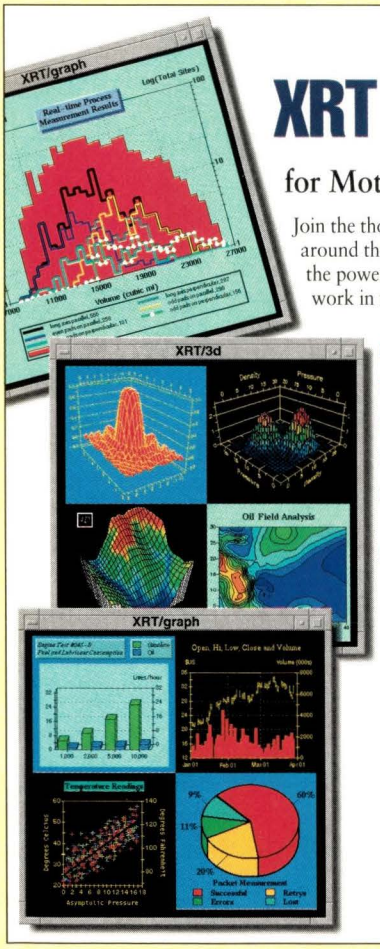

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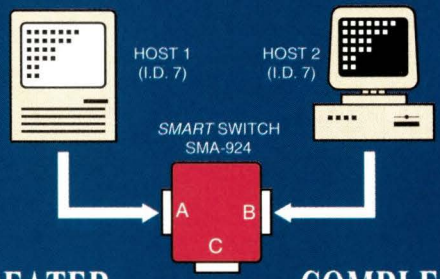

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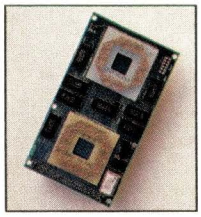

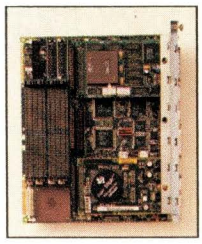

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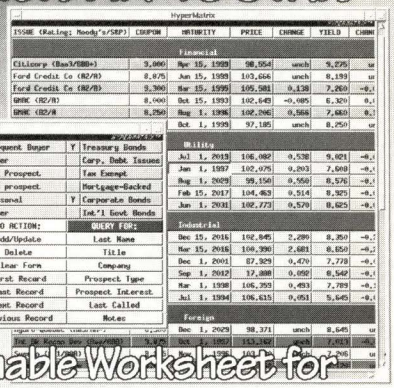

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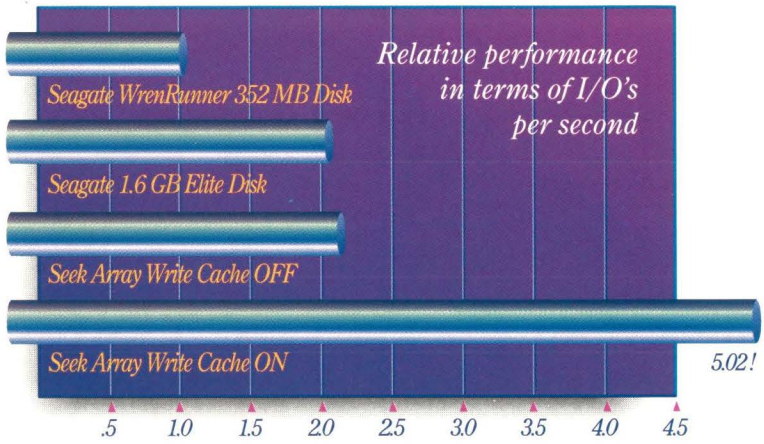

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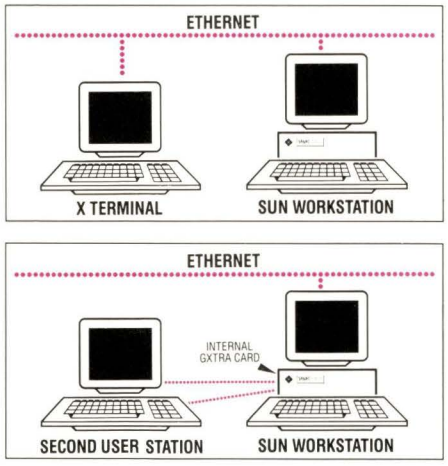

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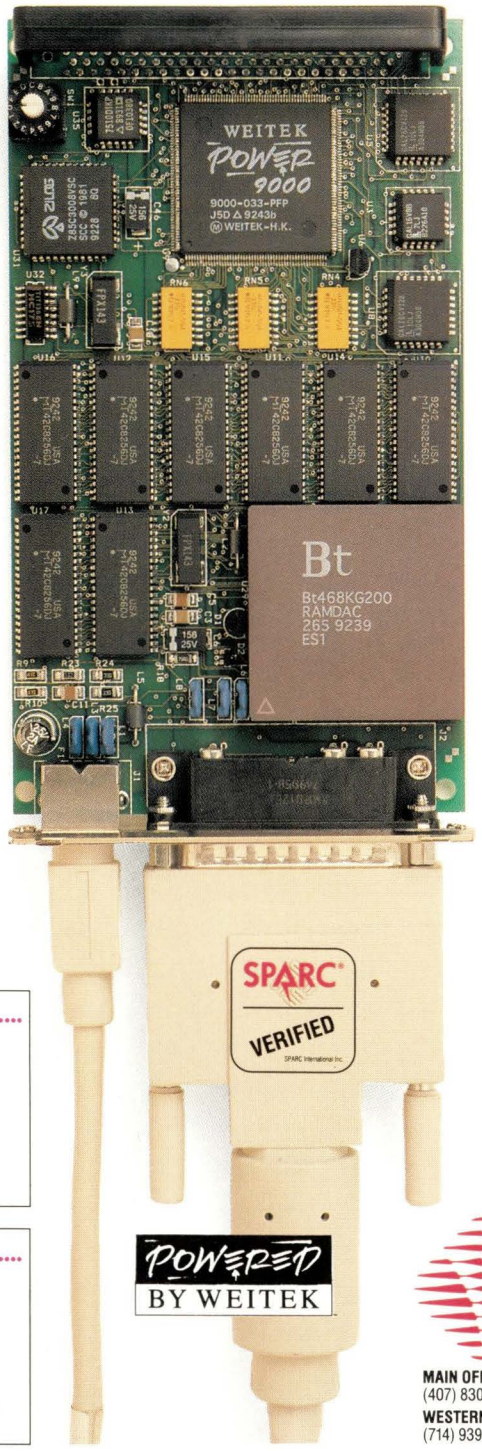

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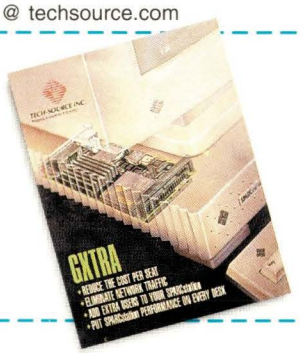

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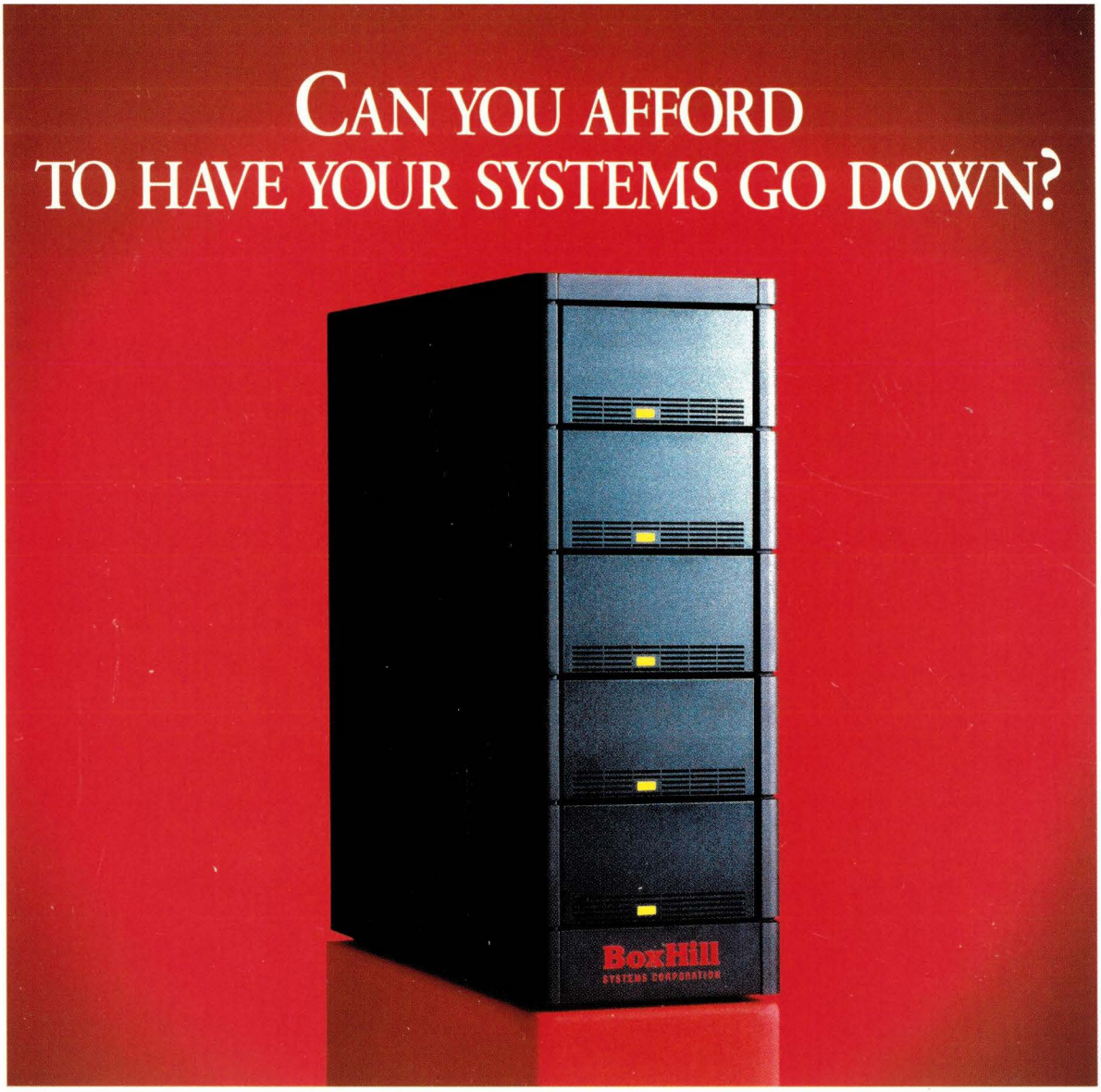

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