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UniForum MONTHLY

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The International Association of Open Systems Professionals

THE MAGAZINE FOR OPEN SYSTEMS PROFESSIONALS

Integration Case Study: A Wall Street Story

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Lessons from the Front

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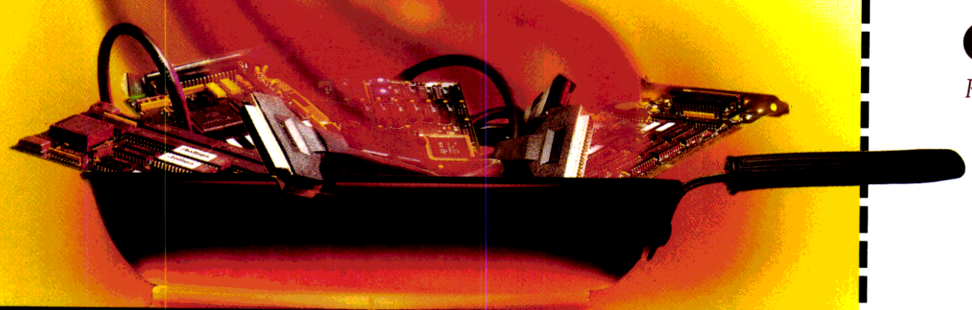

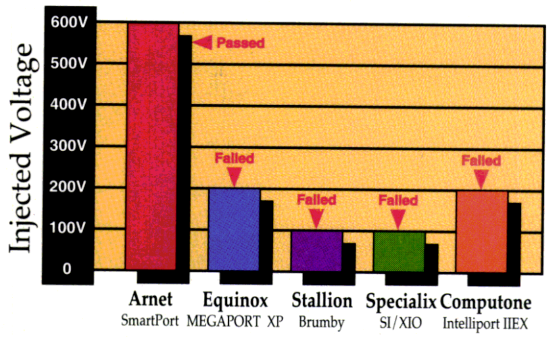

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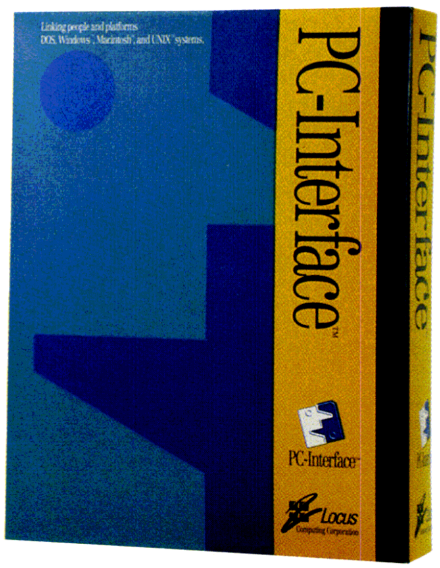

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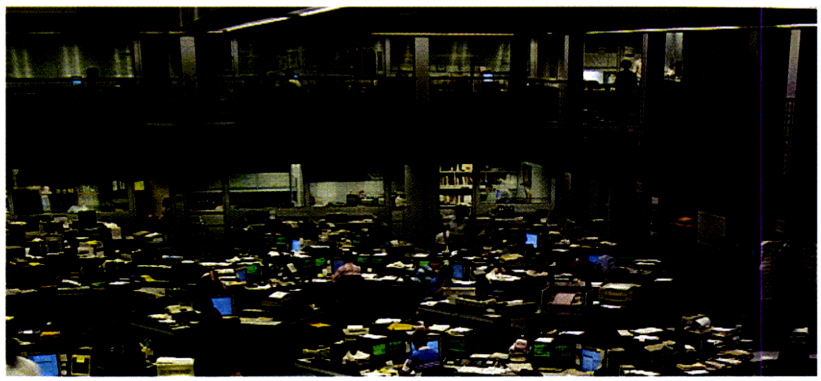

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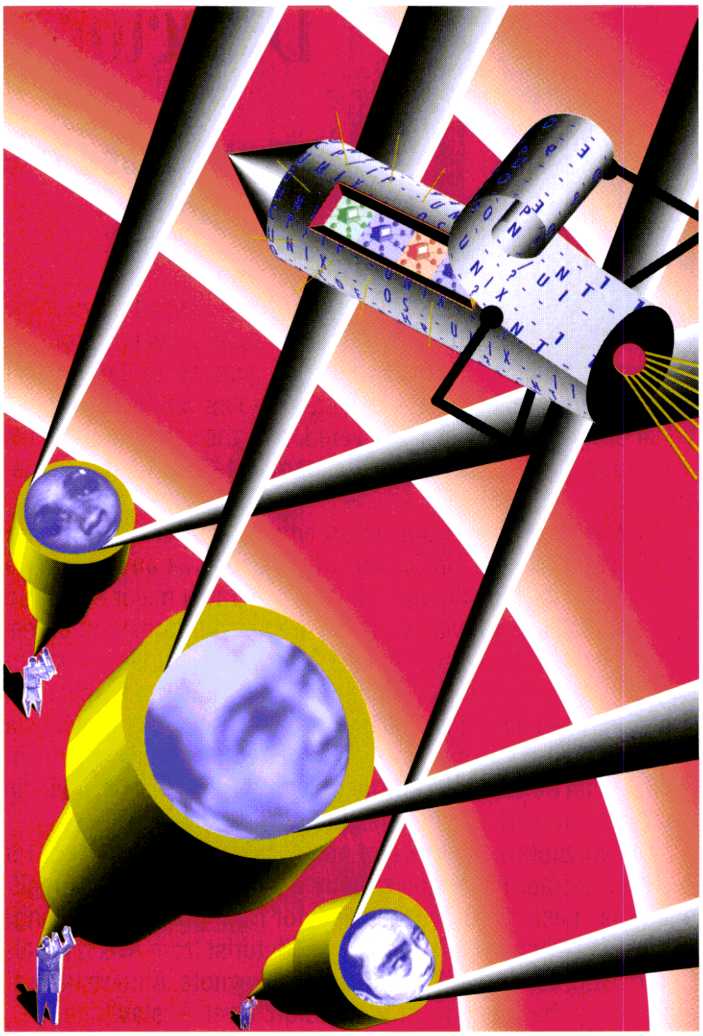

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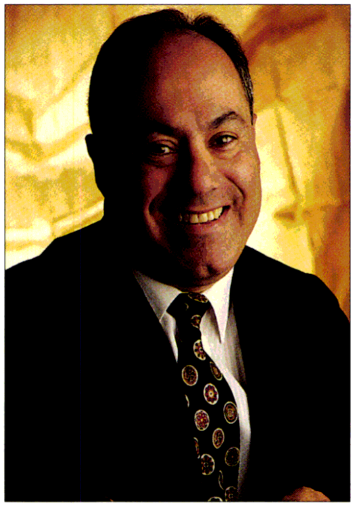

From the Director

Why You Need To Be at UniForum '94

For more than a decade, The UniForum Conference and Trade Show has brought together the industry's leading professionals in UNIX and open systems. UniForum '94's program of sessions, tutorials, workshops, plenaries and keynotes will be the most comprehensive educational program we've ever delivered. It is the scope and content of this program that makes me urge you to be with us March 21-25 at the Moscone Center in San Francisco.

Most trade shows put on an educational program — sort of tacked on as an afterthought. Not so UniForum, which began as an educational event and has never lost that focus, even though it has grown into a major event for exhibitors.

Our goal is to provide you with the latest information on new technology in a field where obsolescence occurs faster than anyone thought imaginable. We do this in two ways: through the UniForum Trade Show you'll find what's available now and in the near future, while at the UniForum Conference you'll learn what the future will bring. You need both to be successful and that's what you'll get at UniForum '94.

So, what do we have in store for you? The specifics are in the Show Preview in this issue, but here are some highlights:

Our Keynoters really are of note. We have chosen extraordinary people who have achieved extraordinary goals: Andy Grove, the master strategist who put it all together at Intel; Lester Thurow, the educator from MIT who challenges our way of thinking; and Dennis Ritchie, the trailblazer and futurist from AT&T. We also have Robert Palmer, CEO of DEC, for our first-ever afternoon keynote. And we have a few more surprises up our sleeves that can't be announced quite yet — stay tuned!

Our Conferences and Tutorials give you real value: We've brought back the very successful two-day Technology Managers Conference by Hurwitz Consulting; and important new collaborative arrangements with two of our industry's premier user groups have brought us Security and Systems Administration tutorials from USENIX/SAGE; plus a management seminar from MOSES on UNIX and the Large Data Center. These special events, together with seven complete conference tracks, make UniForum's educational program better than ever before.

Our first ever **International Teleconference** hookup will shrink the global village: UniForum '94's keynote addresses will go out live via satellite to concurrent UniForum '94 meetings held in New York and Europe.

And what about a **Beach Boys Concert** at the UniForum '94 party? It's happening, and you must be registered to attend.

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Richard H. Jaross
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Letters To The Editor

CDE Developers Conference: The Event....

After thinking long and hard about it (and justifying the cost), I decided to attend the Common Desktop Environment (CDE) Developers Conference. I'm glad I did.

Glad because my worst fear did not materialize. I've attended industry sponsored developer conferences before and have come to expect a great deal of commercial speechifying and not-so-subtle selling going on. When I saw that CDE was being put on by such major companies as IBM and HP my first thought was that this conference was also going to have more than a little hard sell. What didn't dawn on me until I got there was that because the sponsors *were* competing companies, the commercial "buy me" messages were at a minimum. This was refreshing, and I guess inevitable that with five giant firms all on stage at the same time they couldn't all monopolize.

What I really came for, of course, was to learn about the specification, and the meat was on the bone. The work that went into creating the CD-ROM, and the presentations given by the software architects made my trip worthwhile. I don't think I'm going to write new programs based on the demo disk, but its going to be fun crunching through it. Maybe those of us who are playing around with it should share experiences over the Internet, yes?

Philip Farnow
SoftDev Inc.
Franklinburg, Calif.

The Maven — Evermore

I am inspired to write to you in appreciation for your printing the truly amazing poem, The Maven, by David Sherr ("Back Door," November *UniForum Monthly*). Please tell him for me it has been passed around the college and far beyond. I don't pretend to get all of Sherr's inside allusions and jokes, but that's not the point. The creative talent and energy that went into The Maven made it a Joy (sorry) to read.

Elizabeth Boylan
Queens College
New York, N.Y.

Editor's note: *UniForum Monthly* invites readers to submit humorous articles, observations and other creative work for "The Back Door." Send your best to us in care of Susan Bryant, managing editor.

LAN Chaos?

I found myself nodding my head in agreement as I was reading Philip Gill's article on the problems Northwestern Mutual was having with its e-mail systems ("The Trouble With E-Mail," November *UniForum Monthly*). Gill reveals that the company was struggling with three separate and incompatible e-mail systems. I wonder if Northwestern is sure they had just three. These things seem to grow by themselves in de-centralized departments and their proliferation is symptomatic of a disease I call Creeping LAN. Creeping LAN is most commonly seen in patients (MIS managers at companies that have LANs, are building or expanding LANs), and can lead to a more serious condition known as LAN Chaos.

If you think MIS departments had problems with PC chaos in the 1980's, just wait until the light starts to get into the backrooms where the LANs are multiplying. Gill's article is a good case study of how to regain control over e-mail, but in reality it serves to illustrate a bigger and more pressing need – the re-establishment of control over networking within a heterogeneous computing environment. MIS managers, who are faced with the challenge of remaining relevant in the world of open systems computing, must now also face up to the need to become experts in aspects of communications networking. Are we up to the task?

Gordon Haight
Providence Mills Inc.
Woonsocket, R.I.

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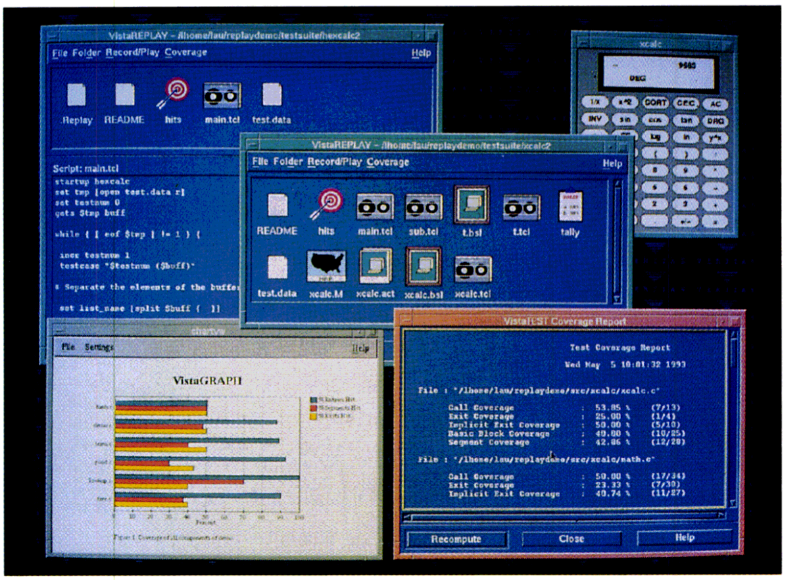

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Coming Next Month:

X/Open: The New Shepherd of UNIX

UniForum Monthly sets out to discover more about X/Open Co. Ltd., and the increasingly important role it is playing in helping to end the UNIX wars. We'll talk to the X/Open leaders who are in the know.

Integration Case Studies

How MIS managers wrestle with disparate systems is the theme of this new series that continues in February with a case study of the Georgia Medical Care Foundation.

UniForum '94 Show Program

You've heard about it, you've read something about it, now here's the whole thing! The complete, soup-to-nuts UniForum '94 Show Program is in the February issue — save it!

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Milt Johnson, Design Engineer, DigiBoard Cluster Technology Team

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Has NT Lost Its Luster?

It seems that there may truly be some things that money can't buy, even if you're Bill Gates. After all the hype and suspense around its introduction, it seems Microsoft's Windows NT operating system is meeting with less than enthusiastic reception in the marketplace, now that it has passed from the realm of vaporware into the real world of operating system software. Surely NT is winning important converts. Those publicly named thus far include Nordstrom Co. and Bank America Corp. Increasingly, though, NT's shortcomings are coming to light. In press reports, early users rate NT a slow performer, say it lacks sufficient networking capabilities, such as Netware, NFS and TCP/IP, requires expensive high-end hardware configurations and has virtually no native 32-bit applications. On the plus side, users say NT is robust, secure and provides a consistent user interface.

Not to worry, nor rejoice. NT is far from dead, despite some premature reports, says David Smith, director of UNIX system and software research, at International Data Corp. (IDC), Framingham, Mass. The newer, less glowing assessments of NT are only the natural result of what happens to an operating system when it passes from vaporware into the marketplace, and users can get their hands on real code. The result: a more realistic assessment. "Until NT shipped, the only thing people could evaluate was the press it was getting," says Smith. As for beta-version users who had their hands on it before general release, he says, they couldn't tell whether NT's flaws were inherent, or because they were using beta-version code. "Now that it's real, they [users] tend to show its flaws," he said.

Smith says he believes that much of the current publicity (including some reports that NT is dead!) makes Microsoft to some extent a victim of its own excessive hype. "NT was overhyped to the point where it was actually detrimental to Microsoft," Smith says. "The company can't live up to the expectations it set." However, Smith says the industry should make no mistake about it, "Microsoft is behind NT all the way. They're prepared for the long haul."

Mostly, though, it appears users are confused about NT, about what it is and is not. "People on the server side say it's a desktop thing, and people on the desktop side say it's a server thing," says Smith. "And everybody says it's going to be big, but not in my market." Then there's the confusion that Microsoft itself has created, some say, by airing too many of its future plans at once. Chuck Musciano, a manager in Harris Corp.'s advanced technology department and a Sun/Solaris user, put it succinctly in a recent SunSoft broadcast: "Microsoft now says that you should use NT as a server operating system and Windows on the desktop," said Musciano. "Then Windows will become Chicago, and NT will become Cairo. We're not dealing with one OS here, but four. As a systems manager, you know the nightmare of managing one OS. Can you imagine four?"

The question of whether or not NT will be a success remains up in the air, and depends on one's perspective, says analyst Smith. NT clearly won't take over the world, but will it ship a million copies a year? That's a possibility, says Smith. And what about NT as an advanced enterprise-wide operating environment? "The bottom line is risk avoidance," says Smith. Not so long ago, MIS viewed UNIX as a big risk. Now, says Smith, MIS is taking a risk if it doesn't go UNIX in some fashion, and NT is where UNIX was five years ago. "It doesn't mean that because you decide to take a risk," Smith says, "that you make the riskiest choice."◆

NEWS BRIEFS...

The **X Consortium**, recently spun off from Massachusetts Institute of Technology (MIT), will preview version 6 of the X Windows standard at the upcoming 8th Annual Technical Conference later this month in Boston. Slated for an April release, version 6 enhancements include support for the X Image Extension (XIE) standard for advanced image processing; the Fresco object-oriented interface, a next-generation C++ tool kit; internationalization, supporting input and output of different native languages; low-bandwidth X (LBX), efficient X over serial lines; network audio, to support X's move into the multimedia arena; multithreaded server and libraries; and the ability to run X applications on Microsoft Windows NT. ...While all the attention is focused on the possibility of a major legal tussle between **SunSoft**, Sun Microsystems Inc.'s systems-software business unit, and Microsoft Corp. over Wabi, which allows users to run Windows applications unaltered on Sun/Solaris and other UNIX workstations platforms, Sun has not forgotten about Macintosh users. In its recent broadcast about enterprise-wide computing issues, one user asked if **Apple Computer Inc.** Macintosh users weren't being forgotten in all the rush to accommodate Windows users and their applications. That's when SunSoft president Ed Zander let it drop that the company has been talking to Apple Computer over the possibility of licensing a technology that Zander referred to as "SoftMac." Zander didn't say what SoftMac is, but presumably it would do the same for Macintosh applications as Wabi does for Windows applications — let them run out-of-the-box on Solaris systems. After realizing his slip, Zander said he didn't want to preannounce anything, but then, he added with a smile, he guessed he already had. In any case, Zander said users should look toward an announcement on the SunSoft/Apple agreement early next year.◆

PARALLEL PROCESSING: BOOM OR BUST?

An apparent boom in parallel-processing product introductions last November may actually be the first sign of hard times ahead. In November, IBM, NCR and Thinking Machines Inc. introduced new product lines, while Informix Inc. joined rival database vendors Oracle and Sybase in offering a parallelized version of its Informix On-Line relational database. After years of promise, all this activity might make it seem that parallel processing is coming of age as a technology for mainstream commercial applications.

But on closer examination, one analyst says major barriers remain. Richard Partridge, a senior analyst at D.H. Brown Associates, Port Chester, N.Y., says that the federal government has been the prime customer for parallel-processing vendors. As government funding dries up for their products, parallel-processing vendors are currently pushing into commercial applications, but with little success. Parallel-processing systems have always offered a price/performance edge over traditional large-scale systems, such as mainframes, says Partridge, but software remains the biggest challenge. Scientific and technical users are used to writing new software with each project, while commercial users live with the same legacy applications for 15 to 20 years or more, and they are not about to rewrite their existing legacy mainframe applications to take advantage of parallel-processing architectures, he says. Any vendor hoping to capitalize on commercial applications will have a long wait. Indeed, an IDC study projects parallel-processing system revenues will grow a modest 10 percent next year, from $312 million in 1993 to $344 million in 1994.

Instead, Partridge says success in the commercial market for parallel-processing system vendors may lie in staking out niches that need the raw I/O performance a large-scale multiprocessing system offers, not in applications that exploit parallelization. For instance, he says some parallel-processing systems would make excellent video servers for cable TV providers who want to offer on-demand movie libraries to their customers. In this application, parallel-processing systems would offer superior I/O capabilities able to respond to multiple, simultaneous requests for movie playback.◆

Speakers Named for UniForum '94

An internationally known economist, the CEOs of Intel Corp. and Digital Equipment Corp., and one of the creators of UNIX will be among the featured speakers at the UniForum '94 Conference and Trade Show March 21-25.

Dennis Ritchie, one of the two creators of UNIX; Lester Thurow, dean of the Massachusetts Institute of Technology's Sloan School of Management; and Andy Grove, president and CEO of Intel Corp., will keynote the 11th annual UniForum show, the largest such gathering dedicated to UNIX and open systems.

In addition, Robert B. Palmer, president and CEO of DEC, will give an address Wednesday, March 23 at 3 p.m. on the topic, "Beyond Open and Proprietary Environments."

Ritchie, with AT&T Bell Laboratories since 1968 and now engaged in research concerned with the structure of operating systems, will speak Friday, March 25, on "The History and Problems of UNIX," including how UNIX developed, and explain how events in its early life affected the operating system of today. In addition, he will cover what could drive the operating system of the future and how it may benefit from past experiences.

Thurow will speak Thursday, March 24, on "The Changing Global Economy and its Implications to IT." Thurow is a world-renowned economist and distinguished professor who has taught at MIT for more than 20 years. Vice president of the American Economics Association, he is author of several books, including the best-sellers, *The Zero-Sum Society* and *The Zero-Sum Solution*, which advocate the need for a more competitive U.S. economy. Thurow's newest book, *Head-to-Head: The Coming Economic Battle Among Japan, Europe and America*, was on *The New York Times* best-seller list for more than six months.

Grove will speak Wednesday, March 23, and will analyze forces affecting the UNIX industry from without and within. Grove was born in Budapest, Hungary, in 1936. He graduated from the City College of New York in 1960 with a bachelor of chemical engineering degree and received his Ph.D. from the University of California, Berkeley, in 1963. Upon graduation, he joined the research and development laboratory of Fairchild Semiconductor and became assistant director of research and development in 1967. In 1968, Grove participated in the founding of Intel Corp. In 1979 he was named its president, and in 1987 he was named chief executive officer.

Palmer will describe what role open and proprietary operating systems will play in the computing environments of the '90s. What customers really want in a computing environment goes beyond the semantics of "open" and "proprietary," Palmer says, consisting of commonality, interoperability, functionality and performance. Today's systems have not necessarily been designed with that in mind, Palmer contends. He will explore how, with the right architectural approach, the computer industry can design systems that deliver both universality and robust functionality.◆

QUOTABLE

"We have to come out of the glass house ourselves, or the glass house will be torn down with us inside it."
— Dennis Jones, senior vice president, Federal Express Corp., during a SunSoft broadcast on downsizing and advanced operating system environments.

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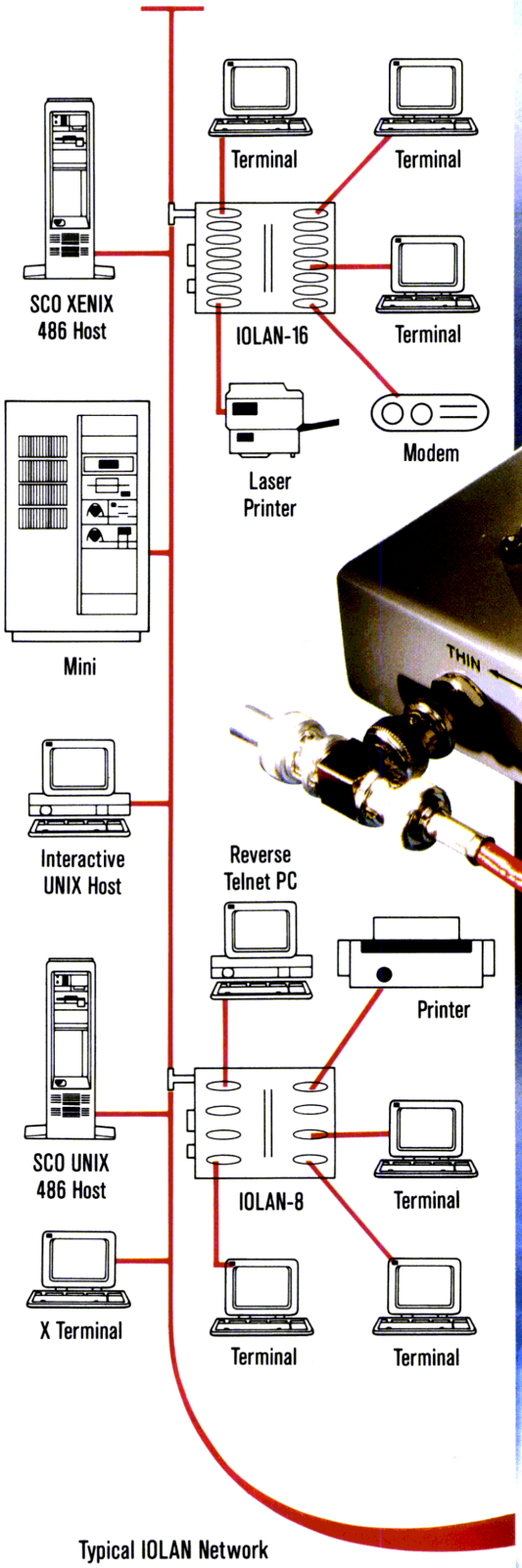
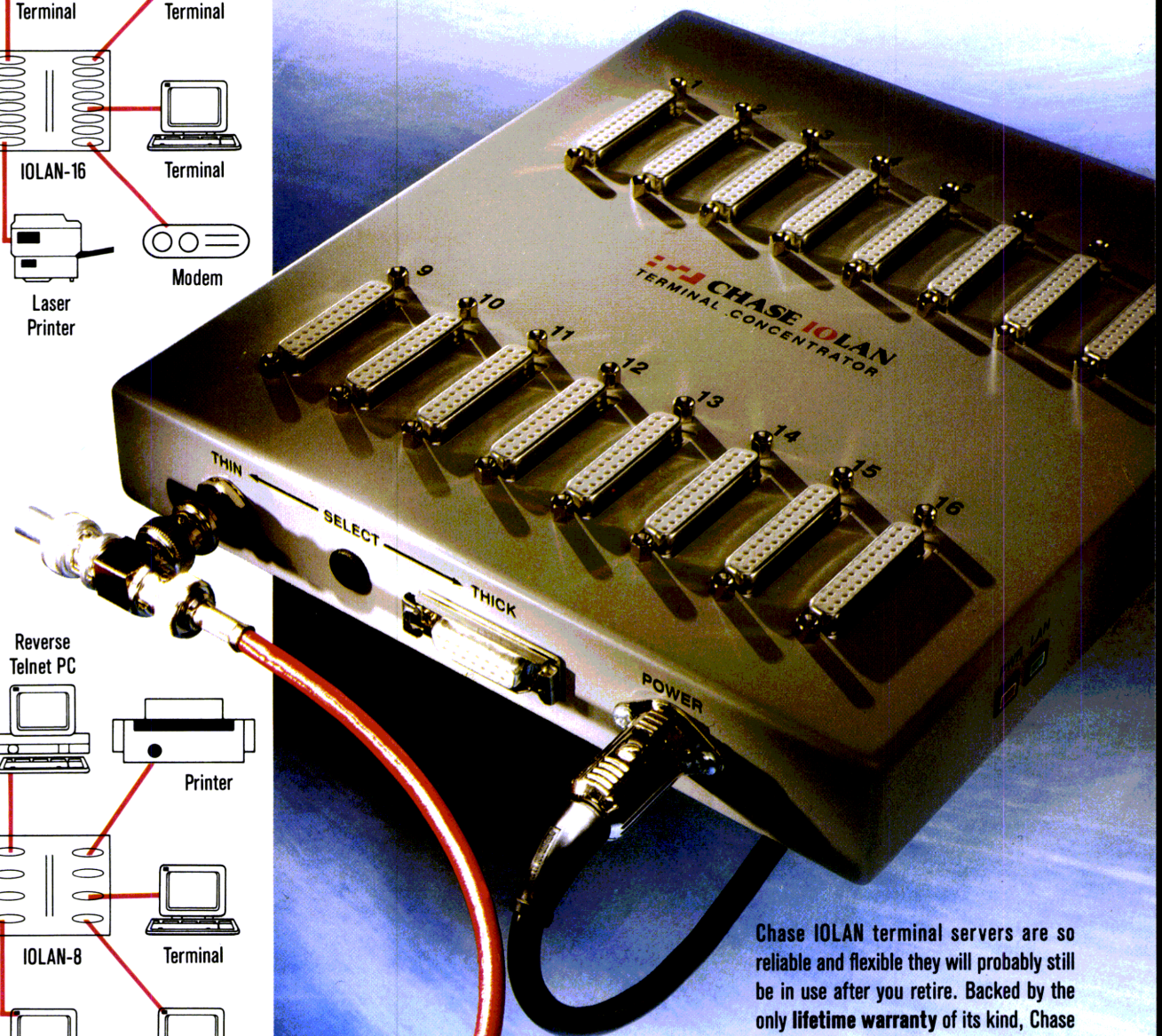


Typical IOLAN Network

Ethernet – TCP/IP based LAN.



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GLOBAL, MOBILE AND SECURE: **LESSONS** FROM THE OPEN SYSTEMS **FRONT**

By Barry D. Bowen

AT A GLANCE

Swiss Bank Capital Markets and Treasury has deployed distributed client/server applications on a global, secure network, and is now looking to build in secure mobile capabilities.

Drawing on nearly a decade of client/server experience, Swiss Bank's director of financial systems development lays out four fundamental principles that may be easy for the busy open systems professional to overlook:

- Applications should not be "moved" to a network; they should be designed for the network.
- Applications should not be "moved" off the network; they should be designed for mobility.
- Make the up-front investment in the proper tools.
- Let the economics dictate the technology.

A small options and futures trading firm based in Chicago called O'Connor and Associates grew out of the early 1980s to become a highly profitable powerhouse. One important factor contributing to its success was its drive to push the boundaries of computer technology. O'Connor's leading-edge implementation of a distributed client/server architecture based on open systems led first to a technology joint venture with Swiss Bank Corp., Basel, Switzerland, and then — in the fall of 1992 — to a merger into Swiss Bank's Capital Markets and Treasury business, based predominantly in Chicago. In the process, Swiss Bank learned invaluable lessons on the open systems front.

Much of the senior technical staff in Capital Markets and Treasury have roots that reach back several years into the O'Connor era, and they are bringing that collective experience to bear on building an information technology (IT) infrastructure that is "totally global, totally mobile and totally secure," said Pat Kerpan, executive director, information technology, who oversees the development of proprietary financial trading systems on open systems platforms, and their deployment onto the global network.

Swiss Bank organizes its IT history, and its vision for the future, by means of a simple pyramid of seven technology layers. The base of the pyramid is computing hardware, upon which sits operating systems, networking, databases, data distribution, applications, and finally, end-user computing. Kerpan notes a number of stages where the company created its own systems because commercial technologies had not yet evolved to meet their business needs.

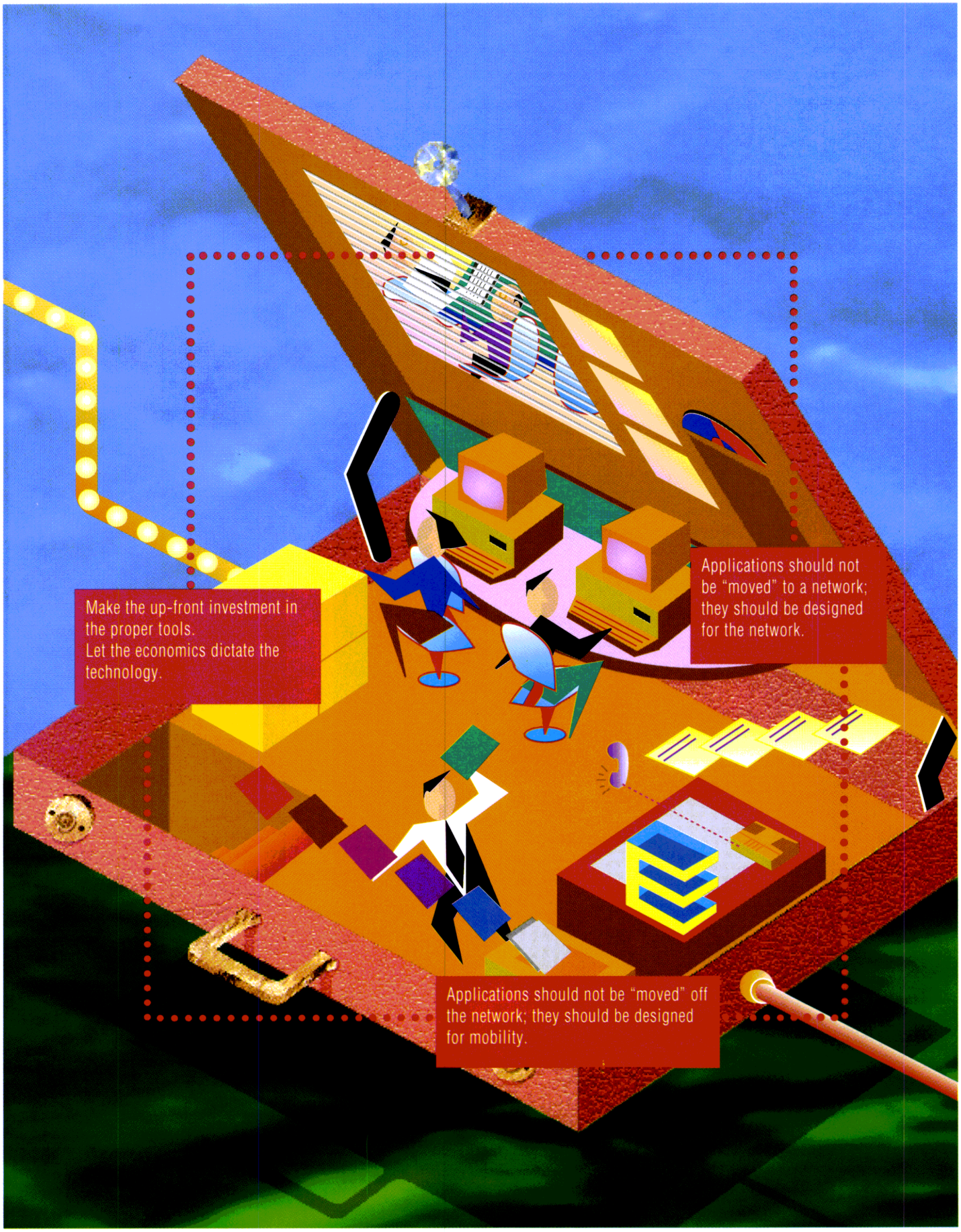
In 1981 and 1982 Swiss Bank was burning EPROMs and hacking on operating systems in order to create watch buffers to track options pricing. In 1983 the company was networking machines designed to be stand-alone hosts. In 1985 O'Connor made the leap to Sun Microsystems because of its UNIX OS and its TCP/IP networking technology. Commercial technology was finally able to fulfill the company's most fundamental IT needs.

Like a rising tide, commercial technology gradually displaced home-grown solutions on the bottom half of Kerpan's pyramid. Data distribution for the company's global network is now the threshold layer, he said, where some commercial capabilities exist but no off-the-shelf technology can match what they have built. Swiss Bank has a secure global network where applications deployed worldwide tap distributed data that sits in memory, out on the network, close to end users. Centralized databases provide recovery points in case someone "pulls the plug," Kerpan said.

With 500 subnets, 1,500 servers and 6,000 nodes worldwide, Kerpan said several of their suppliers have described them as having the largest single network of its kind to run on their equipment. As Swiss Bank looks toward its vision of a completely secure mobile capability, Kerpan said it will have to revisit lower technology layers to determine where the company will choose to cook up solutions on its own, versus waiting for their commercial suppliers to deliver the goods.

> "I think it's a very common mistake... to deploy their database in one city, ship the applications out to the other two offices and fully expect... to have quality response times."

In looking back at what the company has accomplished, and forward to new challenges, Kerpan described four practical lessons for open systems professionals involved in building and managing the development and deployment of distributed client/server systems.


Make the up-front investment in the proper tools.
Let the economics dictate the technology.
Applications should not be "moved" to a network; they should be designed for the network.
Applications should not be "moved" off the network; they should be designed for mobility.

"Suddenly the harried CIO ... has engineers saying things like SMP... and...'Don't worry, replication servers are coming any day now,' and the CIO... has no idea what they're talking about. They shouldn't have to know. Those engineers should have thought about the network as being the bone and sinew of the system, not some water slide to zip down on a lazy day."

DESIGN FOR THE NETWORK

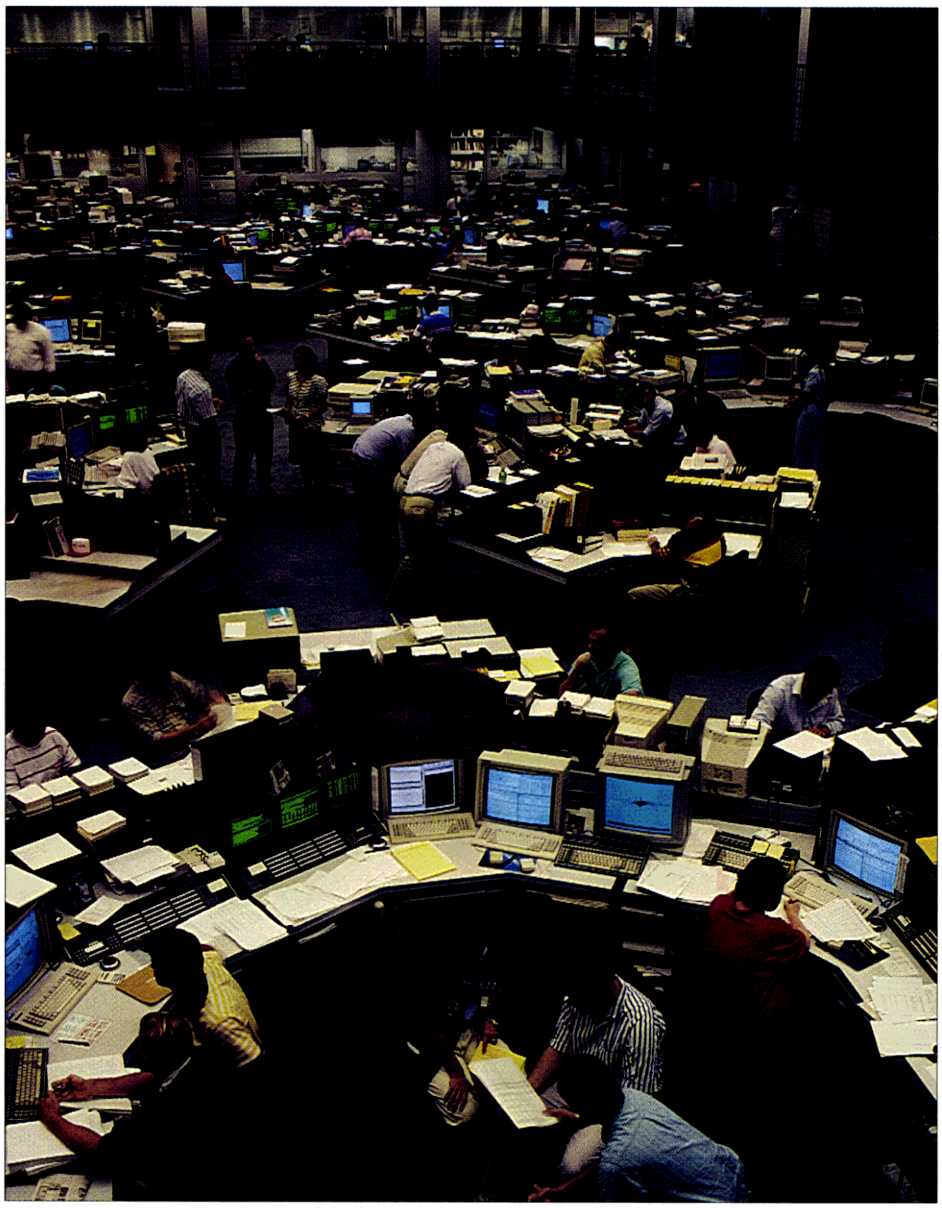
Kerpan's first principle is that successful applications or systems are not moved to the network — they are designed for the network. With many information technology departments preparing to move beyond client/server prototypes to deploy production systems, Kerpan's recommendation to "design for the network" is timely.

Open systems professionals involved in moving host-based application environments to a client/server network need to pay particular attention to the impact a company's host-based culture may have on the thinking of developers and managers. "When people with a host-based background first move to distributed computing," Kerpan said, "they tend to think of the network as merely some sort of highway." But cars are not designed in a vacuum and then thrown on the highway, he notes. An automobile supplier must think about the resistance quality of the rubber in the tires, the turning radius, and how highways get banked and graded, and then account for these variables in the car's design.

Third-party application suppliers do some of this, Kerpan said, but internal development projects have the opportunity to take into account the specific conditions of the network within which their applications will function. All too often a development team may set up two systems on the same sub-net, one as a server and another as the client, and then proceed to build and test an application that will run on a global or national network, and assume everything works fine. But that does not account for the road conditions of the network, he said.

"Successfully implementing client/server applications on a large network makes a company quite proud. But then someone asks, can't I run some of these applications on my laptop? 'This is the next big wave for client/server computing.'"

Swiss Bank is deploying distributed client/server applications on a global, secure network.



"I think it's a very common mistake for someone to deploy their database in one city, ship the applications out to the other two offices and fully expect that 40 users in one city, 50 users in another city, and 50 users in another city are all going to make a direct connection to a data server over the network and have quality response times," Kerpan said.

Developers have to build in the latency, the laziness of a distributed network. They need to account for what happens if the return information the program expected doesn't come back or isn't available. How can the user undo the request for data, short of killing the machine or the application, which now has them pending for a minute and a half? Development teams need to create a test network, put in network delay generators, put in satellite delay generators, and even emulate satellite transmissions for cases where the land line is down, Kerpan suggested.

Failing to account for these conditions is a very common mistake for a team to make their first time out, Kerpan said. And once the application is deployed for testing, it doesn't function, or at least doesn't function well, so the company must

> "How do you release stuff to your sales force when you have a lot of machines in the field? How are you going to update their software? Are you going to wait for them all to come to their quarterly sales meeting and try to steal the machine from them while they are there at the meeting?"

compensate. And that eats up money and time. "Companies have a fixed tolerance of time to build an application. So when the development team has to start upgrading infrastructure to get a usable product, they lose some of the time to build in flexible features for convenient end-user computing," Kerpan said. Indeed, engineers may have to take out nice features to boost performance.

The company may also spend a lot of money to increase network bandwidth, so the application can perform at speeds that more closely approximate expectations. Or a project you thought you could do on a Sparcstation 2 with 24MB of RAM — a small workgroup server — now has your engineers telling you to buy a 690 or a Sparccluster 1,000.

"Suddenly the harried CIO or CTO of a small but growing firm has engineers saying things like SMP (symmetric multiprocessing) and saying, 'Don't worry replication servers are coming any day now,' and the CIO or CTO has no idea what they're talking about," Kerpan said. "They shouldn't have to know. Those engineers should have thought about the network as being the bone and sinew of the system, not some water slide to zip down on a lazy day," he said.

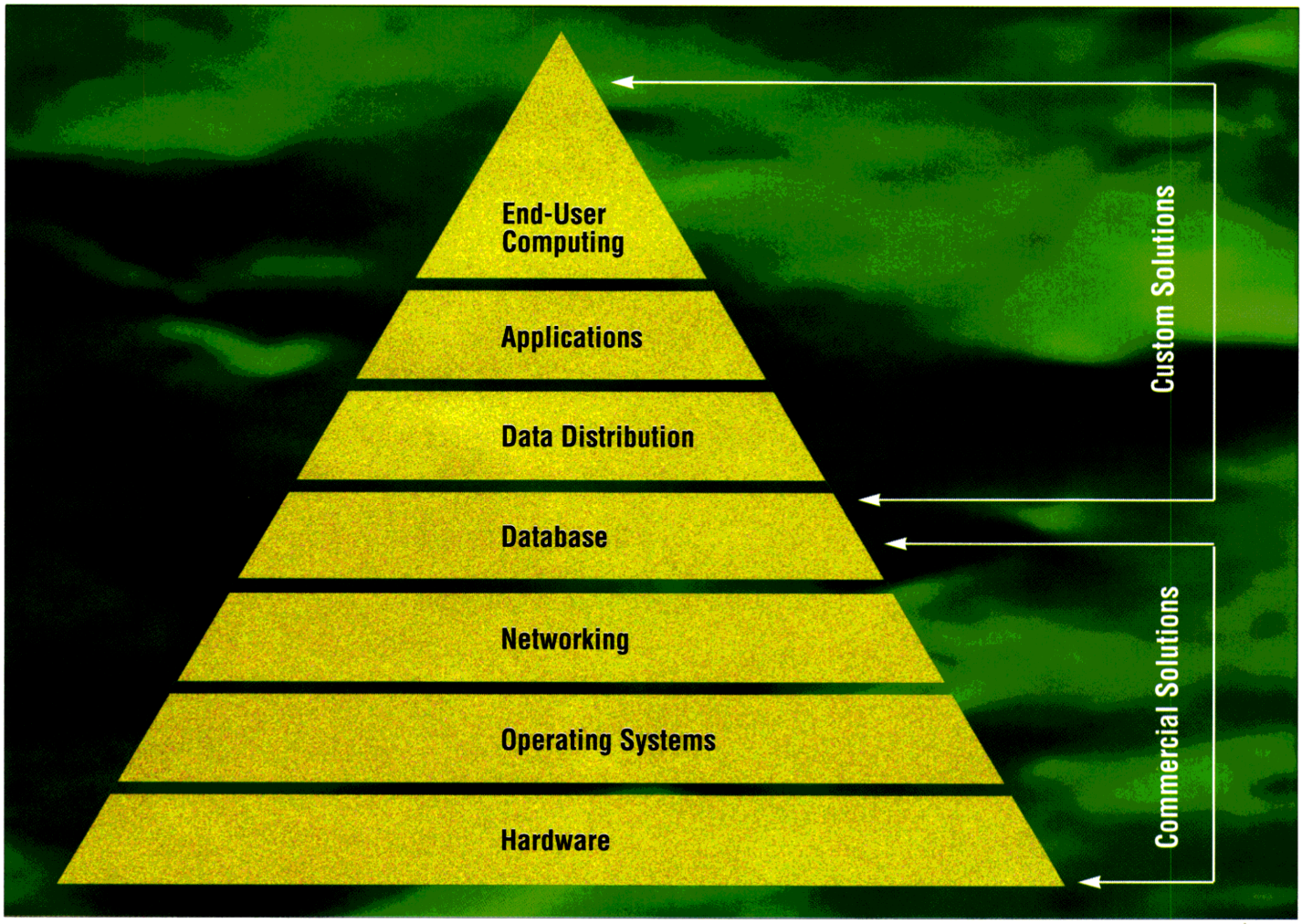
DESIGN FOR MOBILITY

Kerpan's second principle focuses on an area where Swiss Bank is headed for future systems — mobile computing. Applications don't simply get moved off the network. They must be designed to be untethered as well, Kerpan said.

Companies that have been implementing client/server applications for several years, especially on large networks, if they stop to think about it, are probably quite proud. The open systems professionals, like those at Swiss Bank, have developed a global network with high-quality applications and data distribution with a high degree of integrity. But then someone asks, "Can't I run some of these applications on my laptop?" For a fast-paced investment and trading environment like Swiss Bank, users understand transactions can't be saved to the database. But they still want to know why they can't use their system while they're flying to or from a meeting, Kerpan said. They want to be able to do some analysis, look at some models and queue up some trades. Then when they get home they want to plug into the network and have the work executed. "This is the next big wave for client/server computing," he said.

The problem for open systems professionals involved in developing and managing these systems is this: They have just spent years underscoring the importance of engineers grasping the principle that the network is the bone and sinew of the system. So the network is integral to the application and the client counts on the server always being there. For Swiss Bank users, who can sit at their desk and do simulations, pricing, and all kinds of what-if scenarios against data stored on their global network, the goal is to be able to slide out some sort of docking workstation and take those capabilities with them.

For most people who have been building applications that run on large networks,



perhaps with leased lines, very few applications will work when unplugged from the network, Kerpan said. So open systems professionals need to rethink how they build networked applications yet again. "All the linkages in the applications have to be designed to tolerate not being on the network. This is absolutely critical to support the next wave of capabilities that business management will ask for," Kerpan said.

INVEST IN MANAGEMENT TOOLS

Kerpan's third principle returns the focus to environments that are preparing to move from host-based systems to client/server architecture, or are nearing the threshold of greatly expanding their client/server infrastructure. Open systems professionals need to insist that the firm invest up front in the management tools needed to get the job done well — the network management tools, project management tools, source code control and release control applications. "All these must move in lockstep with your growth as you scale the organization," Kerpan said.

> "Quality organizations put together a product team, and the core team stays with a project throughout its life cycle. The focus is not maintenance, but the evolution of the project, so that it is as relevant in year four as it was when first deployed."

"If someone is embarking in this technology now, they should do the due diligence, through whatever mechanisms — reading, consultants like Gartner Group (Stamford, Conn.), or pick the Big Six accounting firm of your choice. They should do the due diligence to find out what's out there because, unlike some mainframe environments, source-code control doesn't just happen," Kerpan said. "In 1981, none of those things existed. Now they are sitting out there on the shelf. Definitely use them," he said.

Kerpan said he does not want to endorse or recommend any specific product but he said there are a number of "niche boutique tools" on the market to handle specific tasks in a distributed client/server environment. And there are also a number of product suites that position themselves as more comprehensive environments. Some examples are CA-Unicenter from Computer Associates (Islandia, N.Y.), and Tivoli Systems' (Austin, Texas) Tivoli Management Environment, for managing distributed systems. For network management there are framework products such as SunConnect's (Mountain View, Calif.) SunNet Manager, Hewlett Packard's (Palo Alto, Calif.) OpenView, and Cabletron's (Rochester, N.H.) Spectrum, all of which are supported by a plethora of third-party plug-in modules that handle specific tasks or hardware.

Regardless of the specific suite of tools selected, managers need to bring them in early and invest the resources necessary to customize the package for the particular needs of the environment. With national and global networks, release controls and mechanisms need to be well-defined, Kerpan said, because it is important to keep versions synchronized and to make sure software doesn't creep into a production

environment before it is ready and officially "blessed" by the proper channels. And then the logistics can still be a problem, Kerpan noted. "How do you release stuff to your sales force when you have a lot of machines in the field? How are you going to update their software? Are you going to wait for them all to come to their quarterly sales meeting and try to steal the machine from them while they are there at the meeting. It's very unclear," he said.

Kerpan noted the technology to handle some of these situations is still under development, but open systems professionals need to understand they need these things. "It is a lot better now than it was for those starting out five years ago. The entry level costs for traditional distributed networks have already been paid by users individually and by the industry collectively," he said.

Swiss Bank is now looking toward putting together the tools that will enable the company to take the next step — to move toward a globally secure network that is also mobile. That technology is still in its infancy, Kerpan said. It involves new networking encryption technologies that are not commercially available, or not available in a form that most development teams can work with and integrate into applications.

Now that everything is in place for a totally secure global desktop environment, Kerpan said, that will free up "intellectual bandwidth to construct the new environment we think we need. We've worked with our major vendors to make their product what we want it to be. Now we are looking to work with them in new and interesting ways to make this new mobile and secure infrastructure available," he said.

LET ECONOMICS CONTROL TECHNOLOGY

Kerpan's fourth and final principle may sound obvious, but remember that a Nobel Prize in economics was awarded a few years back for an investment theory summarized as "don't put all your eggs in one basket." Kerpan's principle is to let the economics of the situation control the technology.

Perhaps it is not so much the principle as the consistency and sophistication with which it is applied that makes it noteworthy. The background of Kerpan and his colleagues in stock, options and futures trading, makes applying risk management principles fairly natural for them.

Two examples of how these principles have been applied were the decision to use Next computers for office automation and trading workstations, and the decision to invest significant resources into developing Swiss Bank's data distribution capabilities.

"Generally a company cannot get more intellectual bandwidth at any price, because you have to understand the company and its needs and businesses. Intellectual bandwidth is always more limited than money."

Given the scope of Swiss Bank's operation, Kerpan said, the decision to bring in a new platform and deploy it widely is not made lightly. The company began evaluating Next prior to its commercial release, worked with it for more than a year porting libraries and applications, and evaluating its performance and reliability, and the ease with which non-engineers could use the system.

The development staff had been so busy building the strategic client/server infrastructure, that host-based office automation capabilities got lost in the transition. Next offered drag and drop e-mail, including spreadsheets, and a few other convenient tools that were very easy for office workers to use, he said.

So a 100-system office automation prototype was deployed, followed by further evaluation. That experience was factored into selecting Next for a new trading business prototype, followed by testing, limited deployment and widespread deployment. Each step of the way the up-front costs for acquisition and development, the marginal deployment costs, and the life-cycle maintenance costs, were put up against the returns that the investment made possible, Kerpan said.

Most every environment looks at up-front costs, Kerpan said, but many overlook marginal deployment costs, such as: How many deployed systems will exceed the threshold where users will have good performance on a subnet, and thus what are the incremental networking costs of deployment? When will I need to add additional or more powerful servers?

Life-cycle costs also tend to be overlooked. Some organizations that take a project approach throw people at a task until it is released, and then move on to the next project. "That doesn't seem to be the model that quality organizations use to build software," Kerpan said. Quality organizations put together a product team, and the core team stays with a project throughout its life cycle. The focus is not maintenance, but the evolution of the project, so that it is as relevant in year four as it was when first deployed.

"How has the market changed? How have our organizational structures changed? How have the technology and price-points of the industry changed? My product managers who build systems are required to look at all those things as well," Kerpan said.

A serious dilemma for open systems environments that are pushing at the edges of deployable technology is when to build a custom layer of IT infrastructure, versus when to be satisfied with what commercial vendors can offer — build now or buy later. For Kerpan, it still comes down to economics.

Kerpan estimated building proprietary data distribution mechanisms for Swiss Bank's global network took nearly a third of his resources. A couple of years back his commercial option would have been a two-phase commit, but that would have locked transactions for an unacceptable length of time and presented other administrative problems. Rather than a global network, the firm would have needed to settle for multiple regional systems, Kerpan said.

"If our business model was to manage foreign exchange regionally, rather than globally, then I should have been fired for spending 30 percent of our time solving global data distribution," he said, even though as an engineer it presented an interesting challenge and the firm might need it one day. But our model was global, so we laid it out for the decision makers: Here's how many millions of dollars a year it will cost you to develop and maintain that global capability. Is it worth it to you?" The profit margin looked good so they did it, he said.

In spite of how much money Kerpan's team expended to solve the problem, he draws a distinction between hard currency and something he calls *intellectual bandwidth*. "Generally a company cannot get more intellectual bandwidth at any price, because you have to understand the company and its needs and businesses. It takes a while to grow. So, even if money is no object, you still have to make the decisions and evaluate trade-offs. Intellectual bandwidth is always more limited than money," Kerpan said.◆

Barry D. Bowen *is a writer and consultant with Bgroup, Ferndale, WA. He can be reached at xeno@bgroup.com.*

NOMURA SECURITIES: OPENING UP THE MAINFRAME

By Rick Cook

Tying together an IBM mainframe and a fast-moving operation based on UNIX is a challenge. At Nomura Securities, the American arm of one of the biggest brokerage houses in the world, the answer was open systems and TCP/IP.

Brokerage firms break naturally into the front office, which does the actual trading, and the back office, which handles accounting, transfers and other chores. At most companies the front and back offices are different worlds with different cultures and different computer systems – often located miles apart. Typically the front office uses UNIX workstations for data display, order entry, and modeling, while back offices are more mainframe oriented and often do their work by batch.

That was the way it was at Nomura. The front office was in the financial district of Manhattan while the back office was on Staten Island about five miles away. The front office ran on a network of Sun workstations running SunOS (UNIX) with Sun's NFS (Network File System). The back office relied on an IBM 3090-500 mainframe running MVS/CICS and PCs networked with Novell NetWare. In the front office computing was time-critical, in the back office it tended toward batch processing.

The back office operation is built around the mainframe because Nomura uses a trading software package purchased from Morgan Stanley, another Wall Street giant, which only runs on an IBM mainframe. Originally there was only very limited communication between the mainframe and the workstations on the front office desks.

"For a long time the mainframe was completely separate from the front office," says Bill Shepas, senior systems programmer for Nomura. "A lot of things we did [to transfer data] was to tape, which was extremely slow and definitely not interactive."

By the late '80s, 'slow' and 'not interactive' were increasingly expensive liabilities as the securities business moved ever faster and became more global and round-the-clock. Trades couldn't be completed until the information was in the back office. Program trading and deadlines with banks and governments often meant the information had to be there the same day the front office did the trade — if not sooner.

In addition the front office wanted access to the back office data. Brokers and analysts needed information on previous trades as grist for mathematical models and to help them assemble bundles of securities for customers. Nomura's challenge was to combine the systems so the front office workers could get the information they needed from the back office computer.

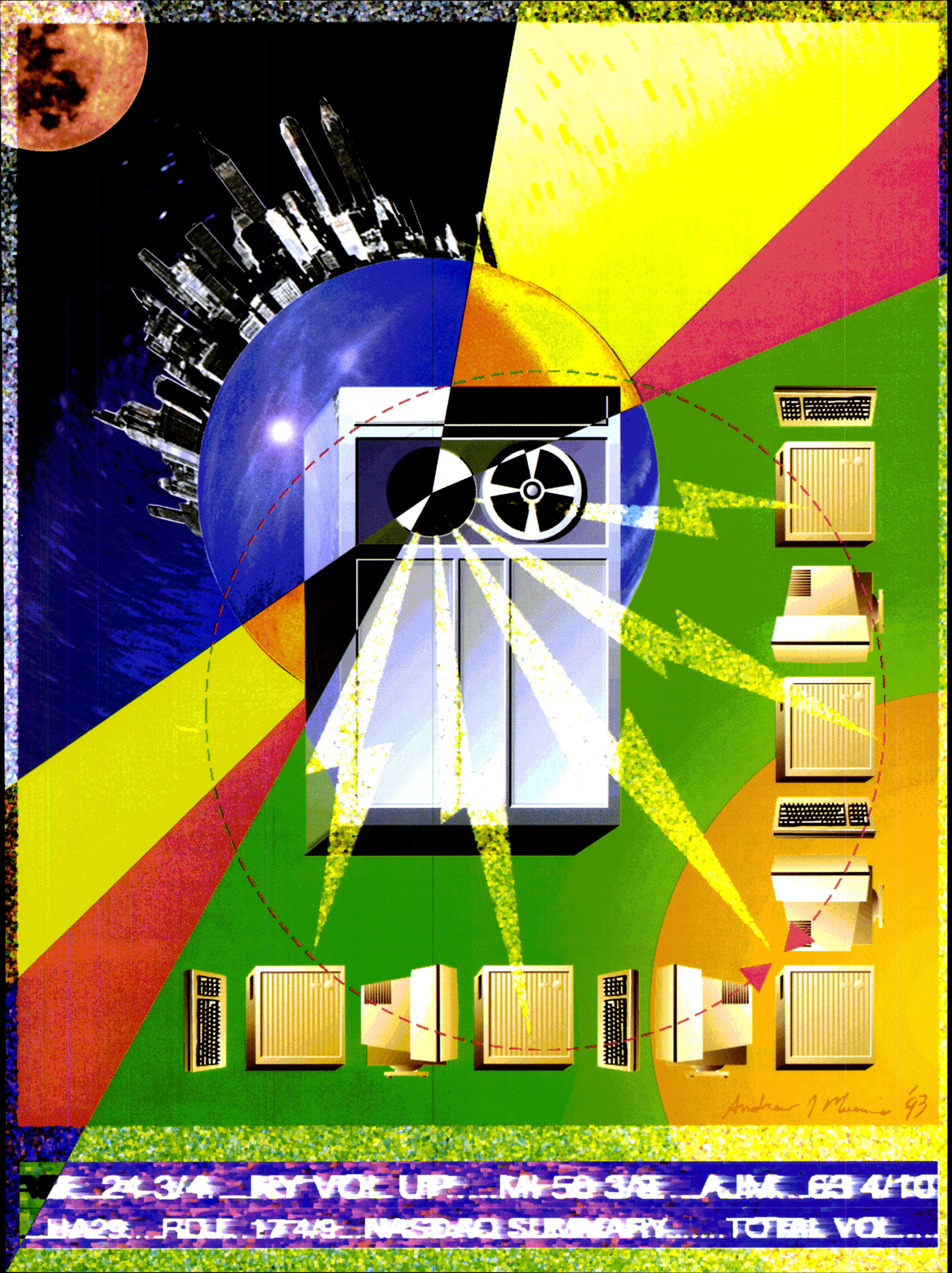
The three main criteria for the connection, Shepas says, were speed, access and transparency. "I can't even express how important speed is," Shepas says. "In securities, especially with derivative products, speed is absolutely essential."

(Derivative products are one of the hottest areas in the securities business today. Most commonly they are packages of securities assembled either for general sale or specially created to meet the needs of a particular customer. A simple example would be a group of mortgage loans. Assembling the best possible package is an art and it requires cranking a lot of rapidly changing information through a model.)

The importance of access was obvious: The reason for the integration was to get the information to the users in the front and back offices. To make the integration really useful, the front office users had to be able to get information off the mainframe easily.

"They're not technology people," Shepas says. "These are users and they don't want to be bothered with the technical aspects. They want to go in, press a few buttons and get the data."

Ideally, the users shouldn't have to worry about whether the data was in the


NASDAQ SUMMARY
TOTAL VOL

"Keeping track of the data is much more critical in socket programming than in SNA," Shepas says. "SNA takes care of that burden for you, but with TCP/IP you have to keep track of what you're receiving."

disk on their workstation or on the mainframe. Either way, they should be able to call it up with ease.

In 1989 Nomura began looking for solutions. Several possible ways of connecting were looked at and discarded. For example, Nomura could have connected up using SNA under LU6.2. That was the preferred back office solution, but the front office didn't like it because it would have been harder for the front office to implement. The front office prevailed.

The alternative was an open systems solution built around TCP/IP. That was the way Nomura chose to do it.

"[The front office] didn't feel they wanted to go to LU6.2 because it was totally foreign to almost everyone there," Shepas says. "Plus we wanted the front office people to have some confidence in communicating with us and we thought this [TCP/IP] was the best way to do it. It was something they understood and we [the back office] would adapt to. In our case we really didn't have much of a choice. TCP/IP is standard in UNIX and the front office was completely UNIX."

Using TCP/IP simplified things for the front office, but it meant most of the changing would have to be done in the back office.

Now Nomura uses TCP/IP to move data to and from sockets in the MVS/CICS operating and transaction processing environment on the mainframe. If a reliable connection cannot be established to the sockets, the file is sent via ftp.

The system has an IBM 3172 gateway between the Ethernet LANs in the front office and the mainframe via leased lines. For the front office sites that connected via Telnet, the company installed TN3270 software which allows the users to log on and use mainframe applications. TN3270 is basically a 3270 emulator running under the X Window System and UNIX, which allows the users to do CICS transactions.

From the time the project started, it took about three months to get the system in place. By the spring of 1990 it was already operating, at least in part. As might be expected, there were a number of problems to be met along the way.

One of the biggest problems was an intangible. The data center staff, used to working with SNA, was not well-versed in TCP/IP and the socket API. "One of the biggest problems we had was that we didn't have a good understanding of TCP/IP here," Shepas says. "Also we didn't have people who were knowledgeable enough to understand the implications of it." (See SIDEBAR for further discussion.)

"The socket programming part of the project was quite an experience at first," Shepas says. "Certainly we needed to train the programmers on the mainframe side more thoroughly. TCP/IP is not terribly complicated, it's just a different way of looking at interconnecting. With SNA it was fairly standard and there were only so many ways you could do it." That wasn't true of TCP/IP.

"Keeping track of the data is much more critical in socket programming than in SNA," Shepas says. "SNA takes care of that burden for you but with TCP/IP you have to keep track of what you're receiving."

The solution was a combination of education, trial-and-error and relying on the front office people for advice. "Some of us went to TCP/IP classes," Shepas says, "but I would say that the bulk of the learning occurred on the job by trial and error. We also had support from the front office people. A lot of the concepts were given to us by them and they helped us out on the logical design.

There were also the usual problems faced by early adopters. In 1989 and 1990, when Nomura decided to use TCP/IP to connect MVS/CICS on the mainframe with SunOS via TCP/IP, IBM's TCP/IP connection was new. Nomura was one of the first companies to use IBM's TCP/IP product. "We were one of a handful of people testing the socket API for IBM," Shepas says. "At first the socket API had a lot of bugs that had to be ironed out."

Initially the company used ftp for file transfer. The first problem was that when the system used ftp to transfer a file, the software didn't notify the mainframe. "It was difficult for us to know when they were sending files," Shepas says. "They resolved that with software that allowed the workstation to send the data along with the JCL to process the data."

The other problem was connecting and getting a socket connected properly to the remote host. "With the socket calls there were a lot of minor problems with the software because it's fairly complicated on the mainframe side," Shepas said. "There are MVS and CICS pieces to it."

The solution to this problem was to fix the software. Over the several months it took to bring the system into production, IBM provided patches to fix almost all of these difficulties.

The problem with the sockets led to a significant change in the scope of the project. "The problems [with the socket interface] weren't really anticipated and weren't expected from the front office point of view," says Shepas. "So when [problems] did occur, they were very concerned about it. That led to us using ftp as a backup.

"The front office was not happy with the fact that we were having very intermittent software problems. They wanted an automated backup so we had to implement ftp in case of a socket fault. That was unexpected. It added a lot of complexity we weren't expecting, but mostly on the front office's side."

The solution was to have the system try three times to make a connection via sockets. "After the third time it would simply ftp the file over," Shepas says.

The communications problems disappeared with later versions of the TCP/IP and socket software from IBM, but the situation reflects cultural and organizational considerations that continue to play a role in designing and implementing open systems.

Each of Nomura's departments is vertically integrated with control over its own MIS resources and its own computer budget. Because of the departmental independence, solutions had to be reached by negotiations rather than managerial fiat.

That process has an important impact on the one remaining problem: Managing Telnet connections used to connect some systems to the mainframe. (The main connection is via leased lines.) "In Telnet there's practically no monitoring of what's

"Cooperation is essential on all sides, it is absolutely the most important aspect of it. We had all agreed on the project, agreed to the benefits and agreed on how to resolve the problems as they came along."

"One of the problems we had was we jumped into it very quickly on the mainframe side and we weren't as prepared technically as we should have been."

going on," Shepas says. "We don't have SNMP fully integrated yet and it's a little difficult to debug programs."

Technically there is no reason why Nomura can't use SNMP. "We also have NetView and NetView will incorporate SNMP," Shepas says. "However you also have to have all the agents on the network to agree to run SNMP and take SNMP messages and agents. All these things have to be coordinated and that's something we're still working at.

"It's very difficult coordinating this monitoring across different departments, especially since each department has its own network technician. There's also the organizational problem. Who's going to be in charge of it? Who gets called for problems? Who handles the problems?"

In addition, the departments use different monitoring packages. "It would be nice if we could standardize on one monitoring package," Shepas says.

In the process of implementing an open systems connection Shepas says he learned some important lessons and he has some advice for anyone who is in the same situation.

"Cooperation is essential on all sides," Shepas says. "It is absolutely the most important aspect of it. We had all agreed on the project, agreed to the benefits and agreed on how to resolve the problems as they came along. Luckily, I had a good rapport with the people in the front office and they helped me a lot. I helped them a little bit and together we implemented the software on a fairly timely basis."

It's also important to know the technology, he says. "Another important lesson was that it's very important that people are trained on a new technology before you make the commitment to it. One of the problems we had was we jumped into it very quickly on the mainframe side and we weren't as prepared technically as we should have been."

For the first step in implementing such a project, Shepas advises getting help. "The first thing I would do is call someone who's already done it and get some ideas," Shepas says. "When we did it, there were only a handful of people who were doing it and they were at a much lower level than we were. In one sense we were out there alone."

The next step, Shepas says, is to extend open systems even further. Currently, the networked PCs are connected to the mainframe using an Icon gateway that makes an SNA connection. The company plans to move to a TCP/IP-NetWare gateway instead.

"Even our Novell networks are becoming integrated into that TCP/IP network." Shepas says. "I'd say TCP/IP will probably be the dominant network here within the next couple of years."◆

Rick Cook *divides his time between covering high-technology industries for magazines and writing fantasy novels full of bad computer jokes. He is rcook@bix.com.*

Bringing TCP/IP into an SNA World

IBM's SNA (System Network Architecture) is the networking core in most IBM-only shops. As these organizations move to open systems the people raised on SNA often find themselves meeting TCP/IP (Transmission Control Protocol/Internet Protocol), a pervasive and expanding technology for connecting open systems.

It isn't always an easy meeting. Although SNA and TCP/IP do the same thing they do it very differently. That takes some adjustment.

"People who have only seen SNA have the warm fuzzies with SNA being a very reliable system," says Jim Keohane, a Levittown, N.Y.-based consultant on multiplatform systems. "That's not to say TCP/IP is not reliable but it is designed differently."

SNA was originally designed to connect clusters of remote dumb terminals to a mainframe. Over the years it has been modified to accept smart terminals, PCs and networking that is not mainframe-controlled. However its heritage still shows in important ways.

One of those ways is the assumption that all the equipment on the network can be known to a very fine level of detail because it all comes from the same vendor. "Under SNA you know that a transmission or message is going to get through," Keohane says. "That can't be reproduced at present when you're sitting there with multiple platforms from multiple vendors, so networking is sometimes radically different from what people who know SNA come to expect."

Take, for example, error handling. SNA assumes the connection won't work and carefully checks every link for every packet. TCP/IP assumes the connection will work and doesn't do anything until the receiving end gets a bad or missing packet. That saves a lot of busy work for TCP/IP at the expense of taking longer when there is a problem.

"SNA does an awful lot of handshaking from point to point along a transfer," Keohane says. "In TCP/IP most of the handshaking is only done end-to-end at the two actual ends of the connection. Any intermediate nodes will accept what they can and pass it on. If they can't accept it, they will discard the packet they can't handle and they don't necessarily notify the source as to the nature of the problem. The fallback will be for the source to have time-out logic and if it times out before getting an acknowledgment from the other end, it will go into retry.

"As hardware and everything else becomes more reliable, TCP/IP ends up being a very efficient way to do things," Keohane says. "It provides for the error [usually by re-sending the corrupted packet] as a last resort so you don't incur the overhead up front."

What that means for the SNA shop implementing TCP/IP is that they must pay closer attention to the data being transmitted and keep track of which packets have been acknowledged by the destination and which packets are still outstanding.

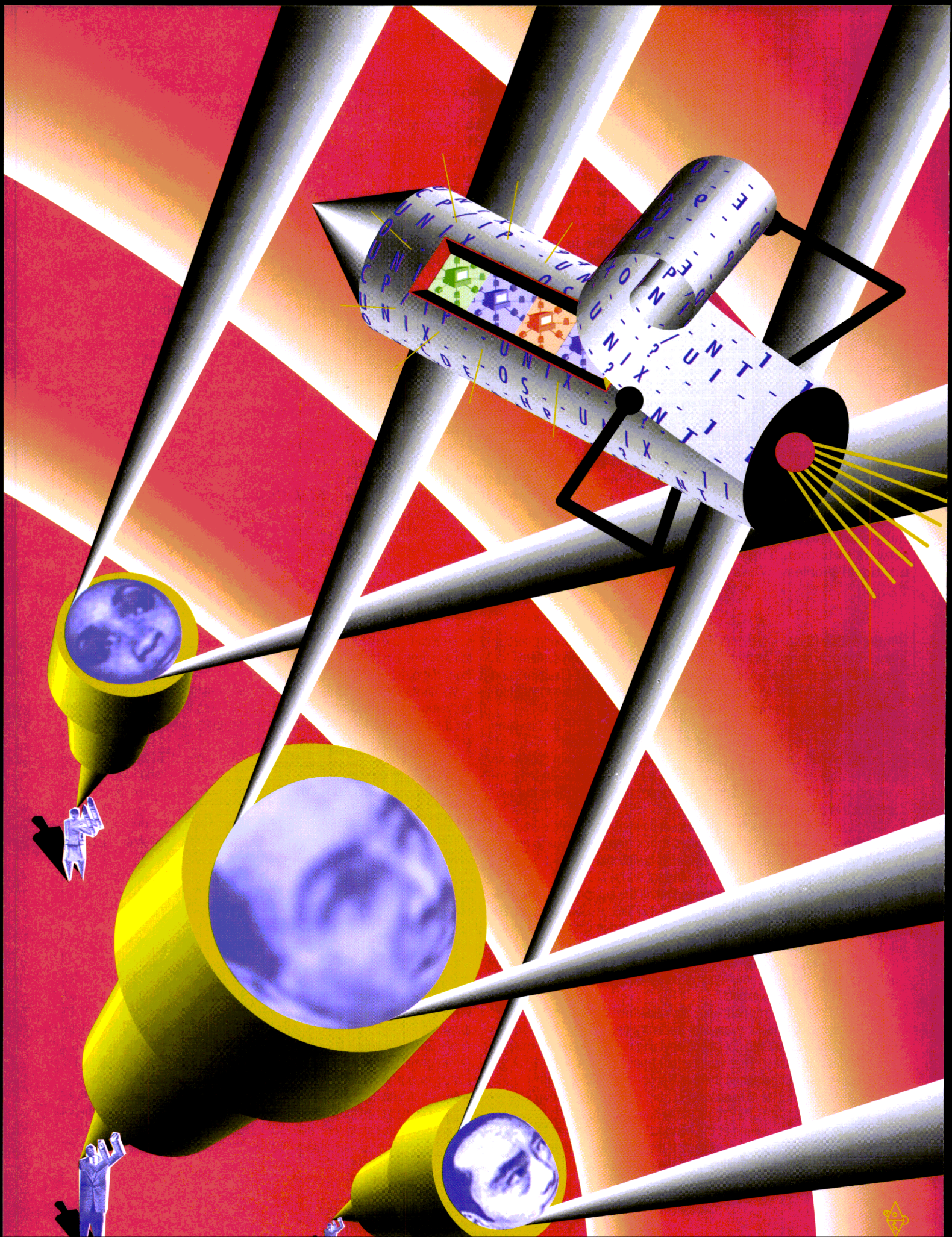
"It's a culture shock," Keohane says. "Part of it is you have two diverging philosophies. Basically they are solving the same problem but they are coming at it from two different angles."

Overcoming the differences takes knowledge and Keohane has several suggestions for SNA people who need to learn TCP/IP. "There's plenty of training available," he says. "There are seminars and more and more excellent books coming out."

Besides the usual sources, Keohane suggests one other way of getting information.

"I would take a couple of their main design people and have them get some connection to the Internet," he says. There are several news groups on the Internet dealing with TCP/IP and the people there are happy to answer questions. "Just last night we had a query to be answered on a particular RFC [Request For Comment]. We got the answer overnight via BIX [an information service with an Internet gateway] via the Internet. It's a handy resource which unfortunately too many people still dismiss."

Among others, Keohane suggests the ibmtcp-1 group at listserv@princeton.edu or listserv@pucc for IBM products related to TCP/IP. For others, he suggests querying ietf-request@ietf.cnri.reston.va.us. "E-mail there will get a real live human and you can ask for recommendations on TCP list or whatever," he says.



WHAT'S IN STORE FOR '94?

UniForum Insiders Predict the Future

1993 was a quiet year for open systems.

Nothing much happened.

Okay, a few things happened.

By Jordan Gold

COSE was formed, starting the process to the long-awaited and demanded unification of UNIX. CDE was introduced, beginning the long-awaited and demanded unified UNIX graphical user interface. The two announcements were designed to make users and software developers happy.

In September and October two events pushed unification even further toward reality. First came the Specification 1170 agreement on common UNIX APIs. That was followed by the announcement that Novell had assigned the UNIX trademark name to standards body X/Open in an attempt to make UNIX completely vendor-independent, something that vendors and users had been demanding for many years. "The UNIX wars are over," declares Jim Bell, director of corporate alliances for Hewlett-Packard and President of UniForum. "We are seeing a continuing increase in the amount of vendor cooperation and users are becoming more empowered. We're past the point of no return."

Not everyone agrees with Bell, however. Microsoft's 32-bit operating system, Windows NT, was introduced — an event, many users argue, that caused the aforementioned occurrences. NT, in effect, forced vendors to work together. "The announcements seem like an SOS to me," says Daniel Schutzer, vice president of corporate technology for Citibank. While acknowledging that NT has forced vendors to work together, Richard Jaross, executive director of UniForum, disagrees. "This is no SOS," he says. "I find it hard to believe that IBM, HP and Sun are desperate. These aren't acts of desperation. These are acts of smart people."

A Question of Maturity

The UNIX unification announcements are a signal that the industry is becoming more mature, according to Doug Michels, executive vice president and co-founder of The Santa Cruz Operation and also a co-founder of UniForum. "We're getting away from technology and the historical latest and greatest and moving much more to what can I do with this and what problem does it solve for me," says Doug Michels, "The industry is getting away from marketing technology to early adopters."

Michels argues that the industry is now marketing on more of a benefit basis than a technological one. "There are now mature industries where users focus on how results were achieved," he says. "Users still have to decide what kind of TV set to buy and car to buy, but they don't have to worry what kind of silicon is used in the transistors. The UNIX wars aren't over — in fact they'll get hotter — but they'll be around user benefits, features, support and pricing. They won't be around what kind of exact technology you used."

Michels says traditional applications areas are those closest to the end of the maturity cycle, where there's no more innovation to do, where massive consolidation occurs because you don't need that many vendors. He cites the maturity level in the major applications world as an example. "How many more word processing features do you need?" he asks. "The major factors are price, performance and delivery."

Operating systems are moving into a more mature level. "We're changing from a technology focus to a solution focus," Michels explains. "And there's some consolidation, as there's only a few operating systems and a few versions of UNIX that matter."

Experts predict that the industry will continue to get more mature as 1994 progresses. A major factor will be products that conform to X/Open's 1170 specification. Both Bell and Michels believe vendors will release 1170-conformant applications by the end of the year. "Every vendor

"This is a more efficient process than the old way, however, APIs can be programmed a thousand different ways. And the number of APIs in the standard will probably grow to 1,500 or 2,000. The proposed standard will be a constantly moving target."

is scrambling to get conformant product on the market in 1994 for 1170," Bell says.

Michels says that getting 1170-conformant products on the market won't be as difficult as some people believe. "Open systems vendors have always adopted a level playing field," he says. "The question has always been how high up does that field go. The 1170 specification moves us up to another tier of compatibility. It's more an acknowledgment of reality than a shift in direction. This is a brilliant move to effectively consolidate the gains we've made and move forward without a radical shift. It's a clear way for users to identify products that conform."

The ease of conformance will come because vendors already conform to 80 to 90 percent of the spec, according to Michels. "Unfortunately, everyone has a different 80 to 90 percent. It will take about a year to be 100 percent conformant."

Based on this information, Corinne Moore, director of marketing for UniForum, believes that we won't see 1170 products until 1995. "Because the specification won't be complete until the end of the year, we won't see branded products until 1995," she says.

The transfer of ownership of the X/Open trademark serves two purposes, according to Michels. First, it acknowledges the importance of the 1170 APIs that now make up the core of UNIX. "It's simple, easy, and everyone can understand what it means," he says. Second, it finally removes the ownership of UNIX from any single vendor company and puts it in the hands of a neutral, industry consortium. "It makes it clear that UNIX is an industry phenomenon," he says. "UNIX now identifies an industry, not a source code tape. This frees Novell to compete without having to worry about its responsibility as keeper of the industry standard."

Jaross says, "Users aren't putting up with separate development of UNIX." While users are skeptical that this is the OSF/UI wars and rhetoric all over again, Jaross argues that it's even more of a consolidation. "It's OSF with Sun and USL," he says. "This time vendors have more at stake to make it work."

"It's a way to say we're all in this together, but we're still different," says Moore. "The 1170 API is in the middle, microkernel technology is below it and applications are above it. The way to become competitive is to differentiate. There's room for maneuvering both above and below those API levels."

"This is a more efficient process than the old way," says Alan Paller, UNIX evangelist for Computer Associates. "However, APIs can be programmed a thousand different ways. And the number of APIs in the standard will probably grow to 1,500 or 2,000. The proposed standard will be a constantly moving target."

Not all users buy this line of thinking, however. Hugh Brownstone, vice president of research and development at IMS America and a member of the board of directors of UniForum, considers all of the 1170 talk, just that — talk. "All I see are announcements. I don't see any products," he says. "I don't care about announcements anymore. Announcements are aimed at mindshare. Give me product that's better than what I can get outside of the UNIX market. Vendors are talking as though the world has stood still since 1981 (when the IBM PC was introduced). That's crazy."

Brownstone argues that 1170 does not give him what he wants, which is one version of UNIX. "If there were one version of UNIX, it would dramatically lower our costs, because vendors would have to lower their hardware prices to compete on a price/performance basis. Today, I have a client that has a relational database engine that runs on the HP 800 series, but not on their 700 series because of differences in HP/UX on those two machines. So, if UNIX is not even conformant with one version across one vendor's product lines, what does 1170 conformance get me?"

Brownstone believes we'll never have only one version of UNIX. "All vendors operate under rules of enlightened self interest. If I were Scott McNealy I wouldn't compete only on price/performance, because I'd lose."

"All I see are announcements. I don't see any products, I don't care about announcements anymore. Announcements are aimed at mindshare. Give me product that's better than what I can get outside of the UNIX market."

CDE

While the 1170 API specification takes care of much of UNIX, the GUI is what the user ultimately sees. And the Common Desktop Environment (CDE) is supposed to be the consistent interface that all UNIX users will see. Developers will also benefit from CDE, as they won't have to recode applications for a variety of interfaces. CDE was demonstrated at a conference for developers — sponsored by the CDE companies and organized by UniForum — in late October, where a beta version of the development tools was distributed. It will be ready to run on IBM, HP, SCO and Sun within the next few months. "You might see CDE on users' desktops by the middle of the year," Moore says. "But that's only if everything goes smoothly. The bigger problem is getting applications out there."

Computing Solutions

One of Michels' more interesting predictions for 1994 is the disappearance of UNIX. "We'll see a refocusing of the industry on computing solutions as opposed to UNIX solutions," Michels says. "The whole open systems focus will shift into the much broader space of distributed network computing. Let's say I'm an open systems professional with a mainframe legacy system, 5,000 Windows computers, 1,000 UNIX machines and 1,000 computers running other operating systems; token ring, Ethernet and TCP/IP networks; and Oracle, Informix and Progress databases. How can I have seamless interoperability, so a user can click on an icon and make the network respond to his or her command? How it works shouldn't and can't matter if this is going to be a mature industry. Making it work is the key."

Michels says this problem won't be solved in 1994, but there will be some leaps taken toward solving it in the next 18 months. "All of the core

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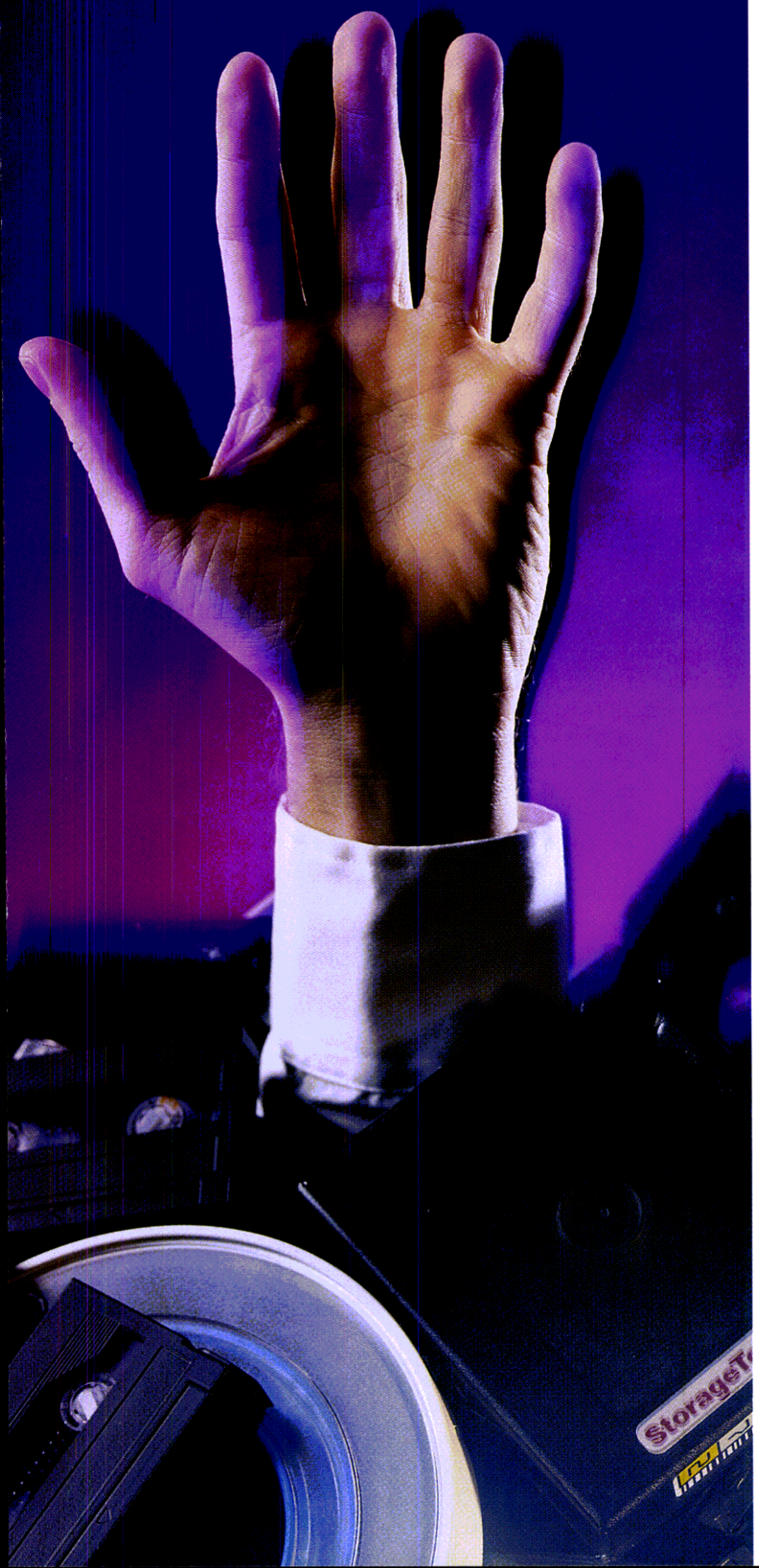

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(continued from page 26)

standards — TCP/IP, Windows, and SNMP — are in place," he says. "The only way you're going to connect these disparate things is with open systems technology. Microsoft and Novell are incorporating TCP/IP into their products while UNIX vendors are supporting Wabi and Merge to allow connectivity into the Windows world. All of these technologies are rooted in open systems standards."

In addition to connectivity, users will need to have reliable system management tools in order to make distributed computing work. To that end, Paller predicts UNIX will make great strides in 1994. "The reputation of UNIX for being unsafe relative to mainframes will be gone," he predicts. "Twenty different vendors will be supplying software that has the same style of management tools that people were used to using on the mainframe. That will make people feel safe." Computer Associates, with Unicenter, is one of those 20 vendors. "But it takes more than one to make people feel safe, even if they don't use other vendors' tools. Candle, Legent, and other leading mainframe [tool] vendors are all porting their system management tools from mainframe systems to UNIX."

When users feel safe, we'll see more growth in client/server computing, Paller says. He predicts that more than 50 percent of IBM mainframe sites will have begun building client/server applications by the end of 1994. "That's up from 27 to 28 percent today and represents some 20,000 organizations that will have moved into client/server computing. While it won't be all of the solution, UNIX will be a big part of this growth."

Paller says he'll talk more about the future of UNIX in his session at UniForum'94, March 21-25 in San Francisco.

Moving off the mainframe will accelerate the downsizing trend, as mainframe applications move onto distributed computing platforms. "We've been talking about it for years, but we'll really start to see applications begin to be decentralized off of large computers," Michels says. "We'll have graphical front ends on PCs and distributed databases on UNIX servers. Networks will link to a variety of servers that will do a variety of jobs. This will start to replace the traditional computing model."

> "Open systems will win to the degree that other operating systems are open and based on shared industry standards, that's the degree to which they'll be successful."

IMS America, traditionally a Big Blue shop, is going "big time" into client/server, according to Brownstone. "UNIX is the operating system on the server. Nothing else makes sense," he says. IMS is both downsizing applications from mainframes and distributing decision support information to clients. Clients are almost exclusively using Windows-based PCs.

Brownstone chose UNIX over OS/2 because it offers many more options than OS/2. "You can't put OS/2 on all of the machines that UNIX will run on," he explains. "Plus, our databases already work on a variety of machines under UNIX. We're not interested in doing ports from one machine to another."

Hot Applications

As distributed computing takes off, so will groupware. "Once you've got everyone on the network, they want to interoperate," Michels says. Electronic mail, shared calendaring and groupware development systems such as Lotus Notes are being demanded by users.

Another related groupware applications area is multimedia. "You won't see much in 1994 — it's still largely experimental," Michels says. However, he predicts we'll see a lot of groupware-related multimedia demos featuring voice mail integrated with electronic mail, video conferencing, kiosk applications at the retail level, on-line catalog shopping and other areas. "I would have thought interest would be slower, but people are really interested in taking advantage of multimedia," Michels adds. "For example, as catalog shopping moves from paper to on-line, people want to go from still photos to video clips. Video conferencing is becoming more important because of the distributed work force and telecommuting." Michels predicts we'll see ISDN in the home and video cameras attached to PCs, all within the next few years.

Multimedia will also have an impact on networks and networking. It will be imperative that high-speed networking standards such as Asynchronous Transfer Mode (ATM) and 100BASE VG continue to evolve. "There's a profound effect on network throughput when you can do video at your desk," Paller says.

Other Operating Systems

One of the reasons 1170 came into existence was because of competition. Operating systems such as Windows NT have put some heat on UNIX and open systems solutions, forcing open systems vendors to act. "Thank goodness for NT and Taligent," Moore says. "They were the operating systems that forced everyone to come together and ended the fragmentation."

Bell acknowledges that users must consider alternatives, but he thinks UNIX is the best solution. "A user's responsibility is to look open-mindedly at everything that comes out," he says. "No one can predict what the future holds for NT, but it's starting a long way behind UNIX and it's trying to shoot at a moving target. Far more developers are advancing the state of the art in UNIX than in NT."

Brownstone disagrees vehemently with this. "UNIX works better right now, but NT is more focused," he says. "But Microsoft has an advantage because they are cohesive, they understand end users and they understand the commercial marketplace. If NT ever gets its act together, it will blow UNIX out of the water."

In a distributed computing world, Michels argues that there's room for everyone. "The problem we're trying to solve is huge," he says. "A number of operating systems will offer different solutions, all in an effort to help users solve the whole problem of enterprisewide computing. They won't all survive, but only one operating system won't win, either. Each operating system that does survive will have to become very good at delivering a certain class of functionality. The trick is that each area has to interoperate."

Michels says UNIX is very good in the high-end networking arena and that this is the turf that UNIX will have to protect. "UNIX is the real robust solution. It's closer to everything for everybody than anything else."

"Open systems will win," Jaross says. "To the degree that other operating systems are open and based on shared industry standards, that's the degree to which they'll be successful."

So nothing much happened in 1993. Looks like we're in for more of the same in 1994.

Oh, and Brownstone's prediction for 1994? "Vendors will make more announcements."◆

Jordan Gold *is associate publisher for Prentice Hall Computer Publishing in Carmel, Ind. He can be reached via CompuServe at 71075446 or Internet at 71075.446@compuserve.com.*

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This track is ideal for IT managers and users who are trying to build a network which includes mainframe, minis, UNIX, NetWare Servers, Macs and PCs. Find out how to integrate UNIX platforms with others in the larger enterprise. Explore the relevant aspects of Netware, Windows, OS/2, and Windows NT. Gain a meaningful understanding of Posix and X/Open standards.

Costs And Benefits — A Manager's Perspective On UNIX.

This track analyzes the economics of Open Systems. Learn how to quantify the many benefits of UNIX platforms deployed in Open Systems architectures. Arm yourself against the hidden costs and learn how you can minimize them. Write more effective business proposals. Find out how to make sure your system actually delivers the savings you banked on. Discover the Ten Lies Vendors Tell. And more.

UNIX And Large Scale Data Management.

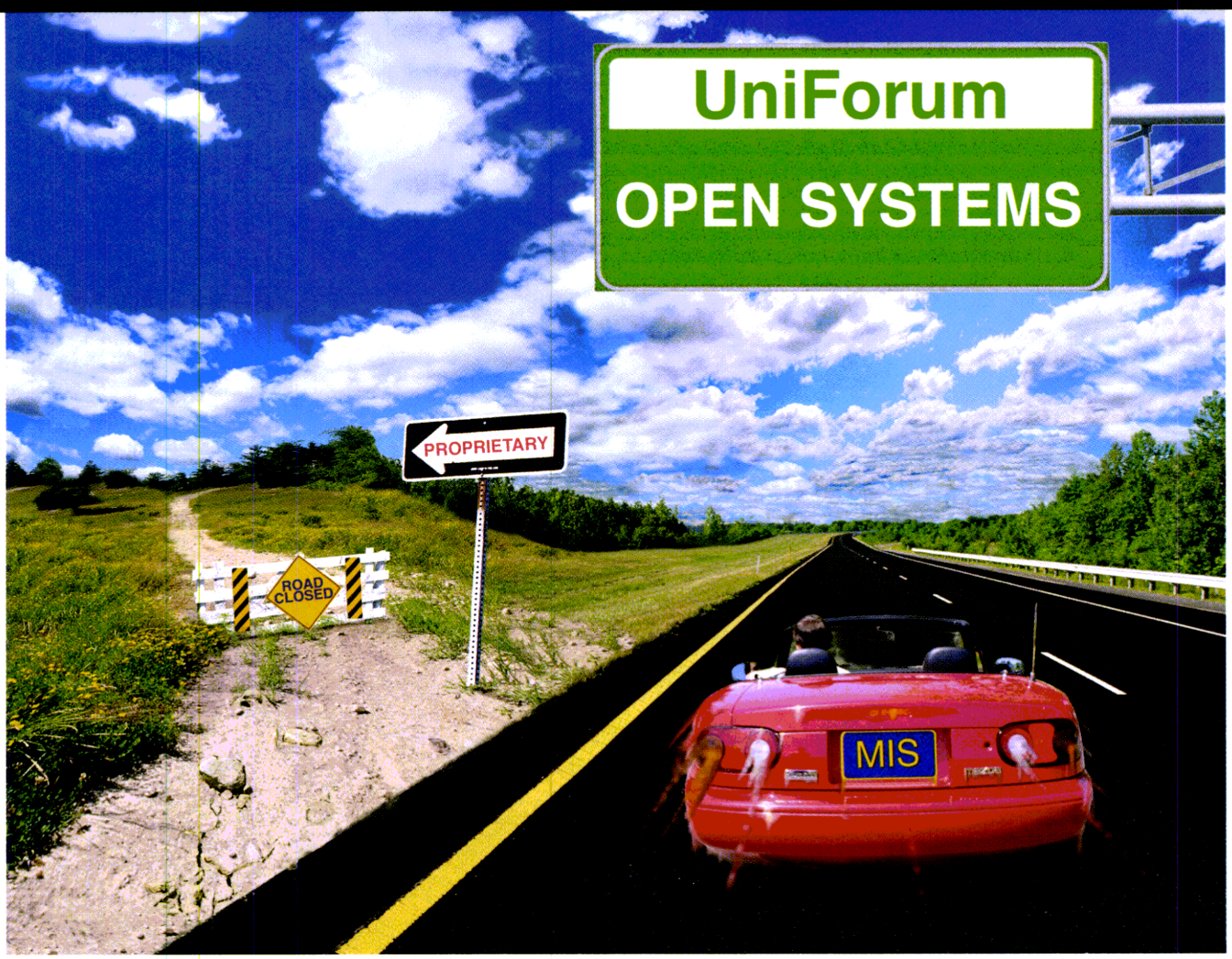
Mainframes and UNIX-based systems can be partners for large scale data management and processing. Learn how Open Systems can integrate with mainframes to provide much more cost-effective large-scale data management needed for applications development. Find out how the latest advances in technology allow Open Systems to provide large-scale, mission-critical data processing.

Trends In Software Development.

The migration of UNIX into the larger enterprise carries a vast number of possibilities for developers who want to distribute powerful applications across a heterogeneous environment. Determine if, when and how to move to object-oriented programming. Also included are: sessions on cross-platform development tools, porting UNIX applications to Windows NT and the creation of cross-platform APIs.

(continued on page 32)

Corporate America at the Crossroads



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Here's just a sampling of what's in store, and why you should make plans to attend, now!

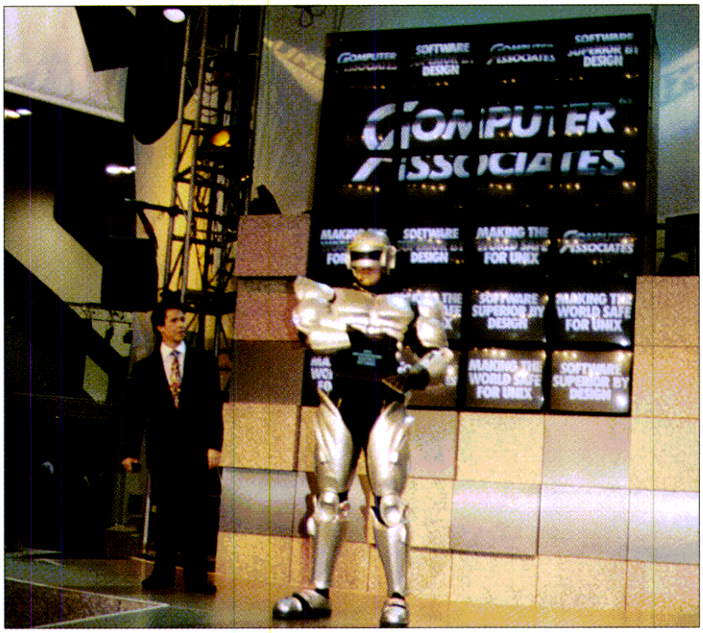
* 75 Conference Sessions on every aspect of the move to Open Systems
* Exclusive seminars and con-

"...come see what we've developed for you, the solutions are here, they're reliable, they're affordable, and they're open."

(continued from page 30)

UniForum Opens The Future.

Only at UniForum can you explore how Open Systems are reshaping the way we live, work and play. Among the possibilities: virtual reality, mobile and nomadic computing, multimedia entertainment, advanced video conferencing and nationwide/worldwide supernetworks. An added extra! The Future Pavilion on the show floor will make much of this technology come alive.



ferences from the leading user groups: USENIX, SAGE, MOSES and the Computer Management Group – all at UniForum

* 10 Tutorials providing instruction at introductory, intermediate and advanced levels
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* 3 FREE Keynote Addresses, plus a first ever CEO Address: hear about the future of Open Systems from Andrew Grove, Chairman and CEO of Intel; Lester Thurow, former Dean of MIT's Sloan School of Management; Dennis Ritchie, the genius behind UNIX and the C language; and Robert Palmer, CEO of Digital Equipment Corporation

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* Open Systems at Work – experience our live Interactive Network and Message Centers
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* An exclusive DCE Showcase shows how you can develop distributed applications transparently
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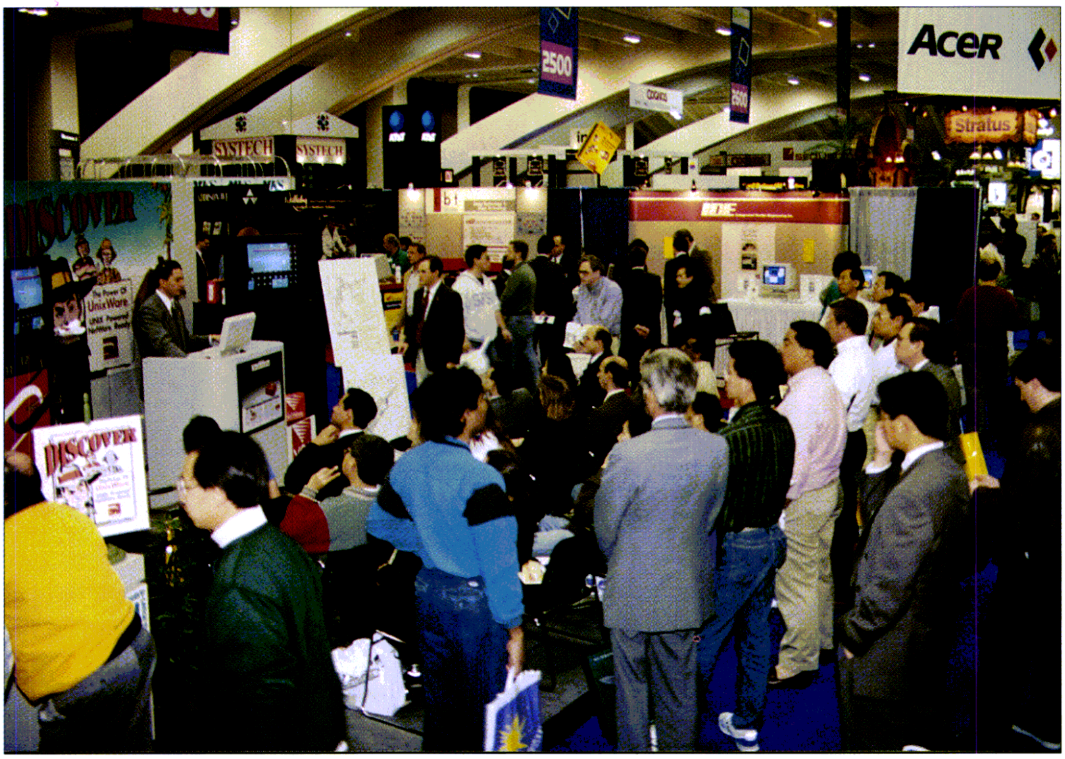
And What Else?

If its UniForum then you know you'll hear and learn more about COSE. Count on it! There'll be lots to find out about specifications, and emerging technologies at numerous COSE sessions and tutorials.

And then there's the UniForum Job Fair where counselors will be on hand, on-site interviews can be scheduled and information on staffing alternatives will be shared.

You mentioned Fun and Pizzazz, right!

Right. How about The Beach Boys – live! That's right – one of the world's best loved rock 'n roll bands will shake the Civic Center to its rafters at the best UniForum party ever. And its free! Ticket quantities are limited but are guaranteed for everyone who registers for a tutorial, workshop or conference day. All others, first registered, first reserved. Hurry...surf's up!◆



		TRACK ONE: Global Networks and the Role of UNIX	TRACK TWO: A New Age for Enterprise System Strategies	TRACK THREE: Open Systems- Truths and Myths	TRACK FOUR: Cost & Benefits: A Manager's Perspective on UNIX
Wednesday, March 23	8:00-9:15	Building Distributed Systems With UNIX	Treating End Users as Customers	Open Systems: Non-UNIX Platforms	UNIX vs. Mainframes: Full Life Costing
	9:30-10:15				**KEYNOTE: ANDREW GROVE, CEO, INTEL**
	10:30				**EXHIBITS OPEN**
	10:30-11:45	Network Services Purchasing Guidelines	Data Center or Distribution? The Wrong Question	Where Will Windows NT Fit in the Enterprise Computing Environment	How to Avoid Budget Surprises: The Actual Costs of UNIX
	12:00-1:00				**PLENARY-POLITICS OF OPEN ARCHITECTURES: SINCERELY EXPANDING OPEN**
	1:15-2:30	Open Messaging Systems: Life After PROFs	Economics of Computer and Network Resource Management	Everything You Wanted to Know But Were Afraid to Ask	Nine Ways You Reduce Your Costs Now!
	2:45-4:00	Interconnecting the Mesh: Simplifying the Global Infrastructure Architecture	Designing and Managing High-Performance Networks	About Integrating UNIX and Windows	Proving You Were Right: How to Measure Productivity Gains
	6:00				**EXHIBITS CLOSE**
Thursday, March 24	8:00-9:15	Networking Choices: Netware, IP, Banyan, FDDI or Wait for NT?	Designing High-Performance Distributed Applications Using Software Performance Engineering	The Myths and Lies of Open Systems	Software Asset Management- Payoff on the Corporate Bottom Line
	9:30-10:15				**KEYNOTE: LESTER THUROW, MIT SLOAN SCHOOL**
	10:00				**EXHIBITS OPEN**
	10:30-11:45	The Internet: The Public Domain, Service Rich Global Network	IT Cost Allocation and Chargeback	Aligning Business and Information Technology Strategies	A Model for Evaluating Midrange System Vendor Functionality and Cost of Ownership
	12:00-1:00				**PLENARY: WINDOWS NT: UNIX THREAT OR P**
	1:15-2:30	Wide Area Transmission: The Next Quantum Leap in Price/Performance	Capacity Management in Distributed and Client/ Server Environment	Integrating UNIX & Netware	How to Write an IS Business Proposal
	2:45-4:00	Preparing Your Telecom Infrastructure for Large-Scale Distributed Networks	Developing and Managing Service Level Agreements	Viewing It All From Your Desktop: CDE and Other Approaches	How to Increase ROI in an Open Environment
	6:00				**EXHIBITS CLOSE**
Friday, March 25	8:00-9:15	Name Services: Global Unique Names for Network Entities	Career Strategies in Enterprise Systems	Importance of Branding and Certificate Programs	The Business Case for Open Systems
	9:30-10:15				**KEYNOTE: DENNIS RITCHIE, AT&T BELL LAB**
	10:00				**EXHIBITS OPEN**
	10:30-11:45	Security Services: Access Control With Confidence	Vendor Partnerships & Alliances: Truth or Consequences	The Movement Toward Interoperability Testing	How to Be An Informed Consumer: Ten Lies VendorsTell
	12:00-1:15	A Planned & Methodical Migration to Mission Critical UNIX Platforms	The IS Professional as Change Agent	Making a Multiplatform Scenario Work in the Real World	Pitfalls and Precipices of Managing Multi-Vendor Projects
	1:30-3:00				**PLENARY: COMPARISON OF HARDWARE VENDORS'**
	4:00				**EXHIBITS CLOSE**

TRACK FIVE: UNIX & Large Scale Data Management	TRACK SIX: Trends in Software Development	TRACK SEVEN: UniForum Opens the Future
Can UNIX Handle OLTP?	Understanding Key Trends in Software Development	Nationwide Supernetworks
The Challenge of the 90's: Open Systems	Integrated Software Development Environments	Mobile Computing
YSTEMS OR MANIPULATING THE MARKET FOR ACCEPTANCE		
SQL: Key Questions to Ask Your Database Vendor	Creating Applications Without Platform Dependencies	Experts Predict the Future of Open Systems
Exploring Alternatives to Mainframes for Large-Scale Transaction Processing	Cross-Platform APIs	
Failover Services: Reliable, Robust Operations	Rapid Application Development: Nextstep	Film and Audio Industry
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Porting CICS Applications From Mainframes to UNIX	Cross-Platform Development Tools	Home Shopping
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Issues in Large-Scale Data Management	Open Systems on the Desktop: What's Inside?	Entertainment
Scalable Computing in the Open Systems Environment: Multiprocessing, Parallel Processing & Clusters	Scalable Desktop Environment: Cross Platform Software Development	Virtual Reality
OSF's DME 1.0: Features and Benefits	Object-Oriented Business Engineering	Multimedia
ES		
Implementing OSF DCE: Practical Strategies for Deploying DCE & DCE Applications	Client/Server Software: Sifting Through the Options	Video Conferencing
Approaches to Distributed Computing	Strategies for Successful Open Systems Development	New Telephone Systems
OPEN SYSTEMS STRATEGIES		

TUTORIALS

Monday, March 21
* Basics of Object-Oriented Technology
* Performance Measurement/Management and Capacity Planning of UNIX Systems
* Multimedia Systems: A Guided Tour
* Mastering Fundamental UNIX
* TCP/IP: Understanding the Protocols of the Internet

Tuesday, March 22
* Internetwork Management In Transition: Moving From SNMP Version 1 to SNMP Version 2
* Distributed Systems Management
* Enterprise Messaging
* Introduction to ATM
* Internet: Past, Present & Future

HANDS-ON WORKSHOP

Friday, March 25
* Exchanging E-Mail Between Two Systems
* Synchronizing E-Mail Directories Between or Among Two or More Systems
* Exchanging Files Between Two Systems

THE SECOND ANNUAL UNIFORUM TECHNOLOGY MANAGER'S CONFERENCE

Monday & Tuesday, March 21-22
* From Pilot To Production: Implementing Client/Server Application in The Real World

USENIX/SAGE SYSTEMS ADMINISTRATION TUTORIALS

Monday & Tuesday, March 21-22
* For Systems Managers and Administrators

PLENARY SESSIONS FREE TO ALL ATTENDEES

Wednesday, March 23
* Politics of Open Architectures: Sincerely Expanding Open Systems or Manipulating the Market for Acceptance?

Thursday, March 24
* Windows NT: UNIX Threat or Paper Tiger?

Friday, March 25
* Comparison of Hardware Vendors' Open Systems Strategies

EXHIBITOR LIST

UniForum '94 expects to host more than 400 exhibitors to the trade show March 23-25 at the Moscone Center. These vendors have confirmed their attendance at press time.

a/Soft Development
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Cabletron Systems Inc.
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Courseware Technologies
Crosswind Technologies
Cucumber Information Services
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DataLynx, Inc.
Datamate Software Services
Dataram
Delta Microsystems
Devcom Mid-America Inc.
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Digital Equipment Corp.
Digital Tools, Inc.
Disk Emulation Systems Inc.
Display Industry Association
Distributed Processing Technology
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Empress Software, Inc.
Encore Computer Corporation
Equinox Systems, Inc.
Esker
Expoconsul International, Inc.
Faximum Software, Inc.
Firesign Computer Co.
First Class Systems Corporation
Four Season Software
Gallium Software Inc.
Green Hills Software, Inc.
Herstal
Hewlett Packard Company
Highland Software
Hitachi, Ltd.
Human Designed Systems, Inc.
Hummingbird Communications Ltd.
I-Kinetics, Inc.
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IBM Corporation Power Personal Systems Division
ICL, Inc.
IDE (Interactive Development Environment)
Information Builders, Inc.
Information Dimensions, Inc.
Informix Software Inc.
Insignia Solutions
Institute for Advanced Professional Studies
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Integrix
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IQ Software
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Federal Watch

Open Systems in the U.S. Government

Slow IS Growth Ahead, Report Says

The good news is that the federal information systems market will grow slightly in the coming years. The bad news is that growth will indeed be slow. A shift from defense-related to civilian agency spending will force vendors to redirect their marketing efforts and build relationships with new clients. The drive to "reinvent government" will help drive civilian agency information spending. Big opportunities could emerge in outsourcing as federal agencies mimic their corporate cousins in farming out some data processing chores. Finally, telecommunications spending should also get a boost as federal agencies move to client/server solutions and try to cooperate more with one another.

That was the gist of the Electronic Industries Association's (EIA) Five-Year Forecast, which was released earlier this year in Washington, D.C. The forecast, which was based on purchase planning interviews conducted at 40 federal offices, projects that the federal information systems market will grow approximately 1 percent annually in real terms for fiscal years 1993 through 1998.

"Information technology funding for the civil sector will increase approximately 3.2 percent annually in real growth over the forecast period, while Department of Defense (DOD) funding for information technology will decline at a rate of 2.7 percent annually," said George Shaw, director of strategic planning for Hughes Information Technology Company, Reston, Va., and chairman of the EIA Five-Year Forecast study team.

Shaw said the anemic real growth rate in the federal information technology market is the result of a balance of positive and negative factors. Among the positives, Shaw cited a demand for information technology requirements because computers and telecommunications networks help agencies stretch their budgets — delivering more service with the same number of agency personnel. Meanwhile, Clinton administration initiatives such as health care reform and reinventing government are likely to change the nature of information technology and present new market opportunities for contractors.

On the down side, Shaw said the continuing specter of large federal deficits will put the squeeze on discretionary spending for all federal agencies. This constriction will impact information technology spending for the defense and civil sectors, as can be seen in the relatively small growth reported in the fiscal 1994 budgets.

Looking at DOD spending, the outlook is fairly bleak. Force reductions, consolidation of facilities and base closures add up to a diminished need for information technology spending. Although large procurements will continue as the DOD upgrades parts of its information technology infrastructure, a smaller military means a smaller information systems budget.

"The largest three agencies for federal information systems spending will shift significantly over the next five years," Shaw said. In fiscal 1993, the three DOD services had the largest information technology budgets. But by fiscal 1998, "The departments of Transportation and Treasury, as well as NASA, will have the largest budgets for information technology," he said.

In a generally lackluster environment, the market for outsourcing will be one of the best growth opportunities. Although specific figures were not available, Shaw said, "The portion of the federal information technology market that is contracted out will continue to grow, creating new opportunities for industry."

The EIA Five-Year Forecast of the federal information technology market reviews budget trends and programs, and analyzes more than 40 civil and defense offices. The forecast and other analyses were developed by EIA member companies and supported by extensive research and more than 125 interviews with senior-level officials from the Office of Management and Budget, DOD, civil agencies, Congress and investment firms.

As a companion and follow-up to the forecast, the EIA also produced a market research report on the civil agency sector of the federal information system. Given the expected guns-to-butter shift in federal spending, the report highlights vendor opportunities that are expected to develop over the next five years. Such opportunities will be fueled by challenges to improve "Service to the Citizen," which is part of Vice President Al Gore's Reinventing Government initiative. Implementing a national information infrastructure, and the impact of health care reform are two other factors expected to drive civil agency spending. The EIA study also shows that budget constraints will force interagency cooperation and coordination on major information technology initiatives. This may complicate selling efforts. But vendors who become adept at cross-agency deal-making could turn that challenge into opportunity. Finally, the study found an increased need for computer and data security at a myriad of civil agencies.

A third part of the EIA's effort to predict future federal spending resulted in the Telecommunications Market Study, which was lead by Dr. Chuck Alvord, director of civilian agency programs for Boeing Computer Services in Vienna, Va. According to Alvord's study, federal agencies are showing renewed interest in telecommunications technology as a way to foster network flexibility and reliability. As in the corporate world, federal agencies are finding that applications are becoming inter-agency oriented. Several new network integration opportunities are synopsized in the EIA telecommunications study covering both the defense and civil sectors.

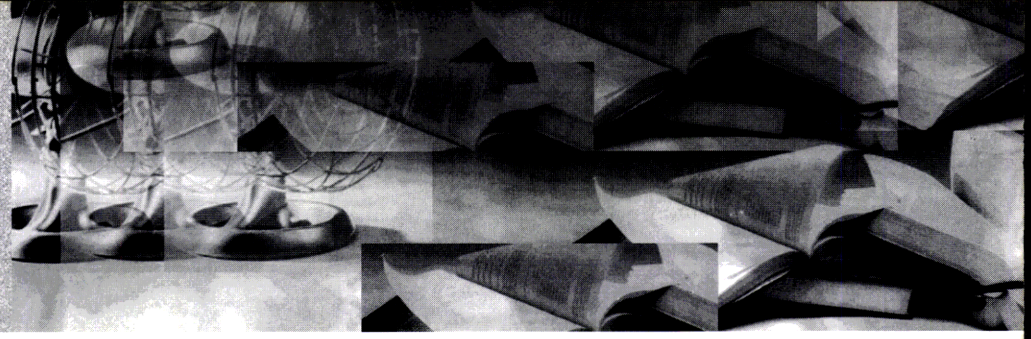
Emerging trends in federal telecommunications usage within several large agencies are consuming available bandwidth and blurring the distinction between the various commercial and government networks. Shared switching technologies, virtual networks and shared facilities enable new economies of scale and make "Bandwidth on Demand" services a reality in the near future. The emerging trend is from a mainframe-centric to data-centric environment where distributed database applications are increasingly geographically dispersed. Heightened governmental interest in security, privacy and wireless technologies are also covered in the report.

For additional information about the various EIA reports, or about the organization itself, contact Mary Lamb at (202) 457-4943. To order a copy of the full market research report, contact Kelly Curtis at (202) 457-8748. The cost for EIA members is $125. Non-members can obtain a copy for $250.◆

Tom Abate *covers science and technology for* The San Francisco Examiner.

Open Books

Reviews of Recent Titles
on Open Systems Subjects



Gigabit Networking

by Craig Partridge

Addison-Wesley Publishing Co.
416 pages; $46.25

Although UNIX is used heavily in the development of networking and communications, *Gigabit Networking* covers a new area that many UNIX professionals are not well informed about. *Gigabit Networking* gives the reader a thorough understanding of the important emerging field of high-speed communications technology. The reader is expected to have some knowledge of networking and computing in general, as this book focuses solely on gigabit networking. Although designed as a professional reference book, it would be suitable as the primary textbook for a graduate-level course in general networking.

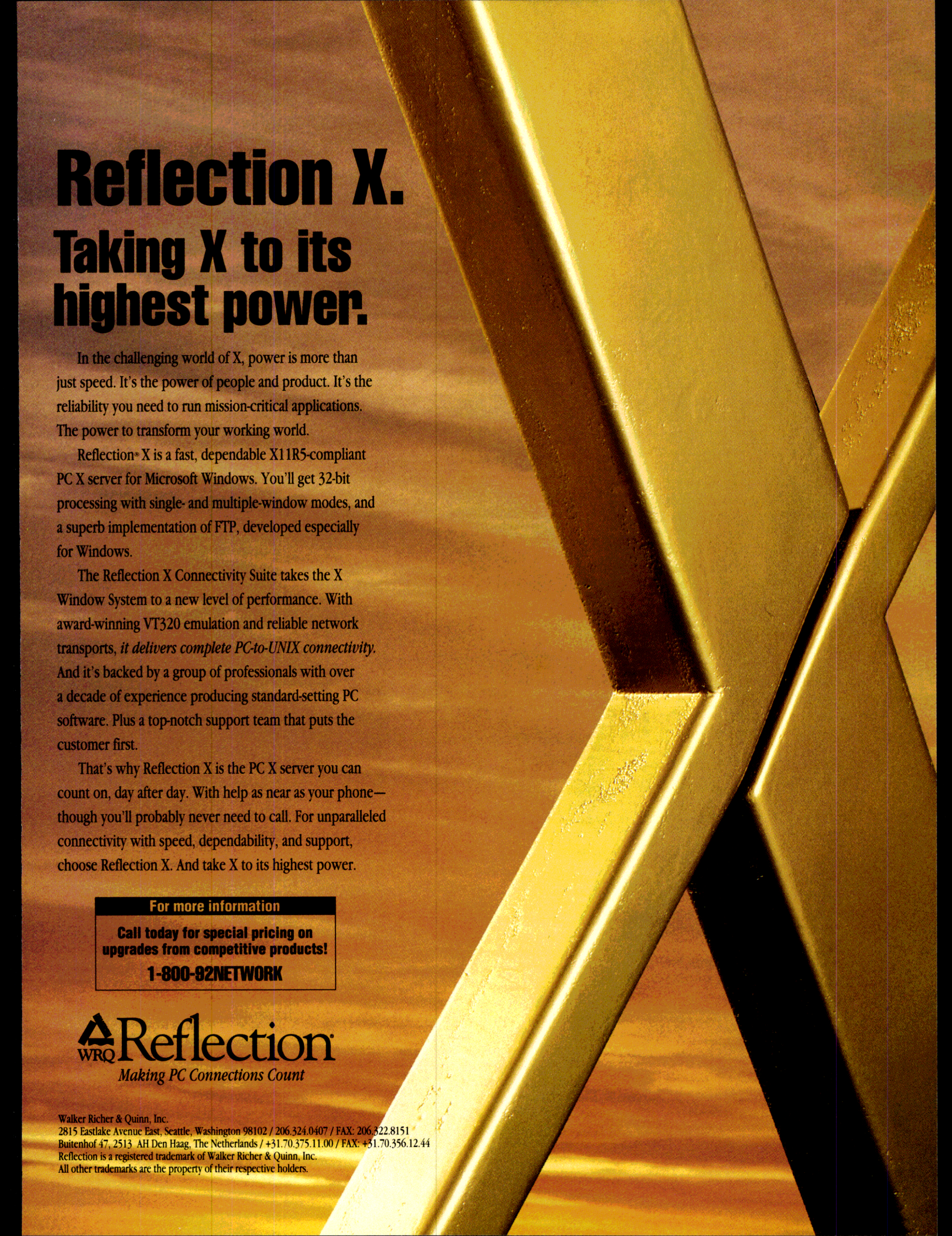
Gigabit Networking is divided into a preface, 16 chapters, a bibliography and an index. An Introduction to Gigabit Networking, the first chapter, does exactly what the title suggests. The second chapter, Fiber Optics, provides a general introduction and useful tutorials on fiber optics and is targeted toward the non-engineer. It is intended to give the reader a firm grasp of how fiber optics affects network design. Chapters 3 through 6 cover cell networking. An Introduction to Cell Networking introduces the notion of a cell, which is a fixed-size packet. Asynchronous Transfer Mode (ATM) covers the most developed form of cell networking. Wide Area Cell Networking covers various cell switch designs, and compares input versus output buffering. Chapters 5, 6 and 7 describe a number of high-speed networking technologies. Local Area Cell Networks examines a variety of technologies suitable for connecting computers, printers, video and voice. Gigabit Packet Networks examines noncell networking at gigabit speeds, and covers technologies such as HIPPI, Fiber Channel, ATOMIC and CSMA/RN. Chapter 8 examines gigabit applications and their requirements. Chapters 9 and 10 provide a useful perspective on protocol performance when studying the internetwork and transport layers. Making Hosts Ready for Gigabit Networks looks at problems encountered when interfacing gigabit networks to computers. Today's Internetworking Protocols examines the limitations of current protocols in a gigabit network environment. Chapters 11, 12 and 13 cover flow control, issues involved in performance guarantees, and enhancing protocols to provide network support for real-time applications. Distributed Systems, the 14th chapter, shows how gigabit networks can affect the performance of distributed systems, and possible solutions to various performance problems. Chapters 15 (The State of Gigabit Networking) and 16 (Where to Learn More) conclude the book with a discussion of open problems in gigabit networking.

Craig Partridge has written a technically "heavy" book that presents numerous models and concepts. *Gigabit Networking* is replete with diagrams that illustrate and explain the workings of many of the devices presented. Partridge gives the reader a clear understanding of the strengths and weaknesses of each of the alternatives in a situation. He is also able to present both the global and the detailed points of view. For example, in Chapter 9 he explains the high costs of copying data, how the seven-layer OSI architecture was developed to allow different layers, how network buffering in 4.3BSD UNIX systems works using this layered approach, and how network buffering produces less than efficient results.

Each chapter of *Gigabit Networking* ends with a summary that pulls together the myriad ideas, models, algorithms, and devices presented. Also included are footnotes, references and suggestions for further reading.

Gigabit Networking fills a void in the field. It is thoroughly researched, and is as up-to-date as possible with the last two chapters telling the reader the current state-of-the-art, and where to get new information. This, in conjunction with the rest of this excellent reference, makes *Gigabit Networking* a "must-have" for anyone who needs to learn about the workings and capabilities of high-speed networking.

Stephen M. Chan *is president of Uniprime Systems, a computer consulting firm in Baltimore that specializes in systems design engineering involving UNIX.*◆



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SysAdmin Solutions

Managing the Integration Process

In many organizations, a system administrator is called on to assemble systems, add interface cards, load operating systems, configure networks, configure databases and other tasks that require a great deal of planning. For example, if the administrator is asked to add 20 new systems to the network, and the company is running thin Ethernet, the network will have to be brought down first. To avoid a crippling blow to productivity, the addition would need to be done during non-business hours. However, if he plans poorly, the administrator may find out at 9 p.m. — with the network down and the Ethernet cable looking like a pot of spaghetti, past the point of no return — that he lacks all the necessary parts to add the additional systems to the network. The following morning, the network is still down and the other employees and the boss are all lined up wondering when they will be able to get to work.

You may recognize this scenario from your own past experience, or that of someone you know. It happens more often than it should. But with proper planning, such a fiasco can be avoided. Just how does one avoid this problem and the lynch mob that will surely follow? Plan, plan, plan. But where to start?

In planning for a systems integration project, whether it is adding systems to the network as described above, or having to build systems, load operating systems or configure databases, you need to be able to clearly identify *all* the steps involved. This includes, all equipment required, all parts necessary, all software and all of the people involved in the process. So, clearly this is not an individual affair; there are always others involved. One technique that may be helpful is to have the people involved in the integration project sit down around the conference table with Post-it notes and pens (I am partial to the multi-colored, felt pens — the Life-Savers scented ones if you can find them — it helps creativity) and give each person a different color to work with. Each person then writes down each step as they see it, until everyone has finished.

Once completed, everyone's Post-it notes are compared, and if there are similar or identical ones, then only one is selected and the others are discarded. Once this is done, you should have a set of Post-it notes that have all the possible steps in the integration project.

As a group, organize the Post-it notes so that the project flows from start to finish. For example, one of the first tasks may be to place purchase orders that bring in the necessary equipment or parts for the project. One of the last tasks may be to clean up the area or send empty boxes to the recycler. One of the intermediate tasks may be something like configuring operating system device drivers for the correct interrupt, I/O address and DMA channel, and making sure it is enabled, with the next step being, perhaps, rebuilding the kernel. By doing this process in a group, the likelihood that a step will be left out is minimized.

"Use one brand of VGA card, one brand of Ethernet adapter, one brand of diskette and hard disk drive. This should reduce your integration time, support time and product costs as well as reduce the number of different products you'll have to have as spares in case of a failure."

One thing that may emerge is that the tasks may be able to be completed in parallel or you may find that a number of tasks can be easily grouped together. If this is the case, group the Post-it notes together, with the first task on top followed by the remainder and this stack of notes will be used to develop a process list to be used in the integration project. Sometimes the integration project entails repetitive tasks — say you need to integrate, load the operating system and database, configure the kernel and load device drivers for 50 systems that are all identical (systems, for example, that are being used as workstations). If this is the case, you will also want to consider making sure that the tasks within each group can be completed in about the same amount of time.

If you are faced with the type of integration project in the above example, I do not recommend doing the systems in batches, such as installing all the Ethernet cards in all the systems. The reason this is not recommended is that if, once you get to the end of the project and begin testing, you find out that all of the Ethernet cards are an old revision and will not work with your operating system, you have to replace 50 cards. If however, you integrate the systems more in an assembly-line fashion and the systems are at various stages of completion when one is complete, you only have to replace the Ethernet card in a few systems and retest. Once you know that all your processes work properly, then you can quickly and methodically complete all the systems.

If you are integrating lots of systems with the same root-disk setup, you should be able to "gas-pump" remaining systems fairly easily. To do this, most systems require the boot track to be laid down on the drive first, along with the fdisk and partitioning information (the partitions must be identical in order for this to work). Once this has been done, most UNIX installation routines require the system to be shut down and rebooted off the hard disk. Rather than boot from that hard disk, swap that drive with the drive that has the complete operating system installed. This, by the way, can include any kernel changes, device drivers, additional software or any other custom setup required for the installation, and the drive can be copied to the disk with only the boot track and partitioning information. You will also need to make sure that the operating system has the necessary device nodes for a second disk drive.

Install the "golden disk" as the root disk, and the boot track and partitioned drive as the second disk (SCSI ID=0 = golden disk and SCSI ID=1 = boot track/partitioned disk, for example) and boot the system.

Once the system has booted up, you can enter a command like the following, which is for SVR4 to make an exact duplicate of the golden disk. Enter the command:

 # dd if=/dev/rdsk/c0t0d0s0 of=/dev/rdsk/c0t1d0s0 bs=100k <enter>

and walk away. In a little while, the disk will be duplicated. Some disk-mirroring controllers may also allow you to do this as well. We have tested this procedure on the Alpha Technology Series 400 controller with excellent results. In fact, we were able to copy a 1GB disk with verification in 20 minutes.

One word of caution: If you set system names and IP addresses on the golden disk, you will need to make these changes on the disks that you are copying. Shell scripts can be easily written to accommodate this process, though. If you are interested please send e-mail to glenn@unizone.com and I can make available a sample shell script for this.

In order to make sure that nothing is forgotten, it is suggested that a "traveler" be developed for each type of system being integrated. The data on the traveler would include such things as: project name, operating system and configuration, additional software, amount of memory, system IP address, listing of equipment to be installed, serial numbers, revision numbers, space for the technician's initials, time-in and time-out blocks for the various integration stations and final inspection. In doing this, nothing that might inadvertently be forgotten is left to someone's memory. I have seen people argue about what the customer said concerning the configuration of an operating system, from kernel tuning parameters to disk partitioning. Avoid these conflicts by faxing a confirmation of the system (including operating system) configuration to the customer for approval or configuration information. The customer may not know, but at least you've covered your bases in writing.

OK. So you say, "This would be fine if we were integrating lots of the same systems, but around here, everybody wants something different." Actually, this is more typically the case in most organizations, but I urge you to standardize if at all possible, even if the requirements for each system differ. By doing so, your costs for spare equipment will be less, and your unit costs should also be lower because you still should be able to provide customized systems from the standard components. Carry one brand of disk drive, use only one company's system, one style of disk controller, one brand of floppy drive, one manufacturer's monitor. In most cases you will be able to limit the number of different brands of components that perform the same function. For instance, use one brand of VGA card, one brand of Ethernet adapter, one brand of diskette and hard disk drive. This should reduce your integration time, support time and product costs as well as reduce the number of different products you'll have to have as spares in case of a failure.

Systems integration can be both fun and hard work. Having good procedures in place from the beginning assures excellent results in the end.◆

Glenn K. Schulke *is the founder of Unizone, a value-added distributor and integrator of UNIX products in Tempe, Ariz. He can be reached at (800)526-8649, or by e-mail at glenn@unizone.com.*

Standards & Technology

A Look Behind the Scenes

The Changed Arena For Standards

During November I attended two conferences on standards and standardization. The two were extremely different in their approach, but both served to illustrate a single point — that standards and standardization are becoming more and more mainstream, and increasingly studied for actual use in the market.

The first of the conferences was at the University of Sussex, in Brighton, and focused on the convergence of information and telecommunications standards and standardization. It was hosted by the Science Policy Research Unit of the Organization for Economic Cooperation and Development. When I initially saw the program my feelings were, as you might expect, something along the lines of "Oh great, another academic panel that will come up with significant equations and no usable information." The first of this type of panel that I ever attended was at MIT nearly eight years ago, when learned academics postulated for hours on the benefits of standardization without ever defining standards or business. You can understand that I was not especially interested in seeing history repeat itself in Brighton.

I might have written off the proceedings had I not seen that several people from the Department of Commerce, from the European Committee for Standardization, (CEN) and others from the European Union (the nomenclature that become operative on Nov. 1, replacing European Community) were also attending and presenting. This changed the nature of the meeting from one of academic research to one of possible policy creation and change. I decided to go to the conference; it is always helpful to know what the policy makers are hearing. Ultimately, I participated on the final day's panel. The panel summed up the findings of the previous three days' worth of discussions on standards and standardization.

On the whole, the conference was good. There were some unnerving moments, as when one of the European delegates stated that the question was not *whether* the governments should get involved in standardization, but *when* they should get involved. The remark did not escape the audience; there was discussion of the implications, but not too much overt resistance to the concept.

There was a reason for this in the context of this particular conference. The presentations on standardization focused on standardization of the telecommunications network and the interplay that telecommunications and information technology share. The telecommunications arena is already heavily regulated; the movement of IT into this arena indicates that IT will also have to become regulated. The rationale is that by their very nature, telecommunications are a "public good" — that is, it is the right of every citizen to have access to telecommunications capabilities, whether it is Plain Old Telephone Service (POTS), or more complex service. It is an area into which governments have a legitimate right to intervene. The IT industry is charging full speed ahead into this arena — without bothering to think what the full impact of their activities will be on the nature of the society and the legislative branches of that society.

"The governmental use of standards to buy items has never been successfully challenged; the governmental right to mandate standards in the areas of health, safety, or homologation has withstood the test of the court system. Therefore, the government can set policy by its judicious (or even injudicious use) of standards."

The well publicized recent spate of pronouncements by various high-visibility figures in the IT world on the potential for multimedia and virtual reality, the acquisition of cable companies by telecommunications companies, and the growth of telecommunications companies in the IT arena have not escaped the legislative eye. While it seems to be a straightforward IT issue to people involved in the industry, it is very unclear to the legislators whether or not this is, in fact, merely a different kind of computing or a socially altering mechanism for the 21st century. If it is IT, then it should be left alone. If, however, it alters the fundamental nature of society (that is, into haves and have nots, or computer-competent and computer incompetent), then we can anticipate a legislative battle.

The battleground could be, unfortunately, standardization. Standards are one of the few areas in which a national interest can be codified. The governmental use of standards to buy items has never been successfully challenged; the governmental right to mandate standards in the areas of health, safety, or homologation has withstood the test of the court system. Therefore, the government can set policy by its judicious (or even injudicious use) of standards. There is nothing to require a company to use the purchasing standards that the government chooses; the only reason that a company would do so is to sell to the largest market in the world — and a market that drives nearly every other market in one form or another.

The Sussex conference looked at those issues and came to no real conclusions. However, there was a commitment to follow up —in both the public and private sectors. The focus was on how to make standardization a discipline — how to provide a coherent set of policies that could be used by government in their attempts to understand and use standardization as an evolutionary tool — not as a devolutionary tool.

The other conference was two days later, in Washington. It was hosted by Verity Consulting, a small Los Angeles competitive benchmarking firm that was doing work for the Company Member Council Executive Committee (CMCEC) of ANSI. The CMCEC had asked Verity to study the problem of *strategic standardization* — that is, the application of standardization practices to help a company achieve a competitive advantage in the market. Verity had the whole of U.S. businesses from which to choose.

With all the money that is spent in the United States on standardization, one would assume that Verity had an easy task. Unfortunately, that assumption proved to be completely incorrect. Verity reviewed over 100 major companies that were heavy participants in the standardization process. Finally, they came up with four companies that practiced strategic

standardization. The four companies were AMP, NYNEX, Proctor and Gamble and Sun Microsystems. (I participated as a representative of Sun Microsystems, and was there to answer questions about how and why Sun did as it did.)

Verity held a day-long session, explaining how standards and standardization were organized, used and implemented at each of the four companies, where there were problems and strengths, and where there were useful or practical things that could be learned. They were at pains to look for cross-functional themes — the four companies tended to have different markets and outlooks that flavored their standardization strategies. However, they concluded that each of the companies was an active participant in standardization, that each had a strategy for this participation, and that each had a method for implementing the results of their activity.

The interesting thing about this conference was that there were 15 companies who had paid several thousands of dollars for the information contained in the Verity report. All of these companies — including some of the largest of the Fortune 500 — realized that by exploiting their expertise in standardization, they could possibly gain an advantage in the market. And it was this advantage that they came to explore.

The questions asked by these participants did stump the panel of experts. One of the questions — "How do you justify a standardization program?" — was especially troublesome to the panelists and to Verity. There is no clean answer to this question, any more than there is for justifying a strategic planning function or a finance function. Standardization is an infrastructure activity in the organization, one that is supposed to help the organization perform more efficiently. Over time, you can point to activities that the standardization function has caused to grow, but none of these are directly attributable to standardization. The saying of the panel — "Success has a thousand parents, failure only has standardization" — rang true.

"There still is no discipline of standardization. There are some very good practitioners, a lot of well intentioned participants, and a large number of people who will be impacted by standardization in nearly every industry."

However, some interesting truths came out. With the appearance of the "virtual corporation" and a client/server environment, you must have standardization available — or each group or activity will be both unique and redundant. And when that occurs in a "new model organization," you'll have chaos. There was some agreement that standardization might be a chaos management tactic — although it wasn't especially referred to that way. The idea was that all organizations display certain types of behavior — and all have certain common goals. Standardization is one way of ensuring that the common goals are shared — and that the common (and best) practices are preserved. This preservation, however, must take place in an environment that saves the flexibility of the structure and the intent — not necessarily the wording — of the rules.

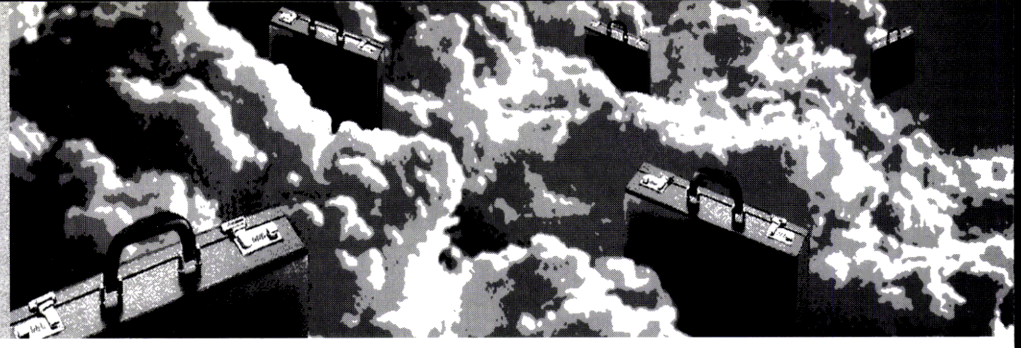
These two conferences both drove home the message that standards and standardization are entering the mainstream of business and government. There still is no *discipline* of standardization, but there are some very good practitioners, a lot of well intentioned participants, and a large number of people who will be impacted by standardization in nearly every industry. Try to imagine the IT world without standards — from Sun-miniature D connectors to the 802 LAN series to the languages to POSIX and to emerging object standards; all have a common heritage. The largest impact, however, will come as companies begin to internalize standards and begin to put economic clout between them.

In this effort, the national governments have tremendous resources. The U.S. government mandated POSIX as part of its procurement process and it has been largely implemented by major providers. The U.K. government mandated ISO 9000 and that standard has taken off. There are other instances of similar activity in nearly every other business. But this time, non-governmental users are beginning to see standards as a way of solving some of their organizational and systems problems. It is this effort, in conjunction with the activities of the government, that will force standardization into the mainstream of U.S. business. The final outcome will be a changed way of doing business — and it is in this changed arena that standards will come into their own, for better or for worse.◆

***Carl Cargill** is standards strategist at SunSoft.*

Concerning Your Career

Employment Tips for Open Systems Professionals



Geographic Information Systems

The Geographic Information Systems (GIS) job market illustrates how careers are being transformed by the widespread acceptance of open systems technology. User needs for cartographic representations of relational databases, friendly interfaces, OS transparency and cross-platform access to data and applications, drive this rapidly growing niche.

Most people may think of the U.S. Geological Survey or the National Forest Service when they hear about GIS, but the applications have become much broader in recent years. Surveying, cartography, oil and gas exploration, and other, ostensibly land-oriented uses still top the list, but it's social and corporate applications that are forming the new wave of demand for this technology. Using differing graphical mapping formats to depict a variety of information from relational databases, symbol tables, and other sources, GIS can communicate virtually any set of complex, real-world spatial relationships and attributes with simplicity and thoroughness.

For example, Taco Bell has been using GIS technology to site their new restaurants intelligently; factoring commercial real estate values, income brackets, and other demographic data into their analysis. Power utilities use it to integrate population density and consumer usage information into their management of existing grids and construction of new plants. Even police departments are using GIS applications, to track crime patterns and facilitate officer deployment. Any information that can be represented by a symbol can become an element of GIS analysis.

The Shortage of Qualified Talent

One of the most significant impediments to the maturation of the GIS industry is the lack of professionals qualified to conduct an effective analysis and design of systems. A combination of three abilities is necessary to work effectively in GIS: proficiency with at least one vendor's development system; experience in the industry being served by the system; and an ability to think spatially. Although the difficulty of finding this synthesis of abilities is slowing the utilization of GIS in many industries, UNIX professionals with workstation experience should have an edge.

It's interesting to note that, in the GIS industry, computer purists are not the most desired workers. Experience, as well as degrees in geography, civil engineering, environmental sciences, marketing, architecture, facilities management, construction and master planning is as important – if not more important – than experience with a specific language, OS or platform.

"A combination of three abilities is necessary to work effectively in GIS: proficiency with at least one vendor's development system; experience in the industry being served by the system; and an ability to think spatially."

I recently counseled a young geologist working in the mapping division of a major SI firm, whose path to career success exemplifies the critical need of GIS systems providers for talent related to their target industry. Along with many other young geologists, he had been hired to conduct the data entry phase of a major project; although not a programmer and only slightly familiar with UNIX, he correctly surmised that software savvy would equal job security. He distinguished himself by gaining familiarity with the configuration of the underlying Arc/Info GIS application software; his company subsequently flew him out to California for a week-long Arc/Info class, and when the layoffs came, he was the only one in his group who was not cut. His company recently sent him back to the university, part-time, to learn more about computer science, making himself even more valuable to them.

The Players and Their Products

Although expanding rapidly, the GIS industry has already become quite competitive. According to John Antenucci, president of a GIS-oriented management consulting firm known as PlanGraphics, over 50 percent of GIS revenue is split between Intergraph Corp. of Huntsville, Ala., and Environmental Systems Research Institute Inc. (ESRI), Redlands, Calif. The other 45 to 50 percent of the market belongs to a wide assortment of small firms, some of which GIS job hunters should consider avoiding. The CEO of one such company that is now filing for Chapter 11 bankruptcy protection, said he just "can't compete against the big players."

In 1981, ESRI introduced Arc/Info, which has since become one of the best-known products in GIS ("the default standard" according to one user). Each cartographic feature in Arc/Info has three types of data: geometric data, representing its coordinate location; topological data, representing the network relationship between features; and attribute data, describing the characteristics of these features. Attributes of features can also be keys to other relationships, allowing for the definition and management of feature attribute data utilizing RDBMS concepts.

ESRI's ARC Macro Language (AML) allows for customized application design, using an organization's own terminology and procedures. Custom applications written in C or Fortran can be integrated, and ESRI also provides a wide range of tools and other products, including a version of Arc/Info that runs on DOS platforms and interfaces with dBase.

Although Intergraph has been a player in the UNIX hardware and software market from early on, the desktop-oriented nature of GIS has also driven the company's product line in application-specific, OS-neutral directions. The core of Inter-

"Independent consultants seeking proficiency with GIS products, as well as job hunters currently at companies not using the above products, ought to consider making a personal investment in training."

"Professionals involved in developing 3-D graphics applications are likely to be suited to GIS's need for engineers who can think in spatial terms. Computer-aided design and drafting, virtual reality applications, video games and other areas involving simulation are examples of disciplines that may cross over to GIS."

graph's software product line is a 2-D/3-D workgroup CAD product called MicroStation, which supports various translation and output formats, allows users to reference the files of other users in real time, can store non-geographical data in RDBMSs, and is available in DOS and Mac versions.

Intergraph also provides the Modular GIS Environment (MGE), a large family of GIS-related hardware and software products that allows users to define a seamless, integrated system to meet their needs. The foundation of MGE is MGE/SX, which runs on RISC-based UNIX platforms as well as IBM and DEC mainframes. Since MGE/SX uses MicroStation as a graphics and geometry subsystem, Macs and DOS-based PCs can be used for map compilation, editing, and data review.

It's worth noting that Intergraph has made an early and substantial commitment to Microsoft Windows NT; according to Microsoft, they are the world's largest independent development site for NT applications. MicroStation is also available for NT; I spoke with one company official who has high praise for NT's GUI and API. With NT becoming more common in open systems environments, UNIX professionals who are unfamiliar with Microsoft's new product may wish to reconsider their relationship with NT.

In terms of site licenses, Antenucci says that Mapping Information Systems Corp. of Troy, N.Y., comes in as No. 1 with their MapInfo product. MapInfo is available for DOS boxes, HP, Sun and Macintosh, and has recently added Arc/Info import and export capabilities. The company has signed a pact with Intergraph to develop a version for the latter's workstations; Intergraph will in turn market MapInfo.

Career Angles

Independent consultants seeking proficiency with GIS products, as well as job hunters currently at companies not using the above products, ought to consider making a personal investment in training. ESRI recently changed their training policy, and has now opened their $1,500, five-day Arc/Info introductory course to non-users of that product. Training in other leading products may be available – contact the vendors directly for more information. Self-starters should consider purchasing a popular low-end, multiplatform product like MapInfo, and training themselves.

Professionals involved in developing 3-D graphics applications are likely to be suited to GIS's need for engineers who can think in spatial terms. Computer-aided design and drafting, virtual reality applications, video games and other areas involving simulation are examples of disciplines that may cross over to GIS.

Positions involving software design and development with GIS vendors are likely to demand skills like C, C++, X Window System and object-oriented methodologies. Constructing the databases will require proficiency with 4GLs and packages from various RDBMS vendors. GIS software makes extensive use of raster and vector graphics, and often involves conversion between the two formats.

Although many engineers dream of working for vendors, I suspect that the bulk of career opportunities will likely be in the systems integration industry. As with other SI opportunities, a wide range of skills and the ability to work closely with clients on site will be in high demand. Many vendors have their own SI and consulting divisions, however, such as ESRI's Rent-A-Tech, that may provide the best of both worlds. Because of the application-specific and user-oriented nature of GIS, experience with a broad assortment of vendors' products and various APIs is likely to be more important than in many areas of open systems engineering.

The Future

Where is GIS going? According to Cliff Kottman, an executive manager in Intergraph's federal systems division, it will eventually join other major features of office automation. Industry-specific tool-kits and interfaces will continue to evolve, making familiarity with the various tool-kits essential for professionals seeking to become generalists. Users will open a GIS window just as they open a word processing or spreadsheet application, pasting data back and forth between them.

With the kind of power it can provide, GIS promises to make some serious waves as it hits a mushrooming number of desktops. Gaining proficiency with the tools and concepts that make it possible amounts to a giant step toward long-term career security.◆

Jim Johnson *is a certified personal consultant and the principal of Options Unlimited, specializing in the placement of UNIX professionals in the Washington, D.C., area. He can be reached at (301) 587-2338.*

Calendar: January-February

Conferences and Seminars

Jan. 10-13
Object World
by IDG World Expo
Hynes Convention Center; Boston, Mass.
Object World covers software concerns of developers and users and offers solutions applying object-oriented technology to reduce application development time, improve software ease-of-use and cut costs. It will feature one day of tutorial, an extensive conference program and a three-day exhibition. Tutorial topics include Object-Oriented Business Engineering, A Fully Worked Example of Object-Oriented Design, An Executive Overview of Object Technology, A Process Framework for Object-Oriented Projects and more. Three main conference tracks will discuss Technology of Objects, Objects in Business and the Software Developer's Track. Conference focus areas include Understanding Objects, Moving to Objects, Analysis and Design, Working with Objects, Storing Objects and Distributing Objects. Object World will also feature over 40 companies exhibiting the latest in Object Technology.

Contact : Object World Boston '94, 111 Speen St., P.O. Box 9107, Framingham, MA 01701-9514; (800) 225-4698, (508) 879-6700 or fax (508) 872-8237.

Jan. 17-21
USENIX Winter Technical Conference
by USENIX Association
San Francisco Hilton; San Francisco, Calif.
The USENIX Winter Technical Conference will include papers and an invited talks track covering topics including UNIX on Wall Street, Interprocess Communications, Networking, Kernel Performance, Microkernels, Mobile Computing, TCL/TK, File Systems, Video Compression and Works in Progress reports. Tutorial topics include Essential UNIX Programming, Topics in System Administration, UNIX Power Tools — Getting the Most Out of UNIX, The Law and the Internet, and much more. Other special features include the Exploratorium and the Vendor Display. The Vendor Display lets attendees review the latest software and hardware products, and the newest releases from technical and professional book publishers.

Contact: The USENIX Association, 22672 Lambert St. #613, Lake Forest, CA 92630; (714) 588-8649 or fax (714) 588-9706.

Jan. 18-21
Client/Server Conference & Exposition
by CMP Conference & Exhibit Group
San Jose Convention Center; San Jose, Calif.
The Client/Server Conference & Exposition's five-track program covers all aspects of client/server computing including implementation strategies, case studies, distributed database processing, mobile computing, applications development and systems integration. This conference also includes more than 75 tutorials with topics such as Client/Server Product and Tool Comparison, Re-Engineering Host-Based Systems to Client/Server and Distributed Computing, Mobile Data, Managing Security in the Client/Server Enterprise, Object-Oriented Tools for Building Client/Server Applications for Your Organization, and more. The Client/Server Conference and Exposition will also feature 20 hours of product education sessions from the industry's premier client/server solution providers, and more than 150 exhibiting companies.

Contact: CMP Publications, P.O. Box 1773, Stamford, CT 06920; (800) 972-5244, (516) 562-7460 or fax (800) 858-0412, (516) 562-7459.

Jan. 24-27
ComNet '94
by IDG World Expo
Washington Convention Center; Washington, D.C.
ComNet '94 is a global networking show, focusing on companywide enterprise networking issues. Through the conference program and exhibition, ComNet '94 offers business solutions to developing an enterprise network architecture. Topics covered include ATM, FDDI, Frame Relay, SMDS and wireless data communications. The Conference Program, Building the Enterprise Network, will focus on real-world solutions such as imaging, voice, data, work group and database technologies. ComNet '94 will include more than 20 in-depth tutorials, over 75 conference sessions, two keynotes, a special plenary session on ATM and an Executive Symposium. It will also feature over 450 companies exhibiting their newest technologies.

Contact : IDG World Expo, 111 Speen St., P.O. Box 9107, Framingham, MA 01701-9107; (800) 255-4698, (508) 879-6700 or fax (508) 875-1573.

Feb. 16-18
Government Technology Conference
by GTC
Austin Convention Center; Austin, Texas
The fifth annual Government Technology Conference (GTC) will offer seminars with topics including GIS Integration, Developing Public-Private Partnerships, Rightsizing & Client/Server, Strategic Planning & Output Measurements, LAN Design & Implementation, Basic Telecommunications, Internet, and Workflow Automation. The opening keynote will be delivered by Ted Gaebler, co-author of *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector.*

Contact: GTC, 9719 Lincoln Village Dr. #500, Sacramento, CA 95827; (916) 363-5000 or fax (916) 363-5197.

Feb. 27-March 3
CASE World and Objex
by Digital Consulting Inc.
Moscone Convention Center; San Francisco, Calif.
CASE World, combined with Objex — the Object Conference & Exhibition, will include seven conferences with topics covering Client/Server & Open Systems, Software Engineering, Business & Software Re-Engineering, Enterprise CASE, Object Methods, Languages and Environments, and Commercial Applications and Results. Special presentations will be given by Tom DeMarco, author and principal of *Atlantic Systems Guild,* Ed Yourdon, and Paul Strassmann, former director of defense information, DOD. CASE World and Objex will also feature more than 150 companies exhibiting the latest software development tools for PCs, workstations, minicomputers and mainframes.

Contact: Digital Consulting Inc., 204 Andover St., Andover, MA 01810; (508) 470-3880 or fax (508) 470-0526.

March 21-25
UniForum '94
by UniForum, the International Association of Open Systems Professionals
Moscone Convention Center; San Francisco, Calif.
The 11th annual UniForum Conference and Trade Show, the largest technology exposition and conference focusing exclusively on the UNIX and open systems marketplace,

will include two major two-day conferences, seven main conference tracks, as well as tutorials, hands-on workshops and special events. A performance by the Beach Boys will be included. Keynote speakers will be Andrew Grove, president and CEO of Intel Corp.; Lester Thurow, economist and dean of the Massachusetts Institute of Technology's Sloan School of Management; and Dennis Ritchie, one of the two creators of UNIX. The two-day conferences, both to be held Monday and Tuesday March 21 and 22, are the 2nd annual UniForum Technology Managers' Conference, "From Pilot to Production: Implementing Client/Server Applications in the Real World," led by Judith Hurwitz, president of the Hurwitz Consulting Group and leading open systems expert; and a two-track conference led by the USENIX Association and its special technical group, SAGE. The USENIX tracks will focus on systems administration and security issues on UNIX systems and networks and the X Window System. Plenary sessions will deal with hot open systems issues. Hundreds of exhibitors are expected from the marketplaces of open systems, UNIX, interoperability and downsizing/rightsizing. Exhibitors already announced include AT&T, Hewlett-Packard Co., Digital Equipment Corp., Computer Associates International, Informix Software, IBM Corp., Oracle Corp., SunSoft, Unisys and Novell, among other major hardware and software vendors.

Contact: IDG World Expo, 111 Speen St., Framingham, MA 01701-9515; (800) 225-4698 or (508) 879-6700; fax (508) 872-8237.

Training

Advanced Programming in the UNIX Environment
Ottawa, Ontario.....Feb. 14
Learnix Ltd., (613) 828-8649; $2,200

Hands-On UNIX Networking
Chicago, Ill. .....Feb. 23-25
American Institute, (800) 345-8016; $1,295

Introduction to SCO System V
Boston, Mass .....Feb. 1-3
Tyngsboro, Mass. Feb. 9-11
Boston University, (508) 649-9731; $895

Introduction to SCO System V
Reston, Va. .....Feb. 9-11
Santa Cruz, Calif. ...Feb. 2-4
The Santa Cruz Operation, (800) SCO-UNIX or (408) 425-7222; $895

Introduction to SCO UNIX/XENIX
Charlotte, N.C.....Feb. 2-4
TR Group, (704) 377-8649; $795

Introduction to Shell Programming
Arden Hills, Minn...Feb. 17-18
Control Data, (800) 624-1231; $695

Introduction to UNIX
Anaheim, Calif. .....Feb. 14-15
Anchorage, Ala.....Feb. 7-8
Herndon, Va .....Feb. 28-March 1
Orlando, Fla. .....Feb. 7-8
American Institute, (800) 345-8016; $1,095

Introduction to UNIX
Phoenix, Ariz.....Feb. 1-4
Bull Technical Training, (800) 343-1206 or (602) 862-5600; $1,300

Introduction to UNIX
Columbus, Ohio.....Feb. 21
Software One, (614) 451-1800; $250

Introduction to UNIX, Level 2
Anaheim, Calif. .....Feb. 16-18
Anchorage, Ala.....Feb. 9-11
Orlando, Fla .....Feb. 9-11
Washington, D.C.....Feb. 3-4
American Institute, (800) 345-8016; $1,295

Introduction to Using UNIX
Edmonton, Alberta .Feb. 3-4
Gemini Learning Systems, (403) 434-4429; $495

Networking UNIX Systems Workshop
Toronto, Ontario .....Feb. 14
Learnix Ltd., (613) 828-8649; $1,320

Object-Oriented Analysis & Design
San Jose, Calif.....Feb. 7-11
Semaphore, (508) 794-3366; $1,595

Object-Oriented Design
Dallas, Texas.....Feb. 14-17
CompuEdge Technology, (214) 746-4600; $900

SCO UNIX System V/386 Administration
Reston, Va. .....Feb. 14-18
Santa Cruz, Calif. ...Feb. 7-11
The Santa Cruz Operation, (800) SCO-UNIX or (408) 425-7222; $1,750

SCO UNIX System V/386 Internals
Santa Cruz, Calif....Feb. 28-March 4
The Santa Cruz Operation, (800) SCO-UNIX or (408) 425-7222; $2,220

SCO UNIX/XENIX System Administration
Charlotte, N.C.....Feb. 7-11
TR Group, (704) 377-8649; $1,395

Shell Programming and Tools
Phoenix, Ariz.....Feb. 7-10
Bull Technical Training, (800) 343-1206 or (602) 862-5600; $1,300

UNIX Advanced System Administration
Rockville, Md.....Feb. 28-March 4
Control Data, (800) 624-1231; $1,550

UNIX Advanced Usage
Arden Hills, Minn...Feb. 21-22
Control Data, (800) 624-1231; $695

UNIX and Shell Programming
Dallas, Texas.....Feb. 28-March 4
CompuEdge Technology, (214) 746-4600; $900

UNIX for System Administrators
Ottawa, Ontario.....Feb. 7
Toronto, Ontario .....Feb. 28
Vancouver, B.C .....Feb. 14
Learnix Ltd., (613) 828-8649; $1,650

UNIX for Users
Ottawa, Ontario.....Feb. 7
Toronto, Ontario .....Feb. 28
Vancouver, B.C. .....Feb. 14
Learnix Ltd., (613) 828-8649; $990

UNIX Fundamentals
Dallas, Texas.....Feb. 28-March 2
CompuEdge Technology, (214) 746-4600; $550

UNIX Fundamentals
Ottawa, Ontario.....Feb. 21
Toronto, Ontario .....Feb. 7
Learnix Ltd., (613) 828-8649; $1,650

UNIX Shell Programming
Ottawa, Ontario.....Feb. 23
Toronto, Ontario .....Feb. 9
Learnix Ltd., (613) 828-8649; $990

UNIX System Administration
Rockville, Md.....Feb. 14-16
Control Data, (800) 624-1231; $1,020

UNIX System Administration
Dallas, Texas.....Feb. 7-10
CompuEdge Technology, (214) 746-4600; $900

UNIX Usage
Arden Hills, Minn...Feb. 14-16
Control Data, (800) 624-1231; $1,020

Using X Windows
Morristown, N.J.....Feb. 23-24
American Research Group, (919) 380-0097; $995

XENIX System Administration
Columbus, Ohio.....Feb. 22-25
Software One, (614) 451-1800; $450◆

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Open Systems Digest

Recently Published References to Open Systems

Untitled Item in Reporter's Notebook
Computerworld, Sept. 6, 1993, p 63 — OSIware's UNIX-based messaging router.

Apple OS Upgrade To Pave Way for PowerPC
Tom Quinlan, *InfoWorld*, Sept. 6, 1993, pp 1, 103.

For the Record
InfoWorld, Sept. 6, 1993, p 6 — Correction to Aug. 23 report on LAN Manager upgrade requirements.

BBS-Internet Link To Offer Window on the World
Cheryl Gerber, *InfoWorld*, Sept. 6, 1993, p 39 — Report on One BBS Con show.

Short Takes
Computerworld, Sept. 13, 1993, p 8 — Item in "News Shorts" reports former UNIX System Laboratories president Roel Pieper named president and CEO of Ungermann-Bass.

The Hype Battle
Paul Gillin, *Computerworld*, Sept. 13, 1993, p 41 — OS/2's networking does not compare well to competitors including UNIX.

Want UNIX Videoconferencing? Build It Yourself
Jean S. Bozman, *Computerworld*, Sept. 13, 1993, pp 49, 58.

Get the Message?
Franco Vitaliano, *Computerworld*, Sept. 13, 1993, p 54 — Remote procedure calls.

Managing Distributed Systems Dilemmas
Johanna Ambrosio, *Computerworld*, Sept. 13, 1993, p 71.

Sun, Axil, HEA Settle
Computerworld, Sept. 13, 1993, p 131 — Item in "In Briefs" reports Sun settles lawsuit against Axil Workstations and Hyundai Electronics America.

IBM Fans the Flames for WABI Standard
Doug Barney and Stuart J. Johnston, *InfoWorld*, Sept. 13, 1993, pp 1, 111.

Internet Spins Web over Business
Mitch Ratcliffe, *MacWEEK*, Sept. 13, 1993, p 22.

Novell UNIXWare: What's the Mac Got to Do With It?
Mitzi Waltz, *MacWEEK*, Sept. 13, 1993, pp 36-37.

Novell Taps UNIX
Elisabeth Horwitt, *Computerworld*, Sept. 20, 1993, pp 1, 14 — Novell to outline strategy for linking NetWare and UNIXWare.

A New Class of Computing
Charles Babcock, *Computerworld*, Sept. 20, 1993, p 6 — Component servers.

Users Want Vendors To Fill In UNIX Gaps
Thomas Hoffman, *Computerworld*, Sept. 20, 1993, p 14 — Users still want systems management and security addressed.

IBM To Debut PowerPC Boxes
Ed Scannell and Michael Fitzgerald, *Computerworld*, Sept. 20, 1993, p 14.

Sun To Finalize WABI
Computerworld, Sept. 20, 1993, p 16 — Item in "News Shorts".

Development Tools Aim for Cross-Platform Market
Kelley Damore, *InfoWorld*, Sept. 20, 1993, pp 1, 121.

IBM To Introduce First PowerPC-Based Workstation
InfoWorld, Sept. 20, 1993, p 6.

Even Norton Can't Find Lost UNIX Files, So Backups Are Essential
Brett Glass, *InfoWorld*, Sept. 20, 1993, p 66.

Intel Chips in with PR Push in Pentium, PowerPC War
Mark Hall, *MacWEEK*, Sept. 20, 1993, pp 1, 116.

Private Sector To Foot Cost of National Data Highway
Roger Karraker, *MacWEEK*, Sept. 20, 1993, p 8.

Standards Group To Shepherd OpenDoc Technologies
Raines Cohen, *MacWEEK*, Sept. 20, 1993, p 115.

Rivals May Squeeze Intel
Michael Fitzgerald, *Computerworld*, Sept. 27, 1993, pp 1, 7.

HP Users Still Stung by Order Processing, Support Snafus
Mark Halper, *Computerworld*, Sept. 27, 1993, p 12.

Novell To Move UNIXWare to Fore
Elisabeth Horwitt, *Computerworld*, Sept. 27, 1993, p 14.

UNIX Trademark Switch on Hold
Jean Bozman, *Computerworld*, Sept. 27, 1993, p 14 — Novell did not announce transfer of UNIX System V Release 4 source code to X/Open Co. at UNIX Expo as expected.

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Computerworld, Sept. 27, 1993, p 15 — COSE holds first systems management subgroup meeting.

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Computerworld, Sept. 27, 1993, p 15 — Computer Associates to submit APIs from its CA-Unicenter to COSE.

IBM Shows PowerPC Systems
Jean S. Bozman, *Computerworld*, Sept. 27, 1993, p 16.

Legent, HP To Link Host, UNIX Worlds
Gary H. Anthes, *Computerworld*, Sept. 27, 1993, p 24 — Legent Corp. and Hewlett-Packard Co. to develop tools for mainframe and UNIX client/server management.

Sun, Amdahl Team on Open Systems Boxes
Jean S. Bozman, *Computerworld*, Sept. 27, 1993, p 24 — Sun and Amdahl to jointly sell Sun servers and Amdhal's service.

Macintosh Users Get Ready for UNIX
James Daly, *Computerworld*, Sept. 27, 1993, p 42 — Macintosh users plan for PowerOpen.

Data General Mulls Aviion Microprocessor Options
Craig Stedman, *Computerworld*, Sept. 27, 1993, p 54.

NCR Eyes Software Growth with New Unit
Thomas Hoffman, *Computerworld*, Sept. 27, 1993, pp 79, 105 — NCR to port its UNIX software products.

UNIX Variants: How Different Are They?
Joe Panepinto, *Computerworld*, Sept. 27, 1993, p 140.

Sprouting Services
Computerworld, Sept. 27, 1993, p 158 — Item in "Inside Lines" reports on Banyan's data and application distribution service.

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Computerworld, Sept. 27, 1993, p 158 — UNIX Expo joke about Novell donation of UNIX specifications to X/Open.

UNIXWare Vision Meets Backlash
Shawn Willett and Scott Mace, *InfoWorld*, Sept. 27, 1993, pp 1, 115 — Concern about Novell's plans for UNIX.

First PowerPC System Finally Hits the Street
Cate Corcoran, *InfoWorld*, Sept. 27, 1993, pp 1, 12.

PowerPC Hinges on Success with NT
Tom Quinlan and Cate Corcoran, *InfoWorld*, Sept. 27, 1993, p 12.

Compaq, Novell Pool Resources To Boost UNIXWare, NetWare
Shawn Willett, *InfoWorld*, Sept. 27, 1993, p 42 — Compaq and Novell's Enterprise Computing Partnership.

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Rachel Parker, *InfoWorld*, Sept. 27, 1993, p 57 — Novell's mini Brainshare event focusing on AppWare; TeleStrategies Inc.'s Commercializing the Internet.

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David Baum, *InfoWorld*, Sept. 27, 1993, pp 68-69.

Burnside, Ancillary Products Strengthen Novell's Core
InfoWorld, Sept. 27, 1993, p 118 — Interview with Novell's Mary Burnside.

Apple Aims for Mainstream with PowerPC Licensing Plans
Henry Norr, *MacWEEK*, Sept. 27, 1993, pp 1, 91.

America Online Expanding Internet Services
Nathalie Welch, *MacWEEK*, Sept. 27, 1993, p 14.

Internet Is More Global Yarn Ball Than Data Highway
Paul Saffo, *MacWEEK*, Sept. 27, 1993, p 28.

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Steve Hannaford, *MacWEEK*, Sept. 27, 1993, pp 30-32.

Mac Development Tools Get with the Program
Bruce Schneir, *MacWEEK*, Sept. 27, 1993, pp 45-46.

Larry O'Brien, Sheer Elegance
AI Expert, September 1993, p 5 — Author rejected his idea for a YACAC, "Yet Another Cellular Automaton Compiler."

Internet Resource Discovery Systems
Katia Obraczka, Peter B. Danzig and Shih-Hao Li, *Computer*, September 1993, pp 9-22.

Internet Resource Discovery at the University of Colorado
Michael F. Schwartz, *Computer*, September 1993, pp 25-35.

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Dario Giuse, *Computing Reviews*, September 1993, pp 463-464.

Review of Writing a UNIX Device Driver (2nd ed.) by Janet I. Egan and Tom Teixeira
L. Pasculescu, *Computing Reviews*, September 1993, pp 468-469.

The Fall of Proprietary Empires
Robin Bloor, *DBMS*, September 1993, pp 10, 12 — "When single-vendor solutions give way to open systems, who will answer your pleas for support?"

Berkeley UNIX Primer for C Programmers
Spencer Dawkins, *IEEE Software*, September 1993, pp 100-101 — Review of *The Berkeley UNIX Environment* by R. Nigel Horspool.

Useful, But Not Mandatory Book on Four Operating Systems
Gautam Barua, *IEEE Software*, September 1993, p 101 — Review of *Software Implementation Techniques, VMS, UNIX, OS/2 and DOS* by Donald E. Merusi.

Cross-Platform Shopping
John Rizzo, *MacUser*, September 1993, pp 239-240, 242, 244 — Cross-platform software.

The PowerPC: For Once a Non-Intel Chip Looks Like the Winner
John C. Dvorak, *PC/Computing*, September 1993, p 111.

Your Next Operating System?
Bill Machrone, *PC Magazine*, September 14, 1993, pp 87-88.

Inside Track
John C. Dvorak, *PC Magazine*, September 14, 1993, p 95 — IBM's future DOS 7 will compete with more advanced operating systems, possibly Sun's and NeXT's.

Inside
Joel Dreyfuss, *PC Magazine*, September 28, 1993, p 4 — Introduction to article on Windows NT.

Gates Promises Limited PowerPC Support
Software Magazine, September 1993, p 8 — Item in "Newsfront".

Hardware Firms Join To Build a Common UNIX
Software Magazine, September 1993, p 12 — Item in "Newsfront" reports Amdahl, ICL, and Fujitsu to cooperate on common UNIX environment.

Novell Creates UNIX Group
Software Magazine, September 1993, p 14 — Item in "Newsfront" reports Novell merges UNIX System Laboratories and Univel into UNIX Systems Group.

OpenVision Expands Storage Offerings
Software Magazine, September 1993, p 16 — Item in "Newsfront" reports OpenVision acquires Aria Suite from Control Data Systems.

Product Briefs
Software Magazine, September 1993, p 16 — Item in "Newsfront" reports Data General's new DG/UX version.

News in Brief
Software Magazine, September 1993, p 16 — Item in "Newsfront" reports XVT Software names William Perry as president.

Feds Seek Network Answer
Henry Heffernan, *Software Magazine*, September 1993, pp 26-27, 32 — OSI vs. Internet.

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Ray Noorda on NetWare vs. NT,
Frederic E. Davis, *Windows Sources*, September 1993, pp 111, 113 — Interview with Novell's CEO, Ray Noorda.◆

Eric S. Rosenthal *is an East Coast-based technical consultant.*

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Affiliate Groups

UniForum Affiliate Groups form the global backbone of UniForum, providing an international network of professionals dedicated to open systems education and adoption.

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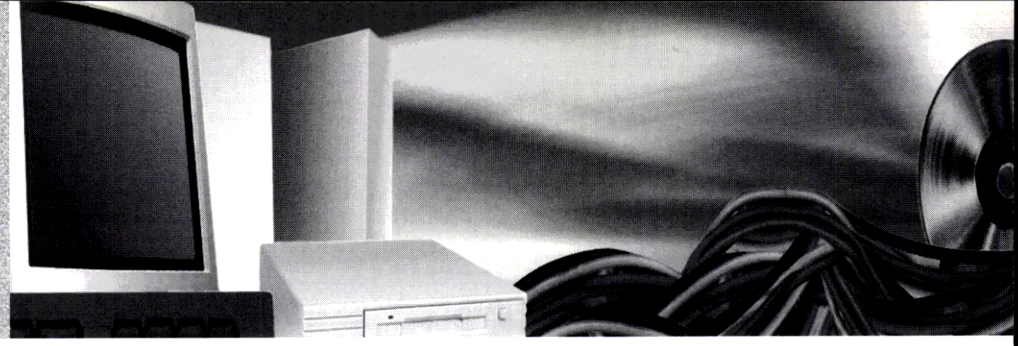
New Products

Latest Releases for Open Systems



SOFTWARE

Software Developers Kit

MainSoft Corp. has announced the commercial availability of its MainWin Software Developers Kit, a tool that enables software developers to rapidly and cost-effectively port Windows applications to UNIX-based workstations without rewriting code.

The MainWin technology enables developers to create multiple versions of an application in order to reach the Sun, HP, IBM and SGI workstations market from the same code base that supports Windows 3.1. Because it enables software developers to maintain the look and feel of the original Windows application, they do not have to modify software documentation and manuals. In addition, because MainWin does not alter the underlying code of the original application, developers can upgrade all versions — Windows and UNIX — simultaneously.

MainWin technology enables developers to port any application written in portable ANSI C or C++ for MS-Windows to UNIX systems, with only minor modifications. Initially, the MainWin technology supports AIX for IBM's RS/6000 computers; HP-UX for Hewlett-Packard's HP Apollo 9000 Series 700 workstations; Solaris 2.2 and SunOS 4.1 for Sun Microsystems' RISC platforms; and IRIX 5.1 for SGI workstations.

The tool requires minimal rewriting of code. In most cases, developers modify less than one-tenth of 1 percent of the original Windows application code during the initial porting process, mostly converting 16-bit dependencies to 32-bit dependencies. Once those changes are incorporated into the base Windows source code, future generations of the application can be quickly compiled to reach the UNIX market.

The MainWin Software Developers Kit is priced at $5,000 for the first copy and $2,000 for additional copies. The end-user environment, MainWin for Workstations, is priced at $195.

MainSoft Corp., 883 N. Shoreline Blvd. #C-100, Mountain View, CA 94043; (415) 966-0600 or (800) MAINWIN.

Data Analysis Tool

BBN Systems and Technologies has announced a significant enhancement of BBN/Probe, a highly optimized time-series data analysis tool for heterogeneous computing environments.

BBN/Probe software provides off-the-shelf, direct access to complicated and nonstandard data sources without reformatting, as well as an interactive environment for users to perform sophisticated analysis and graphics. It is especially well suited to telemetry, aircraft and missile flight testing, telecommunications network management, process control and complex simulation applications.

With release 3.1, BBN/Probe is able to interoperate across the most popular UNIX and OpenVMS operating systems. BBN/Probe's ability to interpret different data formats on widely varying computer architectures means that analysts using the software on a heterogeneous network can directly access and work with the same data files, data dictionaries and command files. BBN/Probe runs on Digital Equipment Corp.'s RISC/ULTRIX, VAX and Alpha OpenVMS; Sun Microsystems' SunOS 4.1 and Sun/Solaris 2.X; Hewlett-Packard's HP/UX; and Silicon Graphics' IRIX Version 4.0 platforms.

BBN/Probe release 3.1 was scheduled for availability in the fourth quarter of 1993. A wide variety of licensing options are available, starting at $13,000.

BBN Systems and Technologies, 10 Moulton St., Cambridge, MA 02138..

NetWare Integration

Pyramid Technology Corp. has announced the availability of Pyramid NetWare SMP, an enhanced version of Novell's NetWare for UNIX product that lets users integrate their Novell networks with high-performance, high-availability multiprocessor open systems from Pyramid, including the recently announced Nile Series.

Licensed from Novell Inc., Pyramid NetWare allows large organizations to unify their computing resources by creating a seamless interface between NetWare networks and Pyramid's UNIX-based enterprise computers. Since NetWare for UNIX is functionally identical to native NetWare, users can access information and services on a Pyramid system exactly as if they resided on a PC-based NetWare server. To accommodate the high throughput requirements of connecting large numbers of NetWare networks throughout an enterprise, Pyramid has added symmetric multiprocessor support to this version of NetWare for UNIX. Customers can add NetWare clients to a Pyramid-based symmetrical multiprocessing environment without diminishing performance.

NetWare for UNIX is a hardware- and processor-independent version of NetWare that runs as an application on the UNIX operating system. It includes support for all native NetWare clients, including DOS, Windows, Macintosh, OS/2 and UNIX desktop systems. Pricing ranges from $9,000 to $20,000 depending on the number of users.

Pyramid Technology Corp., 3860 N. First St., San Jose, CA 95134-1702; (408) 428-9000.

UNIX Access for Windows

I-Kinetics Inc. has introduced I-Bridge, a family of software products that allows Windows applications to directly access databases, programs and files on UNIX servers. The initial release of I-Bridge includes adapters for Excel, as well as Ingres, Oracle and Sybase SQL Server databases. The UNIX adapters are available immediately for Sun and HP platforms. A starter system, including a UNIX server module and two Windows client modules, is priced at $995. The list prices for the components total $3,100 if purchased separately. A limited use demonstration version is also available.

I-Bridge products put information directly into a Windows application, such as a spreadsheet, without the user having to manually locate, transfer or convert it. I-Bridge Windows clients communicate with different UNIX data sources, including different databases, through a single driver with automatic data conversion. I-Bridge helps an information systems staff provide wider access to enterprise data while protecting the operation of those critical resources.

I-Bridge gives Windows applications direct access to data in flat files, or direct output from UNIX programs without intermediate file storage. For example, I-Bridge gives the Excel client the power to run any UNIX program and pipe the results directly into the spreadsheet. This ability to integrate with any UNIX tool, utility or program makes possible support for commercial and proprietary applications.

I-Kinetics Inc., 19 Bishop Allen Drive, Cambridge, MA 02139; (617) 661-8181.

Cluster Information Service

Clam Associates has launched its first high-availability product for the commercial UNIX marketplace, CI Watch. CI Watch is a cluster information service program that extends high availability to the client side. It is the first product of its kind that notifies high-availability clients of a system failover and how it has affected their data and applications, thereby minimizing the impact of a system failure on the end user. It is particularly beneficial to commercial organizations processing real-time data and transactions in a client/server environment where end users need to maintain a connection to the database server. CI Watch can be installed on any 386 or 486 PC running MS-Windows 3.1 and connected to the IBM high available multiprocessing

(HACMP)/6000 server over token ring or Ethernet via TCP/IP.

High-availability solutions — consisting of stable RDBMS, on-line backup, distributed architecture, improved transaction management and fault-tolerant, fast-recovery mechanisms — have become requested improvements among commercial sites migrating from a mainframe or midrange system to a UNIX platform. Familiar with proprietary or fault-tolerant systems, these organizations are now seeking the same levels of fault-tolerant performance for their newly purchased UNIX platforms.

CI Watch is priced at $100 per license and site licenses for up to 100 clients are available for $5,000. If Clam is contracted to modify the client application and integrate CI Watch into existing applications, the charge will depend on the integration work required.

Clam Associates, 101 Main St., Cambridge, MA 02142; (617) 621-2542.

Electronic Image Management

Innovatech Corp. has introduced DocWorx, an open-architecture electronic image management software solution. The software provides complete features for the capture and input, storage and management, and retrieval and output of electronic images, as well as document routing. DocWorx has been in production release for the past 20 months and is currently installed at 25 sites with more than 1,000 concurrent users.

The DocWorx product is based on an open systems, client/server architecture, that scales from a stand-alone prototyping and development system up to departmental and enterprisewide imaging applications. The software runs on existing networks and computer platforms and permits almost any leading off-the-shelf hardware component to be seamlessly integrated into the system.

DocWorx is targeted at commercial and government markets in applications including litigation support; hazardous material safety and data sheet control; management of Public Utilities Commission documents, rates and tariffs; image management of shareholder accounts, operations records and check processing; engineering drawing processing and control; purchasing, requisitions and invoicing; and commercial high-volume scanning services.

At the heart of DocWorx is a data model based on leading RDBMSs such as Oracle, Gupta SQLBase, Ingres and Paradox. Ports to Sybase and Informix are in development. DocWorx runs in UNIX, DOS and Macintosh environments. It supports Ethernet and token ring network configurations, and also offers support for TCP/IP, Novell IPX, NFS and NetBios protocols.

Pricing starts at $5,000 for a single scalable development system including an Oracle RDBMS. Pricing for work groups of up to eight users starts at $1,500 per user. Pricing for enterprisewide applications of 20 or more users starts at $1,650 per user.

Innovatech Corp., 12770 High Bluff Drive #140, San Diego, CA 92130-2958; (619) 792-1940.

Client/Server Backup/Restore

Epoch Systems Inc. has announced a comprehensive client/server backup/restore solution that accommodates PC-based platforms, relational databases and UNIX file systems across an enterprise. This is the first phase in a series of announcements in which Epoch's client/server data management products will support all data formats and all client/server platforms. Specifically, Epoch announced:

- Epoch Enterprise Backup, a client/server backup system for PC LANs, stand-alone or networked UNIX workstations and servers, and mainframe storage subsystems.
- Support for PC local-area network client/server environments with Novell NetWare clients.
- Relational database backup integration strategy with support for Sybase, Oracle, Informix and Ingres.

Enterprise Backup addresses the problems encountered by corporations generating and managing large amounts of distributed data across client/server PC, UNIX and mainframe environments. Epoch's RDBMS backup strategy delivers the mission-critical backup and restore capabilities required by commercial UNIX users of relational databases, where most data in modern client/server computing environments is stored.

Enterprise backup was scheduled for availability beginning Nov. 30, 1993. for SunOS servers and all major UNIX client platforms at prices ranging from $2,200 for five nodes up to $50,000 for 500 nodes. Support for Novell NetWare clients was scheduled for Dec. 31 at prices ranging from $1,500 for five nodes to $40,000 for 500 nodes. Support for Sybase 4.X was scheduled for Dec. 31 and support for Oracle 7.X was expected by March. Pricing for database clients is $2,200 for five nodes to $50,000 for a 500-node license.

Epoch Systems Inc., 8 Technology Drive, Westborough, MA 01581; (415) 579-6620.

HARDWARE

Enhanced Network Servers

Auspex Systems Inc. has announced several enhancements to its NetServer product family, including 3.0-GB disk drives, an FDDI/CDDI interface board, and a new system software release that increases system availability and speeds rebooting and backup procedures.

With the new high-performance 3.0GB 5.25-inch disk drives, Auspex NetServers can support up to 180GB of disk storage, a 50 percent increase over the previous maximum capacity. The new drives store 50 percent more data while costing 36 percent less per gigabyte. Use of the new drives should also increase system availability, since the 3.0GB drive's actual in-the-field mean time between failures rating is expected to be 25 percent better than the previous 2.0GB drives. Priced at $5,990, the 3.0-GB drives are available immediately and are supported by Auspex NetServer Software release 1.5.1 or later

With the FDDI/CDDI Network Processor Interface, Auspex NetServers can connect directly to up to four Fiber Distributed Data Interfaces or four Copper Distributed Data Interface Networks. The FDDI interfaces, known as single attachment station ports, connect to FDDI concentrators, which can connect to an FDDI backbone, other computers with FDDI connections, or to bridges and routers used to reach Ethernet, token ring or remote networks.

The FDDI/CDDI Network Processor can be added to all existing NS 5000, NS 5500 and NS 6000 NetServers. It is priced at $29,900 and is available now.

Auspex Systems, 5200 Great America Parkway, Santa Clara, CA 95054; (408) 986-2000.

Sparc-based UNIX Systems

Mobius Computer Corp. has announced three new models in its Mirage Series of Sparc-based UNIX systems. The new systems are based on the Texas Instruments SuperSparc processor modules.

The new IPS/10 model 30 is based on the TI 36-MHz SuperSparc CPU module with 36K of built-in cache and delivers more than 100 MIPS of computing performance. The model 40 is based on the 40-MHz TI module and also has 38K of internal cache. The model 40 is about 10 percent faster than the model 30. The model 41 uses the 40-MHz TI SuperSparc with 1MB of SuperCache for improved performance in multiuser, multitasking applications. The SuperCache can improve overall system performance by as much as 35 percent in some applications Each model is delivered diskless or fully configured with up to two internal disk drives. Customers can select 545MB SCSI-2, 1.2GB or 2GB fast SCSI-2. Each system also includes a 16-inch flat screen monitor and 16MB main memory, expandable to 512MB on the system board. Solaris 1.1 or 2.2 is preloaded on the system and application packages are available from Mobius for preinstallation as well.

The Mirage IPS/10 model 30 starts at $8,985 for a diskless system with 16MB RAM and 17-inch flat screen monitor. The model 40 is priced at $9,895 and the IPS/10 model 41 starts at $10,985. All systems are available for immediate delivery.

Mobius Computer Corp., 5627 Stoneridge Drive, Bldg. 312, Pleasanton, CA 94588-8503; (510) 460-5252 or (800) MOBIUS-1.◆

Back Door

Mr. Blandings Wires His Dream House

The information technology industry, in its continuing efforts to become a sophisticated leader in the business community, has stumbled upon a wondrous concept that will permit it to establish itself as the benchmark against which other industries will be measured for innovation. This scheme – a poorly kept secret – is known by the title of *open systems*. While those of us in the industry know that open systems is the panacea to the computing problems of the world, there are certain users (also known as customers) who appear to not understand or appreciate the full benefits of the open systems concept. As a result, it is a public duty of this columnist to fully elucidate these benefits to the naive users, who may not have any experience with open systems as a selling concept.

To validate the concept, let us follow one Herbert Blandings, who is building his dream house. Mr. Blandings has completed the shell of his house and is now to begin the interior. He decides that he wants to have the electricity connected, so he calls the utility company – The Electric Supply Lighting Association (TESLA).

After being transferred to several departments, he is finally connected to the residence division.

"Herbert Blandings here. I'd like you to come out and connect the electricity at my new residence.

"Herbert Blandings...Herbert Blandings...Hmm. I'm sorry, we don't have a customer by that name on file.

"No – I'm a new customer. I'd like my electricity hooked up tomorrow. I'm building my dream house, and I need to have electricity tomorrow so that we can continue construction."

"I'm sorry, Herbert – you don't mind if I call you Herbert, do you? Well, you see, Herbert, we don't just sell electricity any more. We now have *open power*. It's something that we learned from the IT industry."

"Er – just what is open power?"

"Well, first of all, we determine what it is you really need..."

"I really need you to hook up electricity. NOW!"

"Nope, Herbert, not that easy anymore. First of all, do you know your electrical terms? Amp, ohm, watt, volt, joule, henry – that's a term we use, Herbert, not a name."

"What does this have to do with my getting electricity? All I want is for you to provide me with some power for my appliances."

"Well, before we can do that, you have to understand how complex power generation is. I'll schedule you for a four-week class, starting a week from yesterday, that explains these terms, and then we'll tell you all about how to generate electricity – with steam, solar, water turbine and photovoltaic. That's the generation scheme of the future, Herbert. Gotta learn about that one."

"But, all I wanted was a little electricity to run my appliances and light my lights. I don't see what the problem is..."

"You've got the wrong idea about electricity, Herbert, if I say so myself. Like a lot of users, you think of electricity in terms of what it can do for you. You should think about open power – that's how we have to think about it, you know. I mean, do you know how complex that grid is that connects TESLA to Edison? I'm sure you'll need to know that, too."

> *"Some customers will never be sophisticated enough to embrace the concepts of open systems. They will insist, instead, on having things done their way, because they have the right to decide what and where they should become experts."*

As the TESLA operator began to compile a list of mandatory courses, manuals, licenses and other things, the voice on the other end of the line became more and more excited.

"Yes, Herbert, I know that this is a shock to you. That's a pun. Get it? Shock? But really, how long do you think you can remain electric-illiterate? Why, I bet you still believe that old Ben Franklin chestnut. I mean, a kite in a storm?"

The salesperson continued to burble happily about things electric as Herbert Blandings became increasingly incoherent.

Finally, the salesperson stopped. "There you are, Herbert. I've gotten it down to a clean 500 Appliance Plug Ins (APIs) that you have to meet and know about. Once you know these, you'll be ready to have your house wired. Then you can start running your own appliances and interfaces."

"*Five hundred APIs*? What kind of moron designed the open power idea?

"Now, now, Herbert – don't go and reverse your polarity on us. Let me assure you that APIs are the latest thing in open power. Most companies subscribe to them. All except that huge utility up in Washington state. I mean, they get their power from the Olympia river for almost free, and they just think that users ought to be able to run whatever appliances they want."

Herbert Blandings grew very quiet. "Oh, you mean MegaSupply Normal Transmission? I saw some ads for that in my neighborhood."

"Well, Herbert, let me tell you, it's a good thing you called us. Can't trust MegaSupply – it's all new equipment and new design. And they don't know a thing about... Hello? Herbert, are you still there? Hello..."

Herbert Blandings' dream house was wired by MegaSupply last week. The MegaSupply contractors appeared and installed cable, wired the house, and left Herbert Blandings to plug in his own appliances. Sure, some things were a little silly – the 220 volt outlet for the dryer was in the attic, and the receptacles were three feet off the floor – but Herbert Blandings never did have to learn about 500 APIs to plug in his toaster or make his television work. And he could go on with his profession, which was designing and building kites.

The moral of the story is obvious – some customers will never be sophisticated enough to embrace the concepts of open systems. They will insist, instead, on having things done their way, because they have the right to decide what and where they should become experts.

Not only that — some people like the story of Ben Franklin and his kite.◆

Mervyn Buntner *is an opinionated open systems professional who still has no life.*

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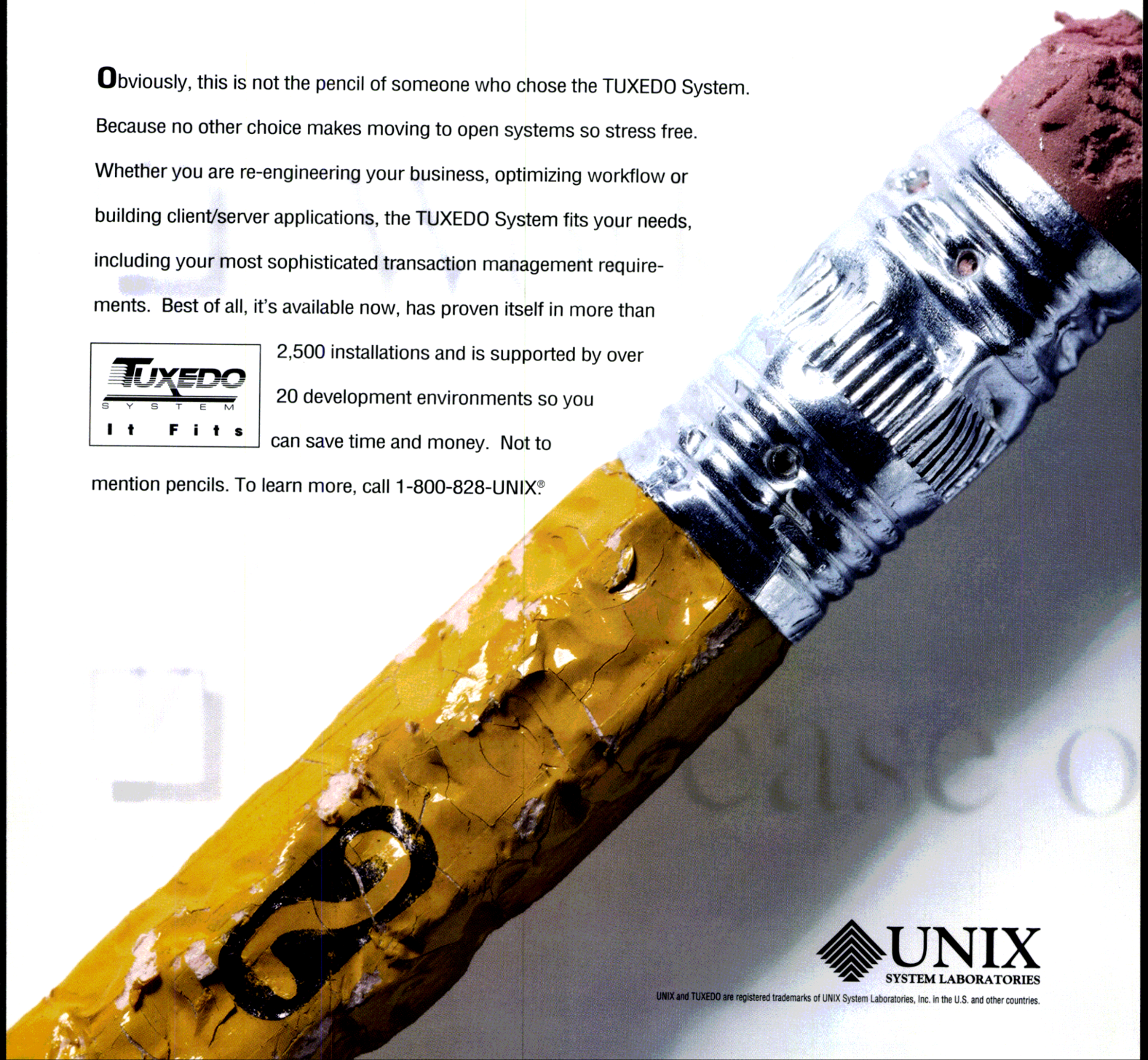

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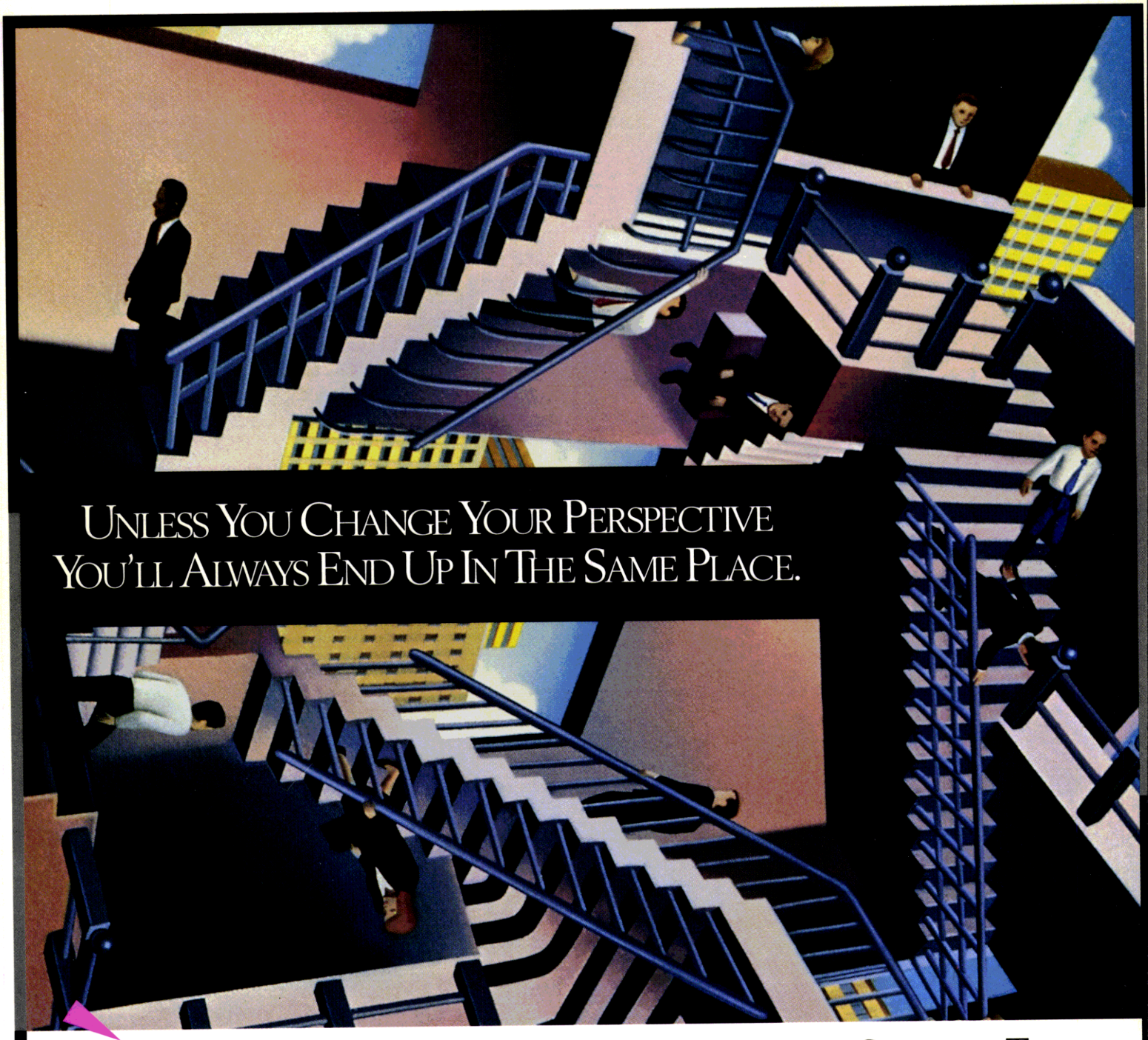

UNLESS YOU CHANGE YOUR PERSPECTIVE YOU'LL ALWAYS END UP IN THE SAME PLACE.

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A Complex Reality

Do you get the feeling lately that you're working longer and harder than ever, only to wind up in the same place? The reason is no mystery: your applications are larger and more complex; quality and time-to-market requirements are brutal; you have to port to multiple platforms, operating systems, databases, and user interfaces.

If you're like most project teams, you've gone as far as you can go with SCCS or RCS. Your developers are stepping all over each other. Changes to requirements, designs, and code aren't controlled or tracked. You can't recreate prior releases. Systems integration is a nightmare.

A Shift In Paradigm

Simply working harder is like trying to climb the stairs in this picture: it goes nowhere. If you are serious about improving the quality of your software, your productivity, and your time-to-market, you must control and improve your engineering process. This is not a new idea. It's what the experts at the Software Engineering Institute teach. It's what ISO-9000 requires. It's what successful teams do.

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